Abstracts

EUROANAESTHESIA 2020

The European Anaesthesiology Congress
European Journal of Anaesthesiology

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Papers should be submitted online at: www.editorialmanager.com/eja.

European Journal of Anaesthesiology (ISSN: 0265-0215) is published monthly by Wolters Kluwer Health, Inc. and distributed in the US by Mercury Airfreight International, Inc., 365 Blair Road, Avenel, NJ 07001. Periodicals postage paid at Rahway, NJ. POSTMASTER: send address changes to European Journal of Anaesthesiology, PO Box 1610, Hagerstown, MD 21740, USA.

All correspondence should be addressed to the Editorial Office: European Journal of Anaesthesiology, Lippincott Williams & Wilkins, Citi Building, 41st Floor, 25 Canada Square, London E14 5LQ, UK.

Publisher
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Production Editor
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DELIRIUM rs-fMRI

Conclusion: The preliminary results support our hypothesis on delirium genesis: the subcortical hyperconnectivity of PPN, LDT, VTA, and Substantia Nigra could induce functional alteration in the frontal lobes that involves the anterior component of different RSNs.

References:

5251

Does our use of marginal liver grafts for liver transplantation adversely affect our liver transplant recipients? A 5 year retrospective review comparing marginal versus non-marginal liver grafts in a large transplant centre in Melbourne

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Materials and Methods: Suitable orthotopic liver grafts for liver transplantation (LT) are a finite resource and are decreasing in quantity. Therefore, the use of ‘marginal’ liver grafts for LT has increased. Marginal liver grafts include those from older donors, steatotic donors, donors with prolonged ICU stays, and donors who have received any form of antihypertensive drugs (34.8% vs 14.3%; p=0.17). MCAV was higher (ex. at 15 min: 103.2; 95% CI: 96.3–110.1 vs 89.6; 95% CI: 82.6–96.5) (p=0.003), but SO2 did not differ between groups. Cardiac index and Norepinephrine plasma levels were similar in both groups. Incidence of coughing was significantly worse in the ETT group (15% vs 8%; p<0.03). CSF leakage was present in 3 patients (13%) in the ETT group and none in the LMA group.

Conclusion: Replacing the ETT with the LMA before neurosurgical patients emerge from anaesthesia results in a more favourable hemodynamic profile, less cerebral blood flow velocities and a lower incidence of cough. Incidence of CSF leakage suggest for a further study.

References:

4801

Proseal laryngeal mask attenuates haemodynamic response and coughing during awakening in Transesphenoidal Pituitary surgery: A randomized Clinical Trial

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Background and Goal of Study: The aim of this clinical trial was to compare systemic and cerebral hemodynamic variable and cough incidence during the emergence of pituitary surgery from general anaesthesia either according to standard procedure (ETT extubation) or after replacement of the ETT with an LMA.

Materials and Methods: Patients undergoing pituitary surgery under general anaesthesia were included in a randomized open-label parallel trial. Patients were randomized to awaken with the ETT in place or after its replacement with a ProSeal LMA (Bailey technique). We recorded mean arterial pressure (MAP) as the primary endpoint, heart rate, middle cerebral artery flow velocity (MCAv), regional cerebral oxygen saturation (rSO2) and hyperventilation index (HI).

Results and Discussion: Preliminary results showed mixed connectivity alterations in resting-state networks (RSN) (Figure 1). Cortical alterations were present in caudal dorsolateral prefrontal cortex (dLPFC) and anterior prefrontal cortex (aPFC) (Brodmann Areas (BA) 10 and 8, respectively), with reduced connectivity in Default Mode Network (DMN), Salience Network (SN) and Executive Control Network (ECN), while in mid dorsolateral PFC (mDLPFC) (BA 9) we found hyper-connectivity in SN and ECN. Subcortical alterations included: hyper-connectivity in Pedunculopontine Nucleus (PPN), Laterodorsal Tegmental Nucleus (LDT), Ventral Tegmental Area (VTA) and Substantia Nigra on the right, and hypoconnectivity in the left hippocampus and insula (bilaterally).

Conclusion: All patients, associated with unfavorable clinical outcomes; although nosologically and clinically well-characterized, its pathophysiology is still under investigation. In order to fill the gap in the literature about the pathophysiology of delirium, we investigated the alteration of brain resting-state network dysconnectivity [1] and its possible correlation with delirium.

Materials and Methods: We have enrolled 11 ICU patients with delirium diagnosed by CAM-ICU (2 consecutive positive evaluations performed by two different observers). The patients underwent functional resting-state fMRI (rsfMRI); the functional connectivity was assessed with Independent Component Analysis. Data were compared with rsfMRI of 11 healthy controls matched for sex and age.

Results and Discussion: Preliminary results showed mixed connectivity alterations in resting-state networks (RSN) (Figure 1). Cortical alterations were present in caudal dorsolateral prefrontal cortex (dLPFC) and anterior prefrontal cortex (aPFC) (Brodmann Areas (BA) 10 and 8, respectively), with reduced connectivity in Default Mode Network (DMN), Salience Network (SN) and Executive Control Network (ECN), while in mid dorsolateral PFC (mDLPFC) (BA 9) we found hyper-connectivity in SN and ECN. Subcortical alterations included: hyper-connectivity in Pedunculopontine Nucleus (PPN), Laterodorsal Tegmental Nucleus (LDT), Ventral Tegmental Area (VTA) and Substantia Nigra on the right, and hypoconnectivity in the left hippocampus and insula (bilaterally).

Conclusion: The preliminary results support our hypothesis on delirium genesis: the subcortical hyperconnectivity of PPN, LDT, VTA, and Substantia Nigra could induce functional alteration in the frontal lobes that involves the anterior component of different RSNs.

References:
2 groups pre-op (p=0.82).
Conclusion: Despite 75% of our liver grafts coming from marginal donors, it does not seem to have a negative impact on the outcome of the LT or the recipient, despite the difference in AST. This could lead to greater enthusiasm using marginal organs, given their now proven safety profile, reducing waiting lists times and mortality on the LT waiting list.

5995
Lidocaine increases the inhibitory effect of ex vivo lung perfusion on the inflammatory response in lungs obtained from asystole donors
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Background and Goal of Study: The shortage of donors is the most important limiting factor for the clinical application of lung transplantation. Ex vivo lung perfusion (EVLP) is a known method to promote lung recovery. However, it results could be even better if modulatory treatments of lung injury secondary to ischemia-reperfusion (IRI) were applied. Regarding to novel therapies that modulate lung injury, growing interest has been aroused for the anti-inflammatory and cytoprotective properties of local anesthetics such as lidocaine (LIDO). The objective of this study was to investigate a possible role of EVLP in the viability of transplanted lungs derived from asystole donors and its possible modulation by lidocaine addition.

Materials and Methods: The surgical procedure consisted on a left lung transplantation model: 1- Hypoxic cardiac arrest is induced in donor pigs and lungs harvested; 2- After 60 min of warm ischemia, left lung was stored in cold preservation solution for 3 hours; 3- Left lung was evaluated and reconditioned ex vivo in a lung perfusion machine for 3h (with different protocols); 4- Left pneumonectomy was performed in the recipient pig followed by transplantation of the donor lung; 5- Assessment of lung function during 3 hours after reperfusion; 6- Lung biopsies were performed and pigs were euthanized. Animals were divided into 3 groups: 1- EVLP: ex vivo lung reconditioning with O2/air ventilation and perfusion with Steen solution; 2- (LIDO): ex vivo lung reconditioning with lidocaine perfusion with Steen solution; 3 (CONTROL): same procedure without ex vivo lung reconditioning. mRNA expression of pro-inflammatory cytokines and apoptotic markers were determined by RT-PCR.

Results and Discussion: Ischemia-reperfusion increased mRNA expression of the pro-inflammatory cytokines (TNFα, IL1β, IL6, IL8 and IL12) and apoptotic (caspase 3, AIF) markers. mRNA expression of all inflammatory and apoptotic markers decreased significantly (p<0.01) in the EVLP Group relative to the Group without EVLP. The effect of EVLP was enhanced by LIDO (p<0.001).
Conclusion: EVLP may allow recovery of lungs obtained from asystole donors, considered non-viable, turning them into valid candidates for transplantation. This beneficial effect of EVLP may be enhanced by the addition of lidocaine.

5824
The minimum effective volume (MEV90) of ropivacaine for ultrasound-guided caudal block in anorectal surgery
Anaesthetics local

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Background and Goal of Study: Caudal epidural block (CB) provides reliable anesthesia and analgesia of lumbosacral nerve roots, which has been widely used in adult anorectal surgery. Despite the widely utilization, the minimum effective volume (MEV90) of ropivacaine for CB remains unknown, which is of the essence for determination of unnecessary administration of potentially toxic doses. Moreover, the volume of caudal block might show a gender difference because of the anatomical structure difference in gender. Hence, the present study was designed to explore MEV90 of 0.5% ropivacaine for ultrasound (US)-guided CB in male and female adult subjected to anorectal surgery.
Materials and Methods: A minimum of 45 patients scheduled for anorectal surgery were included in each gender group. All the patients received US-guided CB using ropivacaine 0.5%. The study was based on a biased coin design (BCD) up-and-down method (UDM) (BCD-UDM), where the volume of ropivacaine administered to each patient depended on the response of the previous one. The first participant received 10ml. In case of failure, the ropivacaine volume was increased by 2ml in the next subject. If the previous patient had a successful block, the next subject was randomized to a lower volume (with a decrement of 2ml), with a probability of 0.11, or the same volume, with a probability of 0.89. Success was determined at 5-minute intervals for 20 minutes after the administration of the local anesthetic by pinprick testing of the perineal area and the presence of a lax anal sphincter.
Results and Discussion: In this double-blind, prospective study, a total of 98 ASA physical status I-II patients (50 male and 48 female) were included, and none of them had severe complications. The MEV90 of ropivacaine for CB were estimated to be 11.8ml (95% CI 10.3-13.5ml) for female and 12.9ml (95% CI 11.3-14.7ml) for male, respectively, and no significant difference of MEV90 was presented between male and female patients. By extrapolation to minimum effective volume in 99%of subjects (MEV99) and pooled adjacent violators algorithm (PAVA) adjusted responses, it would be optimal to choose ropivacaine 14.0ml for all patients.
Conclusion: We concluded that US-guided CB using 0.5% w/v ropivacaine 14 ml can provide successful block in 99% of middle-aged adults subjected to anorectal surgery.
Development and Validation of a Score for Prediction of Adverse Discharge in Elderly Patients after Lower Extremity Surgery (ADELES)

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Background and Goal of Study: Adverse discharge - death in hospital or discharge to a skilled nursing facility - is frequent [1] and devastating [2] in elderly patients undergoing lower extremity surgery. Predicting individual patient risk allows initiation of preventive measures and allocation of critical resources. We developed and validated a prediction score for adverse discharge disposition in a high-risk cohort of elderly patients after lower extremity surgery (ADELES).

Materials and Methods: This was a retrospective, multi-center cohort study in two academic hospital networks in New England, USA using hospital registry data. 20,172 patient cases >60 years previously living at home and undergoing lower extremity surgery were included. We tested preoperatively available candidate predictors for their predictive value for adverse discharge disposition using a stepwise backward elimination process and developed a score from significant predictors (threshold p<0.10).

Results and Discussion: 7,544 patients (37.4%) experienced adverse discharge. The final score comprised 20 variables depicting socioeconomic characteristics, surgical management and frailty-related factors (Figure 1). Achievable score values ranged from 0 to 56. Assessment of C-statistics showed an area under the receiver operating characteristic curve of 0.85 [95% CI 0.84-0.85] (Brier score 0.16) in the development and 0.72 [0.71-0.73] (Brier score 0.20) in the independent validation cohort, confirming good predictive performance. Decision curve analysis confirmed a positive net benefit of up to 84% and 57% risk threshold in the development and validation cohort, respectively.

Socioeconomic variables

- African-American ethnicity
- Female
- Non-married

Surgical variables

- Leg or ankle surgery
- Previous lower extremity surgery
- Pseudoaneurysm
- Fracture management

Frailty-related variables

- Age ≥ 80 years
- ASA physical status ≥ III
- BMI ≥ 30 kg/m²
- COPD
- Congestive heart failure
- Depression
- Dialysis

Prevalence of adverse discharge

Conclusion: These results showed that dexmedetomidine provided lower preoperative anxiety scores than midazolam with less emergence agitation. Sedation and mask acceptance were comparable in the two groups. There was no significant difference in terms of adverse effects in both groups.

References:

5332

The effect of Plethysmographic Variability Index Monitoring on volume replacement in geriatric patients

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1Marmara University Pendik Training and Research Hospital - Istanbul (Turkey), 2Marmara University Pendik Training and Research Hospital - Istanbul (Turkey)

Background and Goal of Study: It is not always possible to determine organ function reserves in geriatric surgical patients. Therefore, in this age group, intraoperative administration of the ideal amount of intravenous fluids and/or blood products is extremely important in order to prevent potential organ damages. The aim of this study is to determine the effect of Pleth Variability Index (PVI) monitoring on the intraoperative volume replacement in geriatric patients undergoing surgery.

Materials and Methods: Following Ethics Committee approval and the obtaining of written informed consents, hundred patients over the age of 65 years, ASA class 2-3, undergoing elective surgery were enrolled into the study. In addition to standard monitoring, PVI monitoring was performed in all patients. After randomization with the sealed envelope method, fluid resuscitation was performed based on PVI data (threshold value being 13%) in Group P (n=50). In the control group (Group C, n=50), anesthesiologists were blinded to the PVI values; fluids being administered based on the hemodynamic parameters. Heart rates, arterial blood pressures, the amount of the administered fluids and blood products, vasopressor agent requirements were recorded with 15-min intervals.

Results and Discussion: Compared to group PVI, PVI values were significantly higher in group C at all time intervals, intraoperatively (p <0.01). There were no significant differences between groups in terms of blood loss, blood transfusion and fluid administration, as well as in terms of mean arterial pressure values. Heart rate was significantly higher in group C after 15 min (p <0.05). The number of patients receiving vasopressor agent was statistically higher in group C (p <0.001).

Conclusion: PVI monitoring in geriatric surgical patients may ensure optimal intravascular volume replacement and the administration of unnecessary vasopressor agents may be prevented.

5259

Intraoperative monitoring of Stroke volume variation versus central venous pressure during liver resection among cirrhotics. A randomized controlled trial

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Background and Goal of Study: Non-invasive monitoring can improve safety during liver resection. Primary goal is to investigate the inter-relationship and agreement of stroke volume variation (SVV) (%) and invasive central venous pressure (CVP) (mmHg) during surgery and secondary the fluid volume intake as guided by each.

Patients and Methods: Ethics committee approval. 44 Cirrhotic adults (Child A, 2 excluded). 42 randomized into: SVV (n=21) of Electric Cardiometery (EC, Osypka Germany) and continuous CVP (n=21) groups (gp). SVV (%), CVP (mmHg), Invasive blood pressure (IBP) (mmHg) recorded at 10 min post-anaesthesia induction (T0), during dissection (T1), following resection. (T2), Surgery end prior to relaxant reversal. (T3). Before and during dissection 0-4 ml/kg/h crystalloids were infused to keep invasive blood pressure (IBP) (>60 mmHg). Blood units if Hb < 8 g/dl. Maintained IBP (>60 mmHg). Blood units if Hb < 8 g/dl.

Results: Median (IQR) for SVV vs. CVP respectively. Age 58[55-63] vs. 56 [52-59] y, males: 15/21 (71.4%) vs. 18/21 (85.7%), p=0.452, BMI 26.1[24.2-27.7] vs. 22.95[23.3-29.3] kg/m², p=0.87. A negligible correlation existed between SVV and CVP (n=252), r=0.102. p=0.03 with a poor degree of reliability between their paired readings (n=252) [Intra-class correlation (ICC) = 0.172 [95% CI -0.061-0.354], P =0.06. Crystalloids 3000 [2580-3100] ml vs. 3000 [3000-3500], p=0.26 and albumin 5% p=0.81. Blood for only 5/21 patients (23.81%) in SVV gp 100[1000-1000] ml vs.
Conclusion: Our data show there is no internal validity to the concept of a ‘definitive’ pulmonary alveolar deadspace, which is much greater for less soluble anaesthetic gases than for CO2. This discrepancy is predicted by models using physiologically realistic distributions of V/Q ratios.

References:

4316

Smartphone-based optical blood pressure monitoring in the acute care setting: Accuracy compared to invasive blood pressure measurement

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Background and Goal of Study: Arterial pressure (AP) monitoring is mandatory in the acute care setting. Technological improvements are opening new paths beyond oscilometric or invasive solutions. Smartphones may play a role, providing access to simplified and accurate monitoring beyond the operating room, thus impacting the management of hypertensive diseases. The main goal of this study was to assess the performance of a smartphone-based optical AP measurement to estimate and track changes of AP compared to invasive measurements.

Materials and Methods: Study population consisted of 120 patients aged >17 years, scheduled for an elective surgery requiring general anesthesia and invasive AP monitoring at the Lausanne and Geneva University Hospitals. Blood pressure values were acquired simultaneously through a radial arterial catheter and a smartphone camera positioned at the patient’s finger. Signals were recorded during induction of general anesthesia and compared offline by a dedicated pulse wave analysis algorithm (uBPMS) designed to estimate AP values on optical signals following an initial 1-point calibration procedure.

Results and Discussion: We provide the preliminary results from the first 100 patients for systolic (SAP), diastolic (DAP) and mean AP (MAP) (Figure 1). We observe strong coherence of our estimations with a concordance rate (CR) over 90% (CRSAP = 92.0%, CRDAP = 91.5%, CRMAP = 91.7%). Pearson’s correlation reflects a good trending ability with coefficients over 0.80 (P < 0.001) (SAP: 0.83, DAP: 0.88, MAP: 0.80).

Conclusion: This study demonstrates the potential for accurate estimation of AP through a smartphone-acquired optical signal in adults undergoing induction of general anesthesia. These preliminary results compared to invasive measurements could lead the way for mobile devices to leverage the monitoring AP in the near future. Such results may impact health assessment capabilities in developed and third world countries with devices widely available.
We collected 24 patients in whom TEE was used as a monitoring system, performed by anesthesiologists with regular training. Before beginning of surgery, a complete TEE scan was performed. During each stage of the surgery, an assessment of cardiac filling volumes and contractility, were obtained beginning of surgery, a complete TEE scan was performed. During each stage of the liver transplantation.

Materials and Methods: We collected 24 patients in whom TEE was used as a monitoring system, performed by anesthesiologists with regular training. Before beginning of surgery, a complete TEE scan was performed. During each stage of the surgery, an assessment of cardiac filling volumes and contractility, were obtained beginning of surgery, a complete TEE scan was performed. During each stage of the liver transplantation.

Results and Discussion: In 6 patients, cardiac monitoring was not possible in the TG SAX view due to subsequent retraction of the stomach produced by surgical separators. And, in 2 patients, surgeons were bothered by the presence of the probe in a deep TG view. The main findings are shown in Table 1.

According to the previous literature, the TEE has a low complication rate. The hemodynamic instability after graft reperfusion could be justified by the common phenomenon of pulmonary embolism; so, is a priority to perform a proper washing of the liver graft before reperfusion, to decrease air embolism, and avoid hemodynamic disturbance.

Conclusion: In summary, the benefits of using TEE in LT outweigh the risks of potential complications. Monitoring with TEE guides us in the diagnosis, treatment and clinical decision-making in LT surgery.


5323

Transcutaneous carbon dioxide monitoring during apnoeic oxygenation: not always correct

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Background and Goal of Study: High-flow nasal cannula (HFNC) oxygenation gained substantial importance during the last years and is increasingly used during deep sedation or general anaesthesia. As end tidal carbon dioxide (CO2) measurement during HFNC-oxygenation is not feasible, continuous transcutaneous CO2 (ptcCO2) monitoring might be used to prevent hypercapnia. This study tests if ptcCO2 is as accurate as paCO2 measured by arterial blood gas samples (ABG) in apnoeic oxygenated patients under general anaesthesia.

Materials and Methods: With ethic committee approval and written informed consent, we included 98 patients under general anaesthesia for elective surgeries in an apnoeic oxygenation study [1]. We collected simultaneous pairs of ptcCO2 and ABG measurements every 2 minutes during apnoeic oxygenation. A TCM 5 with a "tc sensor 84" (Radiometer, Copenhagen, Denmark), placed in the subclavicular area according to manufacturer’s recommendation, measured ptcCO2 and ptCO2. ABG was analysed by a Radiometer ABL800 flex blood gas analyser. Agreement between both CO2 measurements was analysed by the Bland-Altman method.

Results and Discussion: We compared 914 pairs of ABG and transcutaneous CO2 measurements. While in linear regression analysis they correlated significantly (R2 = 0.79, p<0.001), Bland-Altman analysis revealed a statistically significant bias of -20.8 ± 6.6 (mean ± SD) mmHg. 95% limits of agreement were -33.7 mmHg and -7.8 mmHg.

Conclusion: One of the factors for the limited accuracy might be the type of the sensors. The O2-electrode probably influences ptcCO2 measurements during apnoeic HFNC-oxygenation: not always correct

Table1. Number of patients with TEE during each stage of liver surgery.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Direct</th>
<th>Indirect</th>
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<th>Postoperative</th>
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paCO2 = partial pressure of CO2; ptcCO2 = transcutaneous CO2; Bland-Altman analysis revealed a statistically significant bias of -20.8 ± 6.6 (mean ± SD) mmHg. 95% limits of agreement were -33.7 mmHg and -7.8 mmHg.

Fig 1 Bland-Altman-analysis: difference between ptcCO2 and paCO2 versus the mean of the paired measurements
The influence of bispectral index monitoring on the frequency of hemodynamic incidents during anesthesia

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Background and Goal of Study: Maintenance of anesthesia by inhalation agents is most often performed under the control of expiratory gas analysis (ETAG). In this case, anesthetists are guided by the minimum alveolar concentration of the anesthetic. However, this value is very arbitrary and can lead to insufficient depth of anesthesia, which in patients with impaired reflex regulation can lead to hemodynamic instability. Estimation of the depth of sedation using the bispectral index (BIS) may possibly prevent these abnormalities. The aim of the study was to compare the frequency of hemodynamic critical incidents in patients with impaired reflex regulation of the cardiorespiratory system during ETAG-guided BIS-guided anesthesia.

Materials and Methods: The study included 150 patients who underwent elective major abdominal surgery with impaired reflex regulation of the cardiorespiratory system (breath-holding duration less than 34 sec) [1]. Patients were randomized into two subgroups: in the first, anesthesia was performed on the basis of end-tidal anesthetic control and hemodynamic parameters, in the other, by control of the bispectral index with a target value of 40–60.

Results and Discussion: Analysis of the frequency of critical incidents showed a decrease in the incidence of intraoperative hypotension in the group of patients with anesthesia controlled by the level of the bispectral index (21% versus 34% in the ETAG group, p <0.05). No significant differences in the frequency of other incidents (arrhythmias, arterial hypertension, bradycardia) were noted. The level of maximum end-tidal concentration of inhaled anesthetic was statistically significantly lower in the group of patients during anesthesia under the control of the bispectral index. The level of maximum concentration of inhalation anesthetic of the anesthetic was statistically significantly lower in the group of patients during anesthesia under the control of the bispectral index: 0.83 ± 0.12 versus 1.14 ± 0.17 after the first hour of anesthesia, 0.82 ± 0.13 versus 1.12 ± 0.23 after the second hour of anesthesia and 0.86 ± 0.14 versus 1.12 ± 0.20 after the third hour of anesthesia (all p <0.05).

Conclusion: The use of a bispectral index to control the depth of sedation in patients with a high risk of hemodynamic disturbances can reduce the incidence of hypotension.

References:

Noninvasive continuous cardiac output monitoring in patients undergoing spinal surgical procedures in prone position

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Background and Goal of Study: Patients undergoing spinal surgery frequently suffer from a lack of available data about the heart rate, systolic blood pressure, and oxygen saturation. The use of noninvasive continuous cardiac output monitoring enabled to identify mechanism of hemodynamic deterioration and significantly modified intraoperative fluid management.

Results and Discussion: The PTC data of 1732 points of the PTC data were obtained and analyzed. Regression analysis revealed no statistically significant difference in PTCs between two monitors (PTC measured by AF-201P = 0.49·PTC measured by TOF Watch SX® + 0.93, R2=0.31). Bland–Altman analysis also showed acceptable ranges of bias [95% CI] and limits of agreement (0.34 [0.23 to 0.46] and – 4.56 to 5.25) for the PTCs. However, it should be paid attention to the possibility that the difference in PTCs between two monitors may increase as the TOF value increases.

Conclusions: The results of our study demonstrated that a new EMG device, is reliable for evaluating deep rocuronium-induced deep neuromuscular block and similar to TOF Watch SX® that is commonly used in clinical anesthesia.
5414
Changes in mean systemic filling pressure as an estimate of hemodynamic response to anesthesia induction with propofol
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Background and Goal of Study: Mean systemic filling pressure (MSFP) minus the central venous pressure (CVP) is the driving force of the venous system. This pressure gradient between the venous system and the right atrium, is only a few cmH2O, so a small change in the gradient can cause a significant hemodynamic deterioration. (1) MSFP has a significant effect on the venous return, and therefore on the cardiac output. It is known that the use of hypnotic substances during anesthesia induction can cause hemodynamic instability, however, the mechanism responsible for the effect is not fully known. Our objective was to measure Propofol bolus effect during anesthesia induction on different components of the venous and arterial system and on the hemodynamic state of the patient.

Materials and Methods: We collected data from patients undergoing a major surgery requiring hemodynamic monitoring. Hemodynamic measurements (including MSFP, CVP, heart rate, mean arterial pressure, cardiac output, systemic vascular resistance and venous return) were performed before, during and after induction of anesthesia using the p arm method.(2)

Results and Discussion: We examined the results of 15 patients. All patients have showed a decrease in their MSFP after induction with Propofol (pre-induction 25.3±6.2 mmHg, post-induction 18.3±5.7 mmHg). The pressure gradient of the venous return was reduced since the CVP showed only a small change (pre-induction 6.8±5.6 mmHg, post-induction 6.4±5.4 mmHg).

Conclusion: These results support our primary hypothesis that propofol induced hypotension is mediated mainly through a decrease in preload, caused by the change in the vasomotor venous tone and MSFP. These results suggest that a better management of hemodynamic deterioration during induction of anesthesia should focus mainly on the venous system components.


5646
Opioid sensitivity index estimated by vascular stiffness is highly correlated with blood pressure changes after skin incision
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Background and Goal of Study: Our research group previously introduced a vascular stiffness index «K», by fitting a Lissajous curve between plethysmography (PLS) and invasive arterial pressure waveforms with a mechanical impedance model [1]. The rate of change of K for invasive stimulation demonstrated a rough inverse correlation with opioid dose; however, the degree of correlation considerably varied among individuals [2]. We confirmed that the threshold of stimulus intensity at which K changes based on opioid use, called minimal evoking current of K (MECK), is among individuals [2]. We confirmed that the threshold of stimulus intensity at which K changes based on opioid use, called minimal evoking current of K (MECK), is a more accurate index of opioid sensitivity than the rate of change of K. Here, we compared the correlation between blood pressure fluctuation after skin incision under opioid administration and MECs to demonstrate the superiority of MECK as an opioid sensitivity index.

Materials and Methods: Following IRB approval, we recruited patients aged ≥20 years scheduled for laparotomy. After anaesthetisation, remifentanil was administered at a rate to ensure an effect-site concentration of pharmacokinetic simulation of 2 ng/mL. Consequently, 50 Hz of tetanus stimulation (10~80 mA) was applied to the patients’ forearm for 5 s. Lowest current to introduce changes in each parameter was defined as the MEC of each parameter. Correlations between each MEC of K, HR, of systolic blood pressure (sBP), and of PLS, and the rate of change in sBP after skin incision was compared, respectively. Statistical analysis was performed by Pearson’s correlation analysis (p<0.05).

Results and Discussion: We included 30 patients (15 men, 15 women, age=64.5 ± 17.3 years). In this study, MECK, MECHR, MECBp, and MECPLS were 49.7±22.8 mA, 60.7±23.6 mA, 43.3±19.4 mA, and 45.7±23.1 mA, respectively. The sBP was 78 ± 14 mmHg and 91±17 mmHg, before and after skin incision, respectively. The correlation coefficient of MECK and the rate of change of sBP after skin incision was 0.62, 0.35, 0.49, and 0.35 (p=0.0002, 0.06, 0.006, and 0.06) for K, HR, sBP, and PLS, respectively.

Conclusion: Compared with other MECs, MECK was highly correlated with an increased rate of blood pressure due to a skin incision, indicating that arterial stiffness index «K», proposed by us, was a superior index to evaluate opioid sensitivity.


5725
Comparison between phase lag entropy and bispectral index using population pharmacodynamic analysis during target controlled infusion of propofol
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Background and Goal of Study: Monitoring the depth of anaesthesia with processed electroencephalogram (EEG) monitors has become a routine practice during general anaesthesia. However, several limitations of those monitors have been discovered. PLE (Phase Lag Entropy) is a recently developed EEG-based anaesthetic depth measurement algorithm. In contrast to the classical methods, PLE additionally calculates diversity of the temporal dynamics of functional connectivity. We performed pharmacodynamic analysis to compare the performance of PLE to the bispectral index (BIS).

Materials and Methods: After obtaining written informed consent, we observed 18 adult patients scheduled for elective surgery under general anaesthesia. A PLE sensor and a BIS sensor were attached to a patient’s forehead together before anaesthesia. For induction of anaesthesia, propofol was administered with target-controlled infusion using the Schindel model for propofol. The effect-site concentration (Ce) of propofol was increased to 2, 3, 4 and 5 μg/mL with an interval of 4 minutes, and Ce was decreased again to 3 μg/mL. The values of Ce, PLE and BIS were recorded simultaneously by each device, and the data were transferred to a computer after surgery. The pharmacodynamic parameters for PLE and BIS were estimated by NONMÉM VII (Icon Development Solutions) by minimizing log likelihood. The relationship between Ce of propofol and PLE/BIS value was analyzed using sigmoid Emax model. Individual idiosyncratic variability was modeled using an additive error model.

Results and Discussion: A significant (P < 0.001) correlation between PLE and BIS was found (2 =0.837, Pearson correlation coefficient). Pharmacodynamic modeling resulted in estimated E0 values equal to 85.9 (relative standard error [RSE] 0.9%) for PLE and 91.9 (RSE 0.97%) for BIS. Emax parameters were estimated to be 3.69 μg/mL (RSE 3.75%) for PLE and 2.73 μg/mL (RSE 3.77%) for BIS. Ce50 parameters were estimated to be 2.69 μg/mL (RSE 3.75%) for PLE and 37.7 (RSE 7.5%) for BIS. Gamma parameters were estimated to be 6.79 (RSE 14.4%) for PLE and 8.20 (RSE 17.8%) for BIS.

Conclusion: Population pharmacodynamic models using sigmoid Emax model adequately described the responses of BIS and PLE to Ce of propofol. The overall performance of PLE and BIS during propofol anaesthesia seemed to be similar despite major differences in their algorithms.

5738
Acceleromyographic monitoring at the trapezius muscle requires higher dose of rocuronium for maintaining moderate neuromuscular blockade, thereby providing better surgical conditions compared to the monitoring at the adductor pollicis muscle: a prospective randomised controlled trial
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Background and Goal of Study: The adductor pollicis muscle is most commonly used to assess degree of neuromuscular blockade (NMB) during general anaesthesia. However, positioning for surgery can disturb access to the patient’s hand, thereby compromising the acceleromyographic response at the adductor pollicis muscle. Therefore, we aimed to investigate feasibility and characteristics of acceleromyographic monitoring at the trapezius muscle using stimulation of the accessory nerve by assessing operating conditions and total dose of rocuronium.
administered for providing moderate NMB during lumbar spine surgery in which NMB monitoring could be compromised by the prone position.

Materials and Methods: Fifty adult patients with ASA class 1–2 undergoing elective lumbar spine surgery were randomised to maintain train-of-four count 1–3 using accelerometry applied in the adductor pollicis muscle (group A:n=25), or the trapezius muscle (group T:n=25). Total rocuronium dose administered during surgery, time to maximum block for an intubating dose of rocuronium 0.5mg kg\(^{-1}\), intubating conditions, lumbar retractor pressure, degree of lumbar muscle tone (good/moderate/hard), and overall surgical satisfaction score (1–10) were compared. Pain score and rescue opioid consumption in postanaesthesia care unit (PACU) and postoperative patient-controlled analgesia (PCA) consumption were also measured. A P value<0.05 was considered statistically significant.

Results and Discussion: Total rocuronium dose administered during surgery was significantly higher in group T than in group A. Lumbar retractor pressure and degree of lumbar muscle tone in group T were significantly lower than those in group A. Overall surgical satisfaction score in group T was superior to that in group A. The time to maximum block for an intubating dose of rocuronium was significantly shorter in group T than in group A. However, intubating conditions, pain score and rescue opioid consumption in PACU, and postoperative PCA consumption were not different between the two groups. It could be said that the deeper NMB due to higher dose of total rocuronium in group T enabled to make the better surgical environments.

Conclusion: Acceleromyographic monitoring at the trapezius muscle required higher dose of rocuronium for maintaining moderate NMB, thereby providing better surgical conditions compared to the monitoring at the adductor pollicis muscle during lumbar spine surgery under general anaesthesia.

5866

Does thumb preload and arm stabilization affect NMT measurements with electromyography? A pilot study

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Background and Goal of Study: An accurate monitoring of neuromuscular transmission (NMT) is necessary to ensure optimal intraoperative neuromuscular blockade and avoid residual paralysis. When monitoring NMT with electromyography (EMG) the most common nerve–muscle unit used is the ulnar nerve–adductor pollicis muscle. It is commonly assumed that hand position does not affect EMG measurements. In other methods such as mechanomyography (MMG) and acceleromyography (AMG) it is well known that a preload or stretch is required to guarantee NMT reliable measures. Our study is aimed at identifying any changes in EMG monitoring when applying a preload or stretch on thumb.

Materials and Methods: Two GE monitors were used for EMG NMT monitoring over the ulnar nerve-adductor pollicis muscle. Measurements within two group (20 patients, N=40 total: ASA I-III) were analyzed. Group A had monitoring both arms with standard EMG setup. On Group B both hands had standard EMG setup but on left hand a thumb preload and arm stabilization was applied using a splint. Measurements were programmed bilaterally and independently every 20 seconds using a 70mA current, and were automatically recorded. TOF ratios (TOFR) were compared between hands with Bland Altman for statistical significance.

Results and Discussion: After the automatically recording of data, 400 pairs of measurements were randomly selected (20 pairs per patient) during induction and after recovery. Group A showed a statistically significant difference between both hands with a mean difference of -0.02 (0.11 to -0.15 95%CI). Mean difference on Group B was -0.15 (0.08 to -0.38 95%CI). Differences up to 30% of TOFR were observed during recovery phase. Analysis showed a tendency for faster changes in TOFR values in time on the splint arm that was congruent with subsequent changes on the arm with free movement.

Conclusions: Preload has been advocated as a measure of stimulus of NMT signal during quantitative monitoring by the Stockholm group, classically applied only to MMG and AMG. When analysing our EMG measurements, significant differences appear applying a thumb preload compared to the conventional setup. This prior results make us deliver if the EMG should incorporate as standard a thumb preload and an arm stabilization in order to obtain reliable NMT results. Further studies focusing on EMG with preload are needed before any definite conclusion can be given on its practical implications.

6056

Effect of ACEI on cardiopulmonary bypass mean blood pressure and blood lactic acid level of hypertension atients receiving CABB

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Background and Goal of Study: Debate has arisen on the omission of angiotensin-converting enzyme inhibitor(ACEI) type antihypertension drugs on operation day morning. Several Randomized Controlled Trials have shown that continue preoperative ACEI treatment increased the risk of hypotension, postoperative myocardial infarction and postoperative renal dysfunction on coronary artery bypass graft(CABG) patients. But the effect of ACEI compared with other antihypertension drugs or no drugs on the CPB Blood Pressure and Blood Lactic Acid(Lac) level of hypertension patients receiving CABG surgery is unknow.

Materials and Methods: We retrospectively collected 466 hypertension patients receiving isolated CABG surgery in Fuwai Hospital which were separating into 2 groups, ACEI group and no ACEI group(n=106 and 350). Statistical analysis was done by student t test, Chi square analysis, simple Linear Regression and Multiple Linear Regression with SPSS.

Results and Discussion: There’s no significant difference between ACEI and no ACEI group on CPB mean Blood Pressure (60.09±8.83±60.75±1.17, p=0.799), level of Lac (1.3±0.53±1.24±0.45, p=0.277), intraoperative use of Noradrenaline or Dobutamine, Ventilation Time, ICU stay and postoperative hospital Stay.
Background: The purpose of this study was to evaluate the correlation between cerebral state index (CSI) and Ramsey score in determining the level of sedation in patients undergoing minor plastic surgery (1).

Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. 46 patients, aged between 22 and 63 years, ASA I - II, undergoing plastic and ophthalmic surgery were treated. The anesthetic management, after the execution of regional anesthesia with levobupivacaine 0.5% was conducted with midazolam 0.01-0.02 mg/kg i.v. following to a bolus injection of propofol 1-1.5 mg/kg, up to a level of Ramsey Sedation score of 5-6 and a CIS value between 60 and 50. During the procedure were administered additional doses of 4-6 mg propofol to maintain the level of sedation. The respiratory assistance was performed with a facial mask, by administering a mixture of air/O2 (50%). The mean duration of surgical procedures was 68 ± 4.4 min. Additional drugs, side effects, the answer to surgical stimulation and the time of awakening were all recorded. The level of sedation was based on Ramsey Score with the values detected by continuous monitoring of the CIS.

Results: The mean CSI value detected 2 min after induction was 57 ± 4. At the maximum surgical stimulation CSI showed an increase of mean value of 60 ± 2. A significant correlation was observed between CSI values and Ramsey Score 5-6 (p <0.001). For values of Ramsey score of 2-3 was not observed correlation with CSI values (p = 0.3) (Fig.1)

Discussion: Monitoring the state of consciousness is important to avoid excessive or inadequate sedation. The significant correlation between the assessment objective state of sedation using the CSI and the evaluation performed with the Ramsey Score allows an optimal adaptation of sedation.

Conclusions: The CSI technology, provides a simple way to monitoring the level of sedation especially during day surgery in which it is often difficult define the optimal level of sedation.

References:
performed to obtain a further confirmation of the correct positioning of the CVC between the AVJ and the tip of CVC.

Results: 55 CVC were positioned in right IGV while 9 in right SV. All CVC produced an increase in the amplitude of the P wave. Where the amplitude of the P wave has increased by 25% than normal, TEE scanning showed that the CVC tip was 2.4 ± 1.2 cm from the ACJ. Where the amplitude of the P wave has increased by 33%, the TEE scanning showed that the tip of CVC was 1.6 ± 1.0 cm from the ACJ. Where the amplitude of the P wave has increased by 50%, the tip of CVC was 1.2 ± 0.4 cm from the ACJ (Tab. 1). The thoracic RX described only summarily the presence of the catheter in the superior vena cava but not explained the exact position relative to the gap.

Discussion: We demonstrated that the increase of the amplitude of the P wave detected by ECG, showed more precision about the correct position of the CVC tip without the need of the RX control.

References:

<table>
<thead>
<tr>
<th>INCREASED P WAVE AMPLITUDE (%)</th>
<th>CVC TIP-ACJ DISTANCE (cm.)</th>
</tr>
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<tr>
<td>25%</td>
<td>2.4±1.2 cm.</td>
</tr>
<tr>
<td>33%</td>
<td>1.8±1.0 cm.</td>
</tr>
<tr>
<td>50%</td>
<td>1.2±0.4 cm.</td>
</tr>
</tbody>
</table>

Table 1. ECG increased P wave amplitude vs CVC tip distance from ACJ

So, the response to surgical stress is related to the extent of tissue damage. Some risk factors identified in literature are: duration of surgery, extent, size of the incision and location. Conclusion: TFC during the intraoperative period could be a useful tool when estimating lung damage secondary to surgical stress.

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Variation of thoracic fluid content: a parameter for monitoring surgical stress in major abdominal surgery

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Background and Goal: Pulmonary complications in abdominal surgery may be related to anesthesia, mechanical ventilation, tissue damage secondary to surgical aggression, etc. Our objective was to measure the association, using a bioreadance monitor, of surgical stress and damage to glycocalix, and its contribution to lung damage.

Materials and Methods: A prospective observational study was conducted with 50 patients undergoing scheduled abdominal surgery. These were of different degrees of surgical stress. Monitoring with the non-invasive hemodynamic monitor (Cheetah) was performed prior to anesthetic induction. The fluid therapy was done guided by objectives, using the systolic volume value provided by the monitor. The mechanical ventilation was protective and controlled by volume. TFC (Thoracic Fluid Content) values were collected before and after orotracheal intubation, and at the end of the surgery. Also, surgery data: such as its type and duration. They were analyzed using IBM SPSS Statistics program, and Pearson and ANOVA parametric tests.

Results and Discussion: We found no difference between baseline TFC mean values (48.12; SD:22.19) and TFC after intubation (48.37; SD:23.25), while at the end of surgery (TFCd0%) this presented a value of 57.19 (SD:19.81). A longer duration of surgery was correlated with a greater variation of TFCd0% (r=0.47; p<0.001).

6150

Residual neuromuscular blockade and temperature: the impact of perioperative hypothermia

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Background and Goal of Study: Besides being associated with a series of postoperative complications, hypothermia has the potential to influence the pharmacokinetics of multiple drugs used in anaesthetic practice, namely neuromuscular blocking agents2. Residual neuromuscular blockade (RNMB) is a known postoperative complication, associated with an increased risk of patient morbidity and mortality3. The aim of this study was to evaluate the incidence of RNMB in our post-anaesthesia care unit (PACU) and its association with perioperative hypothermia.

Materials and Methods: After approval from the ethics committee, 104 adults who met the inclusion criteria were enrolled in the study. The patients' temperature was recorded in the preoperative (T1), intraoperative periods (T2) and after admission in the PACU (T3). The train-of-four ratio (TOFr) was recorded in the PACU, and RNMB was considered if TOFr average was lower than 0.9 after 3 measurements. Posterior analysis was done to evaluate the correlation between the variables using the Mann-Whitney test.

Results and Discussion: The median pre-operative, intra-operative and PACU temperatures recorded were 36.2°C, 35.9°C and 35.6°C, respectively. In the studied population, RNMB incidence was 16.3%. T2 and T3 were significantly lower in the population with TOFr < 0.9 (35.6°C vs. 36°C, p=0.008 and 35ºC vs. 35.7°C, p=0.000, respectively).

Conclusion: Temperature plays a key role in the anaesthetic management of patients because of its implications on multiple outcomes, from increased myocardial rate to higher incidence of wound infection. It also influences the pharmacokinetics of multiple drugs, like neuromuscular blocking agents, delaying its metabolism. In this study, patients with RNMB in the PACU recorded lower temperatures both in the intraoperative and postoperative periods. Since RNMB is potentially responsible for multiple complications in the PACU, temperature monitoring and normothermia must be a crucial anaesthetic concern.

References:
SVV-directed fluid therapy improves cardiovascular status for renal failure patients undergoing parathyroidectomy

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Background and Goal of Study: Poorly managed renal failure (RF) and long-term dialysis lead to secondary hyperparathyroidism (SHPT). Parathyroidectomy (PTx) for SHPT has high cardiovascular risk. Fluid therapy strikes a tricky balance. So far there’s no ideal volume response parameter. Stroke volume variation (SVV), applied for fluid therapy in high risk patients, is calculated through arterial pressure waveform influenced by respiration. This study is to evaluate SVV-directed fluid therapy for PTX in patients with RF.

Materials and Methods: A single-center randomized controlled trial enrolled RF patients scheduled for PTx from May 2018 to April 2019(Clinical Trial Registration Number:ChiCTR1800019009). Patients were randomized into control (CON) group and SVV group. For SVV group, SVV and cardiac output (CO) were obtained by Vigileo/Flotrac monitor. Patients in SVV group were infused 3mL/kg of 0.9% saline in every 5 minutes until SVV≤10%. CON group followed routine fluid restriction. As remedies, vasopressors were available to maintain SBP≥90mmHg or MAP≥55mmHg, or CI 2.5-4.5/(min/m2). Inferior vena cava (IVC) diameter was measured in M-mode ultrasound and ΔIVC was calculated as (IVCmax-IVCmin)/IVCmax*100%. In CON group, CO was estimated following Lijestrand-Zander formula: CO=(SBPmean-DBPmean)((SBP+DBP)/HR). Power of BP fluctuation was calculated as coefficient of variation (CV)= standard deviation of Zander formula: CO=(SBPmean-DBPmean)/(SBP+DBP)/HR. Primary outcome was peri-operative hemodynamic stability, secondary outcome was morbidity and mortality 30 days after surgery. Data were presented as mean(SD) or median(25%, 75%).

Results and Discussion: 121 patients were enrolled (Table 1). Patients in SVV group exhibited better volume status. BP was more stable within 24 hours after surgery, with higher CO, lower serum lactate acid (CoLAC), and more patients achieved ΔIVC<50%. Post-operative complication in 7 days also decreased. There was no significant correlation between SVV and ΔIVC.

Table 1. Hematological parameters during PTx for SHPT patients and peri-operative outcomes

<table>
<thead>
<tr>
<th>Parameters</th>
<th>CON</th>
<th>SVV</th>
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<tr>
<td>Pre-operative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔAC</td>
<td>1.09(0.17)</td>
<td>1.07(0.16)</td>
</tr>
<tr>
<td>ΔI/C</td>
<td>0.453(0.14)</td>
<td>0.440(0.13)</td>
</tr>
<tr>
<td>INR</td>
<td>4.0(3.3)</td>
<td>3.8(3.3)</td>
</tr>
<tr>
<td>Post-operative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔAC</td>
<td>1.33(0.5)</td>
<td>1.09(0.4)</td>
</tr>
<tr>
<td>ΔI/C</td>
<td>0.403(0.26,0.62)</td>
<td>0.37(0.15,0.24)</td>
</tr>
<tr>
<td>ΔIVC</td>
<td>4.24(0.38,7.28)</td>
<td>3.06(2.5,5.3)</td>
</tr>
<tr>
<td>ΔCV</td>
<td>0.056(0.03)</td>
<td>0.056(0.03)</td>
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</table>


Conclusion: It is proposed for the first time, for RF patients undergoing PTX, SVV-directed liquid titration could correct volume-depleting state and reduce postoperative complications, with no known long-term adverse effects.

Automated cardiac alert systems can improve anesthesia documentation: a retrospective cohort study

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Background and Goal of Study: Clinical alert systems have been used to analyze deviations from hospital standards in the electronic medical record to identify missing documentations and send alerts to the appropriate providers to increase adherence to required elements. To improve compliance, an alert system for documentation of the Immediate Preoperative Assessment was implemented at our institution in August 2018 with the goal of improving documentation compliance rates. We hypothesized that implementation of this alert system would increase the compliance of on-time documentation of the IPOA.

Materials and Methods: An initial data query in our institutional data warehouse was made for all patients who had a completed anesthetic during our study period. This date range corresponded to 6 months before and after August 2nd, 2018, the date when the IPOA alert was implemented and the anesthesia department. The following analyses were performed: testing the proportion of cases compliant with on-time documentation of the IPOA pre-versus post-implementation for the full cohort and among subsets of interest, testing the time when the IPOA was completed relative to anesthesia end, and testing whether time of day of when surgery occurred had an impact on the time when the IPOA was completed relative to the drapes off/IPOA alert sent time. The proportion of compliance for pre-versus post-implementation was tested by Chi-square test.

Results and Discussion: Through retrospective chart review of electronic patient records, 47,417 cases matched our inclusion criteria of patients that had a completed anesthetic between February 2nd, 2018 to February 2nd, 2019. In total, we excluded 5132 cases. The compliance rate of IPOA completion increased from 76% to 88% (P<0.001) before and after the alert implementation date. In the initial month following alert implementation, the compliance rate immediately increased to 83% and stayed in the high 80's for the balance of the study period.

Conclusion: We demonstrate that automated Cardiac Alert Systems operating via a single page notification can improve the compliance rate for documentation of key anesthesia events and that this observation is sustained six months after the implementation date. Improvement in compliance is highest in shorter cases and cases that occur early in the day.

Under-representation of women in leadership roles: An overview of the Spanish gender imbalance

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Background and Goal of Study: Publications of diverse medical specialties confirm that women are under-represented in leadership positions in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.


Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). When asking about having ever been in a leadership position, 46.2% of men answered affirmatively compared to 25.2% of women (P<0.001). About twice as many men as women have held a head of department position, been a section chief, or a surgical coordinator. 70% of respondents answered that their head of department is male. 21.8% of male respondents communicated that they have been offered a head of department position compared to only 9.7% of women (P<0.001). In addition, a greater proportion of men accepted the offered position, 61.5% of men vs 50.5% of women (P<0.05). The results of the survey show that the percentage of men who hold hospital man-agement or leadership positions is significantly higher than that of women. When we compare our results with the numbers from public hospitals given by Spanish Society of Anaesthesiology (SEDAR), the percentages are quite similar. Around 74% of the head of department positions in anaesthesiology are held by men in Spain. In addition, the representation of women in the executive committee of the Spanish Society of Anaesthesia is very low, only one out of seven positions is held by a woman. Further-more, since its foundation in 1953, the president has always been male.

Conclusion: The results of this study show that women are under-represented in leadership positions in Spain.
4327

Under-representation of women in leadership roles: An overview of the Spanish gender imbalance

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Background and Goal of Study: Publications of diverse medical specialties confirm that women are under-represented in leadership positions in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.


Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). When asking about having ever been in a leadership position, 42.2% of men answered affirmatively compared to 25.2% of women (P<0.001). About twice as many men as women have held a head of department position, been a section chief, or a surgical coordinator. 70% of respondents answered that their head of department is male. 21.5% of male respondents communicated that they have been offered a head of department position compared to only 9.7% of women (p<0.001). In addition, a greater proportion of men accepted the offered position, 61.5% of men vs 50.5% of women (P=0.05). The results of the survey show that the percentage of men who hold hospital management or leadership positions is significantly higher than that of women. When we compare our results with the numbers from public hospitals given by Spanish Society of Anaesthesiology (SEDA), the percentages are quite similar. Around 74% of the hospital management positions in anaesthesiology are held by men in Spain. In addition, the representation of women in the executive committees of the Spanish Society of Anaesthesia is very low, only one out of seven positions is held by a woman. Further more, since its foundation in 1953, the president has always been male.

Conclusion: The results of this study show that women are under-represented in leadership positions in Spain.

4328

Individual perceptions among Spanish anaesthesiologist regarding gender discrimination at workplace

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Background and Goal of Study: Publications of diverse medical specialties confirm that gender differences still exist in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.


Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). Among women’s perceptions, 36.3% of female respondents believe that they have lost opportunities for promotion because of their gender; 60% of them think that this situation is frustrating. 39.2% of women were afraid that their contract would not be renewed if they become pregnant. In addition, 10% of women suspect that their pregnancy resulted in non-renewal of their contract. 33.8% of participants consider that female anaesthesiologists are treated differently in the workplace: The majority of respondents (85.2%) reported that patients are more polite to male practitioners than females. Almost half of women surveyed (46%) reported that gender discrimination in the workplace exists. Workplace discrimination has been discussed extensively and it is also evident in this study. Both respondents, men and women, have reported perceptions of workplace gender-based discrimination. Female physicians feel that their colleagues, patients, and nursing staff treat them differently. This situation is considered a social problem; it has been linked to the term «unconscious gender bias» which refers to women being treated differently than men, and to having different expectations placed on them without any realization of this bias. Although the analysis of possible solutions to eliminate gender disparity is not the aim of this study, it cannot be overlooked. Certain measures which could help include identifying current barriers for women within the workplace, and subsequently developing and implementing action plans to combat this. These programs could help with women’s leadership development at any level and include work-life support.

Conclusion: The global perception of the respondents of this survey shows that gender differences also exist in the workplace in anaesthesia in Spain.

4443

Coffee consumption – do young anaesthesiologists drink as much as rumour has it?

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Background and Goal of Study: Traditionally, anaesthesiologists are considered as avid coffee consumers and this impression, although questioned, continues to be propagated. 1,2 This study investigates coffee consumption among young European anaesthesiologists and attempts to indicate if coffee consumption is related to the doctor’s level of experience, working out-of-hours and reporting not getting enough rest while doing no.

Materials and Methods: A questionnaire was written up and this included questions on the number of coffee cups consumed in one day, the number of years working in anaesthesiology and if the responder is a trainee or a specialist, if they work out-of-hours and if they get enough rest. A young anaesthesiologist was arbitrarily defined as a doctor working in anaesthesia for 10 years or less. The questionnaire was published on the ESA Trainee Network Facebook page, an online network which connects European trainees in anaesthesiology and intensive care. The post remained active for 24 hours and generated 286 responses. Responses were filtered and the remaining 231 were analysed using R.

Results and Discussion: Coffee consumption in this cohort was a median of 3 cups (IQR 3). Mean age among responders was 29.8±3.5 years and 34.6% were trainees while 61.0% were specialists. Mean anaesthetic experience was 4.0±2.3 years with 92.6% of participants working out-of-hours. 44.1% “rarely” get enough rest, 40.3% “sometimes” and 8.2% “never”. There was no statistical difference between the number of coffee cups consumed by specialists or trainees (p=0.59), those working out-of-hours or not (p=0.33), those getting rest or not (p=0.72) or with increasing working experience (p=0.11). Coffee consumption in this cohort is similar to that found by Do et al, who discuss how coffee does not affect reported work satisfaction.

Conclusion: Coffee consumption among young European anaesthesiologists appears to be moderate and the factors studied do not seem to be related to it.

References:
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4769

Oxidative stress and antioxidant effects in medical residents occupationally exposed to anaesthetics

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Background and Goal of Study: Occupational exposure to waste anaesthetic gases may be associated with toxic effects. Medical residents are a special category of physicians whose occupational and personal well-being are of major concern worldwide. The aim of this study was to monitor oxidative stress in physicians occupationally exposed to anaesthetics during their medical residency. We hypothesized that changes in oxidative/antioxidative markers would occur during the specialization period.

Materials and Methods: The study was approved by the local IRB and all the subjects signed the informed consent. This follow-up study included 23 young physicians who worked in operating rooms and were occupationally exposed to the waste anaesthetics gases (isoflurane, sevoflurane, desflurane and nitrous oxide) during their medical residency in anaesthesiology at a major teaching hospital in Brazil. Fasted blood samples were collected at three time points, as follows: before the start of the medical residency program (before exposure; the residents were their own control), in the first year and in the second year of medical residency. Oxidative stress markers were monitored in these three time points to assess lipid peroxidation (malonaldehyde; MDA) and oxidative DNA damage, in addition to antioxidant capacity, which were evaluated by repeated measures analysis followed by Duncan test. Additionally, the trace concentration of the anaesthetics were measured in the physician’s breathing zone by a portable infrared analyzer.

Results and Discussion: All the anaesthetic concentrations were above the recommended limit established by the National Institute for Occupational Safety and Health (NIOSH, USA). The results showed a progressive increase in MDA (p < 0.0001) and oxidized DNA bases (p < 0.001) at the first and second years of exposure. In addition, the antioxidant defense enhanced at the first and second years of exposure (p < 0.001). The findings suggest that high concentrations...
of waste anaesthetic gases found in unscreened surgical theatre is related to oxidative stress in young physicians during their specialization.

Conclusion: Exposure to inhaled anaesthetics in an inadequate workplace is associated with oxidative stress in physicians during a 2-year period of medical residency. Therefore, this study emphasizes the need to minimize this occupational exposure.


Results and Discussion: There were 818 respondents from Austria, Germany and Switzerland. The mean age of respondents was 42 ± 10 years and 47% of respondents were female. Overall, women anaesthesiologists in these countries represent 48% ± 15% of the departmental workforce. Women were equally driven to take any leadership position and do research at their departments. However, gender was self-reported as a disadvantage for leadership (P=0.001, Cramer’s V: 0.63) and research (P=0.001, Cramer’s V: 0.51). The current head of the department was reported to be a female in 5.6% and the immediate past head was a female in 9.5%. Similarly, 4.4% of female respondents reported being a current or past head of the department compared to 17.1% of male respondents. Females were also more likely to be mistreated in the workplace (OR 9.2, 95% CI 6.0-14; P<0.001), most commonly by surgeons. Women spent somewhat less time investing in their career (P=0.001, Cramer’s V: 0.29).

Conclusion: We characterised current gender inequity perceptions among German-speaking anaesthesiologists. Women still feel harmed in the promotion of leadership positions and research possibilities within our speciality. There is a high proportion of women who reported having been mistreated at work.

References:

Practice of documenting pre-anaesthesia assessment chart in regional teaching hospital. A concern for patient safety

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Background and Goal of Study: Detailed pre-anaesthetic evaluation, proper and detailed documentation, record keeping for easy access is prime responsibility of every anaesthesiologist. Proper and complete documentation is extremely essential for improving patient’s outcome and for medico-legal aspects. It is also a marker of provision of quality care.

Objective: To identify the quality of preoperative assessment and documentation of patients coming for elective or emergency surgery. The required information including history, examination and investigations and other applicable information. Materials and Methods: Design, setting and participants: Prospective audit of medical records of 100 patients following all kinds of surgical procedures in our hospital during period of one month, data collected by all authors in their own area of work daily.

Results and Discussion: During the study period total of 100 patients’ charts were reviewed, no chart was found completely filled. The most (>90%) completed documentation was of the information addressogram, allergies (even with not any), airway examination and ASA classification. Major (<50%) lack of information was found of pre-operative vital signs, timings of empty stomach pre-operatively, BMI, lab investigations and name of the surgeon. The variables like radiology examination, ECG, weight, procedure to be done, past medical or surgical history and ongoing medications were not reported in between percentages of 22-48%.

There was no significant difference between the trends for elective or emergency surgeries irrespective of daytime or out of hours surgeries.

Conclusion: Main recommendations: The pre-operative assessment and documentation of the patient’s general health and previous conditions are of utmost importance for anaesthetist, not only for planning and provision of safe conduct of anaesthesia and post-operative management, also for medico-legal matters. More emphasis on comprehensive documentation of all information and refreshing the importance of documentation achieved is highly recommended.
Practice of documenting pre-anaesthesia assessment chart in regional teaching hospital. A concern for patient safety

Talreja V. K.1
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Background and Goal of Study: Detailed pre-anaesthetic evaluation, proper and detailed documentation, record keeping for easy access is prime responsibility of every anaesthesiologist. Proper and complete documentation is extremely essential for improving patient’s outcome and for medicolegal aspects. It is also a marker of provision of quality care.

Objective: To identify the quality of preoperative assessment and documentation of patients coming for elective or emergency surgery. The required information including history, examination and investigations and other applicable information.

Materials and Methods: Design, setting and participants: Prospective audit of medical records of 100 patients following all kinds of surgical procedures in our hospital during period of one month, data collected by all authors in their own area of work daily.

Results and Discussion: During the study period total of 100 patients’ charts were reviewed, 95 from surgery, 5 from obstetrics. Most (90%) were males. The data documentation was of the information addressormall, allergies (even with not any), airway examination and ASA classification. Major (<50%) lack of information was found to be of pre-operative vital signs, timings of empty stomach pre-operatively, BMI, lab investigations and name of the surgeon. The variables like radiology examination, ECG, weight, procedure to be done, past medical or surgical history and ongoing medications were not reported in between percentages of 22-48%. There was no significant difference between the trends for elective or emergency surgeries irrespective of daytime or out of hours surgeries.

Conclusion: Main recommendations: The pre-operative assessment and documentation of the patient’s general health and previous conditions are of utmost importance for anaesthetist, not only for planning and provision of safe conduct of anaesthesia and post-operative management, also for medicolegal matters. More emphasize on comprehensive documentation of all information and refreshing the importance of documentation achieved is highly recommended.

Postanaesthetic visits recording: benefits and obstacles

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Background and Goal of Study: Postanaesthetic visits (PAVs) allow detection of anaesthesia related complications and increase patient satisfaction. However, limited information is available regarding current practice of PAVs. Goal of our study was to record and evaluate PAVs.

Materials and Methods: A PAV service was initiated in our department in January 2018. Anaesthesiologists should record in the PAV book any performed surgical anaesthesia by date, patient’s name and age, type of surgery, anesthetic technique, anesthesiologist’s and surgeon’s name. PAV should be performed within 24 h recording pain, PONV, sensory/motor block and other potential complication.

Results and Discussion: We analysed PAVs for cesarean sections (CS) for the year 2018. Just 761 CS (67%) were recorded in the PAV book out of 1139 registered in the formal archive. PAV was performed only to 421 patients (55%). From our data analysis it occurred that regarding anaesthesia technique, general anaesthesia (GA) was carried out in 95 parturients (12%). Among them, 5 were epidurals for vaginal delivery that failed to convert to surgical anaesthesia and 17 were incomplete spinal. Regional anaesthesia (RA) was performed to 666 parturients (88%), 604 spinals, 5 epidurals, 3 comprised spinal-epidurals. Pain ≥5 was recorded in 79 patients (19%); 73 after spinal and 6 after GA, PONV was reported by 8 patients (8%); 7 after spinal and 1 after GA. Sensory/motor block was recorded in 3 patients after RA. It became evident that extra record keeping, lack of time, emergency situations and lack of personnel impeded regular PAVs, even with a dedicated service. On the other hand, PAVs contributed to detection of complications, facilitating their management. Additionally, the recorded data were used to guide future practice. GA reduction was considered a measure of quality improvement along with the need for more effective postoperative pain management. Furthermore, the observed absence of post-dural puncture headache emerged as every positive outcome.

Conclusion: Recording and analyzing PAVs may establish or may guide changes in current anaesthetic practice aiming to improve quality. Lack of technical and personal facilities seems to be major obstacles for adoption in every day practice.

References:

A successful anesthetic management without muscle relaxants in a patient undergoing re-scheduled surgery after intraoperative anaphylaxis due to rocuronium

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Background: Perioperative anaphylaxis is mostly induced by non-depolarizing muscle relaxants (1, 2). We report a successful anesthetic management without muscle relaxants in a patient with an anaphylaxis history due to rocuronium.

Case Report: A 73-year old male patient was diagnosed as gallbladder cancer and was scheduled for extended cholecystectomy. He had no history of general anesthesia or allergy except for skin redness by povidone-iodine. In the first surgery, after insertion of an epidural catheter with lidocaine, remifentanil, propofol and rocuronium were used for induction. Immediately after intubation, a remarkable hypotension of 30mmHg in systolic refractive to ephedrine and phenylephrine was observed, which developed into cardiac arrest. He was successfully resuscitated with ephephrine, and after resuscitation, a pale redness on the chest was observed. An emergent TEE examination revealed temporary basal diffuse hypokinesis with LVEF of 35%, which was not compatible with the findings of ischemia. Judging from the sudden hypotension and the redness, anaphylaxis was suspected. The surgery was suspended and he was transferred to ICU. The measurements of histamine, tryptase, and IgE antibodies of the medications used during the surgery were within normal range and negative, but rocuronium was found positive with the pin prick test. We had a thorough discussion and planned the anesthetic method for the second surgery after two months. In the second surgery, 0.75% of rovipacaine was used for the purpose of epidural analgesia and abdominal muscle relaxation, while remifentanil and midazolam were used for general anaesthesia. Sevoflurane was also used to support muscle relaxation. The surgery was successfully completed and he discharged with no complications.

Discussion and Learning points: Since the common chemical structure of non-depolarizing muscle relaxants is also included in the daily materials such as shampoo (3), patients may possibly be sensitized in daily life, making it hard to predict intraoperative anaphylaxis from the anaesthetic history. Appropriate diagnosis, effective treatment, and careful planning for the future anesthesia for patients with perioperative anaphylaxis history are important.

References:

Incidence of Postoperative Residual Neuromuscular Blockade - A Multicenter, Observational Study in Portugal (INSPIRE 2)

Esteves S.1, Correia De Barros F.1, Nunes C. S.2, on behalf of INSPIRE2 Group - Andreia Puga; Blondina Gomes; Catarina S Nunes; Fernando Abelha; Filinto Correia de Barros; Humberto Machado; Milene Silva; Nuno Fernandes; Paula Vitor, Sandra Pereira; Simao Esteves; Teresa Lapa; Vitor Pinho-Oliveira
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Background: Residual neuromuscular blockade (RNB) is a widely recognized complication associated with the use of neuromuscular blocking agents (NMBAs). RNB may result in significant clinical consequences that may increase postoperative morbidity and mortality. A study in 2010 reporting an incidence of 26% of TOF<ratio<0.9 (TOFir) at post anaesthesia care unit (PACU) arrival highlighted the dimension of this complication in Portugal. Awareness of this problem and sugammadex widespread use since then, may have changed this reality. The primary objective of this study was to determine the current incidence of RNB defined by a TOFr<0.9 at PACU arrival, secondary objectives were the possible association of RNMB with use of reversal agents and intraoperative monitoring of neuromuscular blockade (NMB).

Materials and Methods: Multicentre, observational prospective study involving adult patients undergoing elective surgical procedures requiring general anaesthesia with NMBA (from 07/15 to 06/19). 366 patients were included from 10 Portuguese hospitals. After patient arrival in PACU, an investigator not involved in anaesthesia care, applied 3 consecutive TOF stimulations with 15 seconds interval
Of the 366 patients, 20 had TOFr<0.9 representing an incidence of 5.5%. Intraoperative monitoring of NMB was performed in 53% of patients. NMB was reversed with sugammadex in 340 patients (93%), neostigmine in 12(3%) and 14(4%) had no drug reversal. There was no statistically significant association between RNMB and intraoperative monitoring of NMB (P=0.752). Association between RNMB and reversal drugs or no reversal couldn’t be established due to the low RNMB incidence and the low number of patients with neostigmine or without reversal drugs. Although in 2010 only 7 of 350 patients had sugammadex, intraoperative RNMB monitoring data was not collected, so we can’t exclude that differences in monitoring could also played a role on the improvement in RNMB, beyond the widespread use of sugammadex.

**Conclusion:** A significant reduction in RNMB has been achieved in the last 8 years in Portugal but we believe that an improvement is still possible towards making RNMB a “never event”.

**References:**

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**4517**

Sugammadex Associated Hypotension, Bradycardia, Asystole and Death: A Case Report

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**Background:** Sugammadex, introduced in Europe in 2008, is a well tolerated drug. There are several recent reported events in literature of hypotension, bradycardia and asystole immediately after its administration. In 2015 FDA approved sugammadex, a first and unique selective (NDSMR) binding agent with a greater affinity for rocuronium and vecuronium, as a reversal agent.

**Case Report:** A 68 kg, 82-year male, 150 pack-year smoker, COPD and lung cancer post surgery and radiation. No significant cardiovascular history. January of 2015, cystoprostatectomy which was complicated by a chronic SBO since March of this year treated. An arterial line was placed. Anesthesia was maintained with Desflurane, cystoprostatectomy which was complicated by a chronic SBO since March of this year treated. An arterial line was placed. Anesthesia was maintained with Desflurane, with norepinephrine infusion. A 8.0 ETT. A PEA was noted and 20 minutes prior a combination of 0.25% succinylcholine. We administered corticosteroids and antihistaminic drugs. We maintained anesthesia with sevoflurane, ketamine and epidural analgesia until the end of surgery. The patient was stabilized, extubated and transferred to the ICU for postoperative monitoring.

**Discussion:** According to literature, rocuronium is a potential anaphylactic agent from the intermediate-risk group that induces Type I hypersensitivity reaction in which the IgE antibodies cause inflammatory mediators to be released. Recently, side-effects such as arrhythmia have been reported due to its increased use. We have to recognize and treat this life-threatening condition according to guidelines.

**Learning points:** It is important that we monitor the use of rocuronium closely and ensure that any possible reactions are investigated and reported appropriately in order to facilitate the gathering of adverse events data.

**References:**

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**4958**

Intraoperative anaphylaxis related to rocuronium: a case report

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**Background:** The primary cause of anaphylaxis in 50%-70% of patients under anesthesia is neuromuscular blocking drugs (NMBD). Rapid recognition and immediate management are essential to prevent mortality and morbidity.

**Case Report:** ASA II, 42-year-old-woman was scheduled for right nephrectomy and chemotherapy. She had positive family allergy history and allergy tests positive to several antibiotics and anesthetic agents: propofol, fentanyl, pancuronium and succinylochline. We administered corticosteroids and antihistamine prophylaxis before induction. General anesthesia with continuous remifentanil infusion and epidural analgesia was of choice. Induction was with midazolam, remifentanil and sevofurane. Due to inadequate depth of anesthesia, we gave 50 mg of rocuronium prior to intubation. Thirty minutes after beginning of surgery we repeated 20 mg of rocuronium. Shortly after, she became profoundly hypotensive, with low end-tidal CO2 and high peak inspiratory pressure. We immediately stopped all anesthetic agents, maintained the airway and ventilated the patient with 100% of O2. We started resuscitation with fluids and continuous phenylephrine and epinephrine infusions. Aminophylline, magnesium sulfate, calcium gluconate, lidocaine and a repeated dose of corticosteroids and antihistaminic agents were given. We maintained anesthesia with sevofurane, ketamine and epidural analgesia until the end of surgery. The patient was stabilized, extubated and transferred to the ICU for postoperative monitoring.

**Discussion:** According to literature, rocuronium is a potential anaphylactic agent from the intermediate-risk group that induces Type I hypersensitivity reaction in which the IgE antibodies cause inflammatory mediators to be released. Recently, side-effects such as arrhythmia have been reported due to its increased use. We have to recognize and treat this life-threatening condition according to guidelines.

**Learning points:** It is important that we monitor the use of rocuronium closely and ensure that any possible reactions are investigated and reported appropriately in order to facilitate the gathering of adverse events data.

**References:**

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**4980**

Transient and acute onset atrial fibrillation with rapid ventricular response after reversing of neuromuscular block: unexpected complication of Sugammadex

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**Background:** Sugammadex is a gamma-cyclodextrin, the first selective agent in clinical use since 2008 for reversing neuromuscular blockade induced by steroidal non-depolarizing muscle relaxants with superior affinity for rocuronium. It is aimed to prevent a case of sudden onset of rapid ventricular responded atrial fibrillation due to the use of sugammadex.

**Case Report:** 69-year-old patient, with no comorbidities and medication history, had first and mostly second degree %60 of body flame burns (without inhalation burn) was admitted to hospital. In laboratory tests, electrolyte and other parameters were within normal limits and she had sinus rhythm. As the patient did not have enough peripheral vascular access due to burns on the extremities, the central venous catheter was placed and the patient was taken into operation. Debridement and grafting was performed uneventfully under general anesthesia (used rocuronium as a neuromuscular blocker) by plastic surgery. The patient was treated with appropriate fluid regime during the operation and there was no hemodynamic disorder or arrhythmia. After the surgery, sugammadex (2mg / kg) was performed from the central venous catheter before exubation and after that, atrial fibrillation with rapid ventricular response developed within seconds. The patient was treated with an appropriate dose of esmolol (1 mg/kg) and , due to insufficient, amidaron (300mg in 5% Dextrose). As a result of this treatment, sinus rhythm was obtained and the patient was sended to the burn center after waking up without any problem.

**Discussion:** Arrhythmias due to electrolyte abnormalities are common in burn cases. The patient had normal sinus rhythm with normal laboratory values in preoperative and intraoperative period, and sudden onset of atrial fibrillation (has not been encountered in the literature) developed after sugammadex. It has
Access to the patient may be limited and intravenous line used. Anesthesia induction was performed with remifentanil and propofol infusions.

**Case Report:**

Subcutaneous infiltration of drugs is not a rare event and could lead to serious complications due to unknown pharmacokinetics through this route. Regarding muscle relaxants, subsequent residual blockade may compromise ventilation. In the first hours, a tight surveillance of the patient in a PACU is critical to get an optimal outcome.

**Discussion:**

Subcutaneous infiltration of drugs is a rare event and could lead to serious complications due to unknown pharmacokinetics through this route. Regarding muscle relaxants, subsequent residual blockade may compromise ventilation. In the first hours, a tight surveillance of the patient in a PACU is critical to get an optimal outcome.

**References:**


**Learning points:**

Access to the patient may be limited and intravenous line used. Anesthesia induction was performed with remifentanil and propofol infusions. Therefore, the need of complete paralysis and expected duration of the procedure, a rocuronium infusion at 0.3mg/Kg/h was started through the 20G cannula. Because the patient had already received rocuronium boluses, the infusion rate was increased to 0.6mg/Kg/h. Meanwhile TOF scan got damaged and neuromuscular blockade could not be monitored. As a result, the patient’s arm was allowed by the surgical team placement and five hours later, after some changes in the team’s positioning, a moderate soft tissue swelling was noticed around the 20G cannula. The rocuronium infusion was stopped and another TOF scan monitor was requested. At the end of the surgery the patient was extubated uneventfully after reversal using 4 mg/kg of Sugammadex and a TOF ratio of 0.9. The patient was taken to the post-anesthesia care unit (PACU) where she was closely monitored. Her post-anesthesia period was unremarkable.

**Learning points:**

- Access to the patient may be limited and intravenous line used.
- Anesthesia induction was performed with remifentanil and propofol infusions.
- The need of complete paralysis and expected duration of the procedure, a rocuronium infusion at 0.3mg/Kg/h was started through the 20G cannula.
- Because the patient had already received rocuronium boluses, the infusion rate was increased to 0.6mg/Kg/h.
- Meanwhile TOF scan got damaged and neuromuscular blockade could not be monitored.
- As a result, the patient’s arm was allowed by the surgical team placement and five hours later, after some changes in the team’s positioning, a moderate soft tissue swelling was noticed around the 20G cannula.
- The rocuronium infusion was stopped and another TOF scan monitor was requested.
- At the end of the surgery the patient was extubated uneventfully after reversal using 4 mg/kg of Sugammadex.
- A TOF ratio of 0.9 was achieved.
- The patient was taken to the post-anesthesia care unit (PACU) where she was closely monitored.
- Her post-anesthesia period was unremarkable.

**5058**

**Sugammadex dosing: anaesthesiologist’s clinical perception versus quantitative monitoring**

**Materials and Methods:**

Accelerometryg NM monitoring data and background variables obtained from forty patients (24-85ys) anaesthetized with TIVA participating in the previous study were used for this secondary analyses. Recovery speeds of T1, T4 and TOFR were measured as slopes of the corresponding accelerometrygograph tracings. We specifically focused on occurrence of acceleration or deceleration determined by ratio of early and late phases’ slope (TX-AR = late- TXslope/early-TXslope).

**Results and Discussion:**

Both T1- and T4-AR were less than 1.0 in majority (98%, 95%, respectively). T1-AR (0.13 ± 0.12) was significantly less than T4-AR (0.29 ± 0.25) (P<0.01). Systematic dissociation between them at higher value range indicated by their linear relationship, T4-AR = 0.33(2.4*T1-AR), r=0.85, p<0.005 implies greater T4-AR reduction than T1-AR possibly leading to TOFR reduction, i.e., recurarization. These suggest stronger deceleration on T1 resulting in muscle weakness, and faster deceleration at T4 possibly resulting in recurarization. T1-AR was independently explained by BMI (β=0.005) and GFR (p=0.014), and T4-AR by BMI (β=0.005) and GFR (p=0.01) whereas lower GFR (p<0.01) was a sole independent risk factor for TOFR-AR (0.12 ± 0.13).

**Conclusion:**

Insufficient SGX administration significantly decelerates recovery of both T1 and T4 whereas postsynaptic deceleration is more severely possible leading to symptomatic muscle weakness and faster presynaptic response may result in recurarization.

**Materials and Methods:**

This was a prospective, 3-month study in patients 18-75 years who underwent general anesthesia with rocuronium and reversal with sugammadex. At the time of pharmacologic reversal of NMB, both the sugammadex dose proposed by the Anaesthesiologist and the dose suggested by a TOFscan, according to Portuguese guidelines on the management of the NMB, were recorded. Then the TOFscan suggested dose was administered. The subjective dose was considered appropriate if it was within 10% of the recommended dose for the depth of NMB. The results were analysed descriptively.

**Results and Discussion:**

Of 66 patients evaluated, in 16% the subjective dose would have been >10% below the recommended dose (range for the difference to the recommended dose was -58 to -232 mg), and the median time between the last Rocuronium administration and pharmacological reversal was 45 min (range: 15-220 min). In 44% of patients the subjective dose would have been within 10% of the recommended dose and the mean time to pharmacological reversal was 40 min (range: 15-160 min). The empiric decision would have resulted in sugammadex dosing: anaesthesiologist’s clinical perception versus quantitative monitoring.
Economic Impact of Expanding the Use of Sugammadex for the Reversal of Neuromuscular Blockade in Adults Undergoing Surgery in Spain

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Background and Goal of Study: Neuromuscular blocking agents (NMBAs) are often administered to prevent patient movement during surgical procedures requiring use of general anesthetics with intubation. Patients exubated with incomplete neuromuscular reversal may experience residual neuromuscular paralysis, potentially leading to post-operative complications. The aim of this study was to estimate the clinical and economic impact of expanding the use of sugammadex in the routine reversal of NMB with rocuronium in Spain. NMB induced by cisatracurium and others are included in the analysis with caveat that patients are switched to rocuronium first.

Materials and Methods: A budget impact analysis was developed based on a decision analytic model that followed 733,876 hospital procedures carried out in Spain in 2015,73-3% of them using a NMBA. The model estimated the annual net budget impact of substituting sugammadex for no reversal agent in 50% of the patients administered with rocuronium and no reversal agent. The risk of the composite endpoint, PPC (post-operative pulmonary complications), was based on a study of the Multicenter Perioperative Outcomes Group (MPOG) centralized registry. The analysis was conducted from payers' perspective, considering only the direct costs associated with PPC management (€6,990.01 per episode) and pharmacy costs of the NMBAs. Deterministic sensitivity analyses (DSA) were carried out by varying key parameters included in the model within a range of ±25%.

Results and Discussion: The estimated budget impact of expanding the use of sugammadex in 226,119 procedures, displacing neostigmine or no reversal agent use, in the routine reversal of neuromuscular blockade in Spanish hospitals was a net saving of €6,981,1 annually. The potential increase (€13.9) in pharmacy costs would be offset by savings (€22) from a reduction in the number of PPC events (3,148 cases; 12.8%). The DSA confirmed that the economic impact of expanding the use of sugammadex resulted in cost savings across all variables varied except for where the risk ratio (sugammadex vs neostigmine) of PPC decreases (from 0.71 to 0.89).

Conclusion: Improving patient care in the operating room is essential in surgical procedures. The management of PPC is often expensive. Expanding the use of sugammadex could potentially lead to a reduction in the number of PPC events, resulting in net savings for the Spanish National Healthcare System.

Deep neuromuscular blockade with sugammadex reversal, reduced both anesthetic requirements and recovery times in cervical spine surgery patients: a randomized controlled trial

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Background and Goal of Study: Deep neuromuscular blockade (NMB) is currently used mostly for the benefit of laparoscopic surgeries. We hypothesized that deep NMB could also offer advantages regarding titration of BIS guided propofol/remifentanil anesthesia. EMG activity, if present, may lead to higher risk of reversed sugammadex determined a shortening of muscle recovery from rocuronium when compared with neostigmine with advantage during microlaryngoscopy.

Materials and Methods: Patients subjected to cervical spine surgery (N=63) were randomized to receive rocuronium infusion for deep NMB (PTC of 1-2 kept until the end of wound dressing) with sugammadex (4mg/kg) for reversal or standard-practised rocuronium boluses with neostigmine for reversal if T0F=90%. Propofol/remifentanil TCI anesthesia was titrated to maintain BIS between 40-60. Tidal had national EC/Regulatory authority approvals; all patients provided informed consent. Student’s t test, Mann-Whitney U-test and chi-square c2were used. When samples were compared the 95% CI of the difference was presented. Significance was at p<0.05.

Results and Discussion: Baseline characteristics did not differ among groups. The main results are in Fig1. Propofol estimated Ce for maintenance and total propofol in mg/kg/min were 20% lower in the deep NMB group. BIS average was significantly higher, by 3.3(1.06) and EMG activity significantly reduced in the deep NMB group, but BIS variability was not. Remifentanil did not differ. Ephedrine was administered in 34% of patients in the standard practice group vs 13% in the deep NMB group (P=0.045). At end of surgery propofol Ce was lower in the deep NMB group and times to eye opening and extubation were halved.

Conclusion: Deep NMB and sugammadex reversal accounted for reduced propofol requirements during anesthesia, higher BIS values, decreased EMG activity, less need to treat hypotension and faster recovery times. Possible explanations for these findings may be that deep NMB reduces EMG activity leading the anesthesiologist to accept higher BIS values, or that it reduces afferences to the brain, namely from proprioception, that would favor arousal. While deep NMB is advocated only to provide better surgical conditions, our results suggest that it may be beneficial also from the perspective of anaesthesia.

Sugammadex reversal versus neostigmine: analysis of rapid muscle activity recovery

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Background: The purpose of the study is to test the rapid muscle activity recovery of sugammadex vs neostigmine after surgery through microlaryngoscopy.

Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. We enrolled 148 patients between 39 and 68 years old, ASA I-II, undergoing ENT. The patients were divided into two groups: S (74 pts) and N (74 pts). The group S received sugammadex in a dose dependent on the depth of the block. The patients of Group N received neostigmine for decurarization. In both groups the curarization was obtained by the administration of rocuronium. The recovery time and the achievement of the T0F-ratio 0.9 as extubation index were recorded.

Results: At the end of surgery (mean duration 28 ± 7 min) the TOF showed a partial recovery in 111 patients: in the remaining 37 patients a post-tetanic counts (PTC) was performed to assess the depth of the block and the recommended dose of sugammadex was administered. Of the 111 patients with moderate muscular block and reappearance of T2 to TOF, 33 patients were included in group S with administration of 2 mg/kg of sugammadex while 78 were included in Group I with administration of neostigmine 0.05 mg/kg. 37 patients in which PTC showed a value of 1-2, indicating deep block, were antagonized with sugammadex 4 mg/kg. Times muscle recovery, were respectively: 1 min, 33±6 sec for 33 patients of the group S of 148 cases; 12.8%. The DSA confirmed that the economic impact of expanding the use of sugammadex resulted in cost savings across all variables varied except for where the risk ratio (sugammadex vs neostigmine) of PPC decreases (from 0.71 to 0.89).

Conclusion: Improving patient care in the operating room is essential in surgical procedures. The management of PPC is often expensive. Expanding the use of sugammadex could potentially lead to a reduction in the number of PPC events, resulting in net savings for the Spanish National Healthcare System.

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Comparison of the intubation success rate between two techniques using lightwand in patients undergoing spine surgery with difficult airway: conventional vs. face-to-face technique

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Background and Goal of Study: A lightwand device can provide easy and safe intubation, particularly in a patient with anticipated difficult intubation or cervical immobilization. For a successful lightwand intubation, it is essential to locate the tip of laryngoscope just in front of the vocal cord opening, and some soft tissue injury or technical difficulty can happen during this process. As an alternative technique, the face-to-face lightwand technique provides laryngoscope insertion in a sitting position, thereby anticipating less soft tissue injury, and not requiring mandible lifting for laryngoscope insertion. We compared the intubation success rate between conventional laryngoscope technique and face-to-face laryngoscope technique.

Materials and Methods: Patients who were undergoing spine surgery were randomly allocated into two groups; Group C using a conventional laryngoscope technique or Group F for using a face-to-face laryngoscope technique for tracheal intubation. After anesthesia induction, patients in group C were intubated using lightwand with a conventional technique. In group F, patients were sitting in 45 degrees and intubated facing with an anesthesiologist. The primary outcome was the success rate at first attempt.

Results and Discussion: A total of 178 patients were enrolled. The intubation success rate at first attempt was 88.6% in group C and 84.1% in group F, respectively (P=0.381). Intubation time was slightly shorter in group F, but there was no statistical significance. (14.0 vs. 12.0, P=0.704) Intubation related complications, including post-intubation bleeding, sore throat, and hoarseness, were similar between the two groups.

Conclusion: Compared with the conventional technique, the face-to-face laryngoscope intubation technique showed a similar result. So it may be used as an alternative technique in cervical immobilized patients.

Respiratory distress by airway obstruction in orthognathic surgery during the postoperative period: case report

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Background: A 45 year old female, ASA II, was scheduled for elective orthognathic surgery, under TIVA. In the absence of surgical, anesthetic complications and Cormack I, the patient was extubated and transferred to the critical care unit (CCU) with intermaxilar suture (IMS). After 4 h, the patient develops nasol bleeding, agitation, respiratory distress and desaturation. The IMS is removed and the patient is intubated and transferred to the operating room (OR) where experienced a new desaturation episode for 15 min and chest asymmetry movement, calling the bronchosocist who removes a clot in the left main bronchus.

Subsequently, the patient is moved to the ICU, experiencing a neurological status disorder with a MRI and EEG matching with a hypoxic-ischaemic encephalopathy.

Discussion: The aim of this case report is to review the extubation options and transfer to a CCU in orthognathic surgery. Looking through the literature, there are a few references which review a similar complication1 and standardized recommendations in extubation. Most importantly, it should be individualize according to comorbidities, anxiety, airway, bleeding, OR stability and a CCU availability, and extubating the patient as soon as possible in order to reduce postoperative complications and morbimortality2. In this case, the patient fulfilled all the requirements for an early extubation.

References:
1. Incidence of complications and problems related to orthognathic surgery.
2. Decision on the time for post-operative extubation of maxillofacial surgery patient in the intensive care unit.

Learning points: It is crucial to assess every case aspect to determine the best extubation moment. An early extubation in the OR or in the first hours, doing the IMS 24 h after, could be a secure practice which reduce the risk for severe complications. Finally, emphasize the importance of review the literature with a view to write a clinical guideline with recommendations.
The discrepancy of rotation angle of the endotracheal tube tip at the glottis during nasotracheal intubation using fibroscope

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Background and Goal of Study: Nasotracheal intubation using fibroscope is a useful technique in special patients. In clinical practice, we experience sometimes the difficulty in advancing the tube over the glottis, as the tip of the tube catch on the vocal cord. It may give damage to the vocal cord and lead to postoperative sore throat. Rotation of the tube may easily release this catching. However, when the endotracheal tube is rotated, it may be difficult to maintain it in the soft material tube. The discrepancy of those rotation angles was unclear. In this study, we investigated the discrepancy of the rotation angle between at the tip and at the end side.

Methods: The patients (20-80 yrs) undergoing nasotracheal intubation for oral surgery participated 3 sizes of preformed nasotracheal tubes (Portex; Smiths Medical) were intubated using fibroscope. They were divided into 3 groups; the tube internal diameter (ID) 6.5 mm group (6.5 group), ID 7.0 mm group (7.0 group) and ID 7.5 mm group (7.5 group). The tube was inserted through the nasal cavity into the pharynx. After the fibroscope was advanced through the tube into the trachea. At this timing the side end of the tube was rotated by 90° and 180° in both right (clockwise) and left (counterclockwise) together with fibroscope, then the rotation angle at the tip was monitored by Pentax Airway Scope.

Results and Discussion: A total of 39 patients were included. When the tip was rotated right by 90° at the end side, in 6.5 group (n=13), the tip rotated by 47.8 ± 17.3°. In 7.0 group (n=13), the tip rotated by 40.2 ± 13.7°. In 7.5 group (n=13), the tip rotated by 35.1 ± 7.1°. When the tip was rotated right by 180°, in 6.5 group, the tip rotated by 128.1 ± 37.7°. In 7.0 group, the tip rotated by 122.0 ± 48.8°. In 7.5 group, the tip rotated by 116.8 ± 29.8°. All rotation angles were significantly less than that at the end side (p<0.001). In left rotation, similar results were observed. These discrepancies of the rotation angles might be caused by resistance against the rotation in the nasal cavity and softness of the tube materials. Therefore, overrotation is important to release the catching of the tube tip.

Conclusion: When the tube is rotated to release the tip catching on the vocal cord during nasotracheal intubation using fibroscope, rotation angle at the tip is significantly less than the rotation angle at the end side of the tube. Therefore, overrotation should be considered.

Reference:

Endoscopic closure of a tracheoesophageal fistula using an Amplatz device. Potential new indication

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Background: Tracheoesophageal fistulas (TEF) are a rare condition with a high morbidity and mortality rate. Treatment includes primary repair and endoscopic closure, but there is no clear recommendation as to which the supraglottic device is more suitable. We present a successfully endoscopic closure of TEF using an Amplatz septal occluder (ASO), a device originally designed to treat atrial septal defects.

Case Report: The patient is a 23-year-old man with VACTERL syndrome. Secondary, he presents an 8mm TEF which lead to bronchoesophageal fistulas, chronic bronchopneumopathy and malnutrition. The TEF was treated several times by endoscopic techniques (clip and oesophageal endprosthesis) without success. Surgeons dismissed surgery due to its high risk and complexity. Then, endoscopic closure with an ASO was performed under general anaesthesia: 100mcg of fentanyl, 20mg of etomide and 40mg of rocuronium were administered as induction; endotracheal intubation was achieved easily with an n° 5.5 tube. Anaesthesia was maintained with sevofluorane and remifentanil (0.1mcg/kg/min).

Discussion: The main treatment of TEF is primary repair but the patient’s clinical condition does not often allow it, so several endoscopic treatments have been described (stent, clips, etc). Recently, ASO has been proposed as a new option 1. It is a disk made of nitinol with superelastic properties and memory foam and it was created to treat cardiac defects. Our patient was dismissed surgery, so the medical team thought of endoscopic closure with an ASO as his last curative chance. We choose general anaesthesia instead of sedation as we expected the procedure to last long. A small otracheal tube (n° 5.5) was placed because bronchosocist found it easier to handle the fibroscope from outside the tube than through it. The procedure was uneventful and the patient was discharged the following day.

Reference:
Comparison of Success Rate of Endotracheal Intubation with Two Different Videolaryngoscopes

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Background and Goal of Study: Airway management defines all interventions necessary for airway protection and it is among the main responsibilities of anesthesiologists. Therefore an anesthesiologist should know and be able to practice intubation by using video-assisted techniques if conventional techniques for intubation become unsuccessful. The current study aimed to compare the effects of two different videolaryngoscopes in terms of success of intubation and postoperative early complications.

Materials and Methods: The current retrospective study included 123 ASA I-III patients aged 18-65, undergoing elective surgery and requiring endotracheal intubation. Preoperative demographical variables, thyromental distance, sternomental distance, upper lip bite test and Mallampati classification scores were recorded. The patients intubated with McGrath(n=63) and Truview videolaryngoscope(n=60) were included to Group MG and Group TW, respectively. All patients included to the study had standard protocol for premedication, sedation and anesthesia induction. The number of intubation trials and duration of intubation (standardized as the time between laryngoscope entrance to mouth and demonstration of end-tidal carbondioxide graphy), Cormack Lehane scores and intubation were recorded. All patients included to the study had standard protocol for premedication, sedation and anesthesia induction. The number of intubation trials and duration of intubation (standardized as the time between laryngoscope entrance to mouth and demonstration of end-tidal carbondioxide graphy), Cormack Lehane scores and intubation became unsuccessful. The current study aimed to compare the effects of two different videolaryngoscopes in terms of success of intubation and postoperative early complications.

Results and Discussion: Demographical variables were not significantly different. Intubation was successful in the first trial in 59 patients in Group MG (93.7%) and in 51 patients in Group TW(85%), the difference between groups was not statistically significant. The duration of intubation was significantly shorter in MG group than in the I-gel group (21.6 s vs 2.7%, respectively, p = 0.013; Table 3). The most common complication was bronchospasm and bloody secretion on SAD.

Conclusion: We concluded that I-gel is preferable in fiberoptic-mediated tracheal intubation through SAD because the hemodynamic parameters were stable during the procedure, it has acceptable insertion duration and fewer complication rates. We believe that the more curvature and rigid structure of LMA Protector compared to I-gel might contribute to this result.

Comparison of Success Rate of Endotracheal Intubation with Two Different Videolaryngoscopes

Airway rescue after failed videolaryngoscopic intubation by fibrobronchoscopy through a second-generation supraglottic airway device in a patient with known difficult airway: a case report

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Background: Airway management is safest when potential problems are identified before surgery, enabling the adoption of a strategy, a series of plans, at reducing the risk of complications. However, human factor issues are considered among the most important contributors of bad decision making and adverse outcomes. In the scene of an anticipated difficult airway the anesthesiologist must have a set of backup plans to work around possible unexpected scenarios.

Case Report: We report the airway rescue of a 26-year-old patient scheduled for insertion of a cochlear implant due to history of microtia and bilateral congenital aural atresia in the context of Treacher Collins Syndrome causing deep hypacusis with no other known relevant antecedents. There was no report of difficult airway history, however the patient exhibited multiple difficult airway predictors which led to consider the awake intubation according to the anticipated difficult airway algorithm. There was lack of collaboration from the patient during this attempt. We initiated anesthetic induction with total intravenous anesthesia (TIVA) and neuromuscular relaxation. After three failed attempts at intubation using a videolaryngoscope the patient had to be rescued with a second generation supraglottic airway device (I-gel), and the airway secured using a fibrobronchoscope through said supraglottic airway device to advance an endotracheal tube.

Discussion: The adoption of strategies while managing a difficult airway improves the rate of success. The supraglottic airway devices, one of the stepping stones in the management of the difficult airway algorithm allow intubation even using a fibrobronchoscope which we consider to be a safe alternative in the management of these types of patients.

References:

Learning points: There is not one unique way to face the patient with difficult airway and an initial and backup strategies must be considered in order to guarantee a safe anesthetistic induction. The supraglottic airway device must always be considered in the scenario of a difficult airway in order to rescue it and then secure it via other method, including the use of a fibrobronchoscope.

Unexpected ventricular fibrillation after removal of Laryngeal Mask in a young healthy patient

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Background: Major cardiac complications such as ventricular fibrillation can occur unexpectedly in patients without risk factors.

Case Report: A 44-year-old patient without any coexisting disease was scheduled for elective vitrectomy. After induction with 2mg/kg propofol and 1 mcg/kg fentanyl, anesthesia was maintained with 2–3% sevoFlurane in 50% O2-air via a laryngeal mask airway (LMA). The operation lasted 70 minutes and the LMA was removed when the patient had sufficient spontaneous ventilation. Immediately after removing of the LMA ventricular fibrillation was seen on the monitor. Also, SpO2 disappeared and the patient stopped breathing. Help was called, chest compressions started and the patient was intubated. When the defibrillator arrived in about 90 seconds, the first shock was given with 150 J and 2 minutes CPR was continued according to the ERC guidelines. Sinus rhythm with ST elevations was seen on the monitor at rhythm check after 2 minutes and the return of spontaneous circulation was confirmed. On the ECG has taken in the OR no ST elevation could be seen anymore. The patient was transferred to the Post-anaesthesia care unit (PACU) for further evaluation. Echocardiography(ECHO) was performed by the cardiologist at the bedside. The patient was taken over to the coronary angiography unit, and a diagnostic angiography revealed %60 stenosis in the Left Anterior Descending(LAD) and Circumflex-artery(CX), as well as %30 in the right coronary artery(RCA). Consultations between cardiologists and cardiovascular surgeons ended in the decision of coronary artery bypass graft(CABG). After CABG the patient could be discharged uneventfully.

Discussion: The incidence rate of cardiac arrest during general anesthesia is 1.1–25.5/10,000. The mortality rate in non-cardiac surgery is 1.5%, and 42% of cases are associated with cardiac complications.
Comparison between Opioid-Free Anesthesia (OFA) and Opioid-Reduced Anesthesia (ORA) during open hepatectomy: a retrospective study

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Background and Goal of Study: Open hepatectomy is a painful procedure. Opioids consumption could slow the postoperative rehabilitation. They induce hyperalgesia and could increase the risk of recurrence and metastasis in cancer surgery. Because OFA has become a common practice in our institution, we retrospectively compared OFA to ORA protocols on the postoperative consumption of opioids.

Materials and Methods: In ORA protocol, patients received a multimodal analgesia: lidocaine, ketamine, dexamethasone and opioids (sufentanil or remifentanil). In OFA protocol, patients received similar multimodal treatment but opioids have been replaced by dexmedetomidine. The choice of the protocol was left to the discretion of the anesthesiologist. The primary outcome was the morphine consumption in Postoperative Hepatectomy Care Unit (PACU). Secondary outcomes were pain evaluation using maximum Numeric Rating Scale (maxNRS) in PACU, opioids consumption and maxNRS at D1 and D2, as well as treatment of PostOperative Nausea and Vomiting (PONV). Statistical evaluation was performed with univariate and multivariate analysis, comparison was performed with Student test and Mann-Whitney Wilcoxon test as required. p<0.05 was considered as significant.

Results and Discussion: From January to December 2018, 90 patients received OFA and 57 received ORA protocols. There was no significant difference in patient’s and surgical characteristics. In PACU, morphine titration was significantly lower in the OFA group (2.5±3.5 mg Vs. 6.4±5.5 mg, respectively in OFA and ORA groups; p<0.001) (Fig.1). Pain was significantly reduced (2.4±2.7 Vs. 5.8±2.9; p<0.0001) (Fig.2). At D1 there is a trend, but not significant difference in morphine consumption: (4.8±5.2 mg of equivalent IV morphine (MEIV) Vs. 8.4±9.5; p=0.2). In terms of level of pain, no difference was recorded (max. NRS=5±4.1 Vs. 5.3±1.7; p=0.7). At D2, the morphine consumption wasn’t significantly different (1.7±4.3 Vs. 3.1±7.5; p=0.16) but the pain was significantly lower in OFA group (3.5±2.1 Vs 4.9±1.9; p=0.0001) (Fig.2). The treatment of PONV was significantly less important in OFA group (18% Vs. 33%; p=0.031).

Conclusion: Compared to the multimodal approach in ORA protocol, OFA protocol could reduce the morphine consumption in PACU, and the total postoperative opioid consumption after open liver surgery. It isn’t surprising to find a lower level of PONV in the OFA group.


Can Opioid Free Anesthesia (OFA) reduce postoperative pain after Adolescent Idiopathic Scoliosis surgery?

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Background and Goal of Study: Posterior fusion for adolescent idiopathic scoliosis (AIS) is among the most painful surgeries. Common anaesthesia usually includes high doses of opioids and non-opioid analgesics. High doses of opioids have been reported to trigger chronic pain, responsible for poorer functional outcomes, and Opioid Free Anaesthesia (OFA) has recently gained popularity in colorectal surgery. We therefore hypothesized that avoiding intraoperative opioids using a new OFA protocol, during AIS surgery could decrease both postoperative morphine consumption during hospitalization stay, but also the occurrence of chronic neuropathic pain.

Materials and Methods: After IRB approval, a consecutive series of patients operated for AIS were prospectively included. A control group (January and June 2017) using a standard opioid-based anaesthesia, was compared to the OFA group (June 2018 and September 2018) using dexmedetomidine and ketamine. The primary measured outcome was morphine consumption at day 1 and day 3. The second outcome was the occurrence of self-reported chronic pain at 1 year postoperative.

Results and Discussion: A total of 33 patients included in the OFA protocol were compared to 36 controls. All patients were discharged at day 4 postoperative, without difference between groups. Morphine consumption was significantly decreased in the OFA group at day 1 (0.78 mg/Kg [0.16-1.5] vs 1.07 mg/Kg [0.60-1.69]; p=0.023) and at day 3 (0.59 mg/Kg [0.07-1.73] vs 1.39 mg/Kg [0.48-2.32]; p=0.048). No difference was reported between groups for pain intensity at day 1 and day 3, but the occurrence of chronic pain was significantly reduced in the OFA group at 1-year postoperative (48% vs 12%; p=0.038) without any side effect or complication reported.

Conclusion: OFA is efficient to reduce both postoperative morphine consumption during hospitalization and chronic neuropathic pain after AIS surgery. This protocol should be considered to enhance fast-track rehabilitation.
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Opioid sensitivity estimated by vascular stiffness predicts blood pressure after a skin incision

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Background and Goal of Study: Previously, we quantified the degree of vasovasodilatation as the vascular stiffness value (K) by fitting the Lissajous curve from plethysmography and invasive arterial pressure waveforms to a mechanical impedance model [1], and reported that the rate of change of K (KR) increased with nociceptive stimuli and decreased with opioid dosage [2]. However, the KR value may not be suitable for individual comparison as it varies widely among individuals. We hypothesized that the minimum nociceptive (tetanus) stimuli intensity to evoke the increase in K (MECK): Minimal evoking current of K) more accurately represents individual opioid sensitivity and blood pressure changes after a skin incision than KR.

Materials and Methods: After obtaining local IRB approval, the patients older than 19 years scheduled for a laparotomy were enrolled. After anesthesia induction, when remifentanil was maintained with an effect-site concentration of 2 ng/mL, sequential tetanus stimuli (10 to 50 mA) were loaded. KR at 80mA (KR80) and the current value at which K began to rise (MECK) were measured. The correlation between KR80, MECK, and systolic blood pressure (sBP) changes after the skin incision were analyzed. The formula predicting the sBP after the skin incision was made from MECK, and the accuracy between the predicted and measured sBPs were examined. Pearson’s correlation coefficient and the Bland-Altman method were used for our statistical comparisons.

Results and Discussion: There were 30 patients (15 males, 15 females), with an average age of 64.5±13 years. KR80 was 167±480 %, and MECK was 49.7±22.8 mA. The sBP before and after the skin incision were 78±14 mmHg, and 91±17 mmHg, respectively. The correlation coefficient between KR80, MECK, and the changes in sBP after the skin incision was KR80: r = 0.167, MECK: r = 0.62. A Bland-Altman plot compared the measured and predicted sBPs (Bias: -0.267mmHg, Precision:13.46mmHg). The increase in sBP after the skin incision was accurately estimated.

Conclusion: MECK is superior to KR80 as an opioid sensitivity index. MECK may predict individual opioid requirements for suppressing blood pressure increases from a skin incision.

References:

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Total intravenous anesthesia for laparoscopic cholecystectomy in Duchenne muscular dystrophy patient. With or without opioids: an opioid free anesthesia case report

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Background: Duchenne muscular dystrophy (DMD) patient is always challenging either to respiratory and cardiovascular comorbidity or the anesthetics trigger life-threatening reactions.

Case Report: A DMD 34-year-old patient with absence mobility in lower extremities, domiciliary bi-level positive airway pressure (BIPAP) and multiple admissions due to aspiration, cardiac systolic dysfunction with global hypokinesis, in addition to 95Kg obesity, scoliosis and difficult airway predictors. From acute cholecystoliths multidisciplinary evaluation, percutaneous cholecystectomy and antibiotic started prior surgery scheduled under total intravenous opioid free anesthesia (TiVOFA) with difficult airway and rescue planning. Preoxygenation and recruitment promoted during loading perfusions 1.00 µg/kg Dexmedetomidine, 0.25 µg/Kg Ketamine and 1.25µg/Kg Lidocaine. Anesthesia induction 3 µg/mL effect-site concentration (Ce) Propofol according Marsh program and 1mg/kg Rocuronium bolus achieves Cormack-Lehane I score with tracheal intubation followed protective pulmonary ventilator strategy. Maintenance with Propofol Ce (2.0-2.5 µg/mL) to bispectral index (BIS® 40-60), Dexmedetomidine (0.20-0.60 µg/Kg/h), Ketamine (0.12-0.25 mg/Kg/h), Lidocaine (0.20-0.60 µg/Kg/h) according to hemodynamic parameters and Rocuronium (0.6 mg/Kg) bolus to Post Tetanic Count (PTC <4) measure by Dragger-TOFscan®. Intraoperative treatment with 50mg Dextroketoprofen and 8mg Dexamethasone. Laparoscopic cholecystectomy achieved with hemodynamic stability without opioid requirement. Perusions withdrawal and 2mg/Kg Sugammadex neuromuscular reversal allowed successful extubating to domiciliary nasal BiPAP. At 12h intensive care unit and 72h hospital staying patient was discharge without opioid analgesic postoperative requirement.

Discussion: Short anesthesia in DMD such as propofol and remifentanil are preferable, succinylcholine must be avoided, volatile anesthetics are considered at high risk for life-threatening complications and anticholinesterase drugs are not recommended.1 Pubmed database search founded 143 results for (“Anesthesia” AND “Duchenne”) and 5 results for (“Dexmedetomidine” AND “Duchenne”) in sedation strategies.

References:

Learning points: Regarding respiratory concerns and risk of aspiration in DMD patient, TiVOFA it’s an excellent option allowing hemodynamic stability and postoperative analgesia with less nausea and vomit.

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Opioid Sparing General Anaesthesia and pupillometric evaluation of analgesia depth using dexmedetomidine as adjuvant: a pilot study

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Background and Goal of Study: This observational pilot study aims at verifying if the degree of vasoconstriction as the vascular stiffness value (K) by fitting the Lissajous curve from plethysmography and invasive arterial pressure waveforms to a mechanical impedance model [1], and reported that the rate of change of K (KR) increased with nociceptive stimuli and decreased with opioid dosage [2]. However, the KR value may not be suitable for individual comparison as it varies widely among individuals. We hypothesized that the minimum nociceptive (tetanus) stimuli intensity to evoke the increase in K (MECK): Minimal evoking current of K) more accurately represents individual opioid sensitivity and blood pressure changes after a skin incision than KR.

Materials and Methods: After obtaining local IRB approval, the patients older than 19 years scheduled for a laparotomy were enrolled. After anesthesia induction, when remifentanil was maintained with an effect-site concentration of 2 ng/mL, sequential tetanus stimuli (10 to 50 mA) were loaded. KR at 80mA (KR80) and the current value at which K began to rise (MECK) were measured. The correlation between KR80, MECK, and systolic blood pressure (sBP) changes after the skin incision were analyzed. The formula predicting the sBP after the skin incision was made from MECK, and the accuracy between the predicted and measured sBPs were examined. Pearson’s correlation coefficient and the Bland-Altman method were used for our statistical comparisons.

Results and Discussion: There were 30 patients (15 males, 15 females), with an average age of 64.5±13 years. KR80 was 167±480 %, and MECK was 49.7±22.8 mA. The sBP before and after the skin incision were 78±14 mmHg, and 91±17 mmHg, respectively. The correlation coefficient between KR80, MECK, and the changes in sBP after the skin incision was KR80: r = 0.167, MECK: r = 0.62. A Bland-Altman plot compared the measured and predicted sBPs (Bias: -0.267mmHg, Precision: 13.46mmHg). The increase in sBP after the skin incision was accurately estimated.

Conclusion: MECK is superior to KR80 as an opioid sensitivity index. MECK may predict individual opioid requirements for suppressing blood pressure increases from a skin incision.

References:

Learning points:
Regarding respiratory concerns and risk of aspiration in DMD patient, TiVOFA it’s an excellent option allowing hemodynamic stability and postoperative analgesia with less nausea and vomit.

surgery. PPI ≤3 was observed in 97% of «DEX» group patients compared to 53% of «N-DEX» group. Moreover, «DEX» group received less than half the remifentanil dose of «N-DEX» group (0.13±0.07 vs 0.3±0.11 mcg kg-1 min-1). The average dose of administered dexmedetomidine was 0.17±0.08 mcg kg-1 h-1.

Conclusion: An OSA strategy with Dex may have a better analgesia stability. A RCT is required to verify this hypothesis.

References:
5560

Impact of opioid free anaesthesia (OFA) versus opioid anaesthesia (OA) on oxygenation after bariatric surgery: a prospective observational study

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Background and Goal of Study: Opioids are frequently needed after bariatric surgery to depress breathing. Oxygen (O2) is therefore routinely given postoperative but masks hypoventilation. The primary objective was to compare O2 saturation without O2 therapy at the post anaesthesia care unit (PACU) on admission, at discharge and after an opioid dose was given in patients receiving OFA versus OA.

Materials and Methods: In a observational study 64 patients who underwent bariatric surgery from August till October 2019 were included. The study is recorded on NCT 03660306 and approved by the ethical committee. All patients provided consent to allow anonymized data analysis. Depending on the experience of the attending anesthesiologist an OFA using dexmedetomidine, lidocaine, ketamine and magnesium or an OA using sufentanil was given. Since 2019 laparoscopic bariatric cases are requested to be ventilated using a lung protective ventilation strategy to keep the lungs open until extubation. Fluid loading is restricted to 100 ml/h and deep neuromuscular blockade (PTC<2) is provided until the end of surgery followed by suggammadex to reach full reversal. At the PACU 5 mg of piritramid was given intravenously when VAS for pain was above 5. If saturation drops below 94% an oxygen mask is given. Chi2 and linear regression are used with p<0.05.

Results and Discussion: 34 patients were included in the OFA group and 30 in the OA group. There was no difference between the groups in age, gender and BMI. We found a lower saturation value before induction with OFA due to the dexmedetomidine loading dose of 0.2 mcg/kg LBW. Less oxygen masks at the PACU were needed after OFA (13% vs 53% p=0.001). The average opioid dose required postoperative was 4.8 mg in OFA versus 13.4 mg in OA (p= 0.001). An opioid given in the PACU after OFA or OA gave a significant reduction in oxygen saturation from 97.4% to 94.8% (p=0.001). Oxygen saturation on admission at the PACU was found to be associated with older patients, higher BMI or opioid anaesthesia. The drop in saturation after an opioid bolus was associated with older patients, OA and the dose of opioids given postoperative.

Conclusion: OA reduces oxygen saturation post bariatric surgery. Postoperative opioids (after OA/OFA) reduce oxygen saturation in a dose related manner.

References: 1. Young CC et al. JBA 2019;123:898-913

5580

Comparison of early recovery after manual and target control infusion of remifentanil in obese patients

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Background and Objective of Study: Early recovery characteristics are important for patients’ safety and operating room turnover. Our aim was to compare fundamental methods for dosing remifentanil during morbid obesity surgeries: a manual infusion (MI) and a target-controlled infusion (TCI). Throughout study, patient’s recovery time was tracked and compared between the groups.

Materials and Methods: 31 patients were evaluated who underwent bariatric surgery in HLUHS. All of them had received sevoflurane/remifentanil anaesthesia. Remifentanil infusion was randomly assigned to a MI (control group) or to a TCI (TCI group) method. We had evaluated patients’ hemodynamics (arterial blood pressure (BP), heart rate, saturation), spontaneous breathing and airway reflexes recovery time of extubation, eye opening, recovery of orientation and start of the following oral command. Also we had registered concentrations of remifentanil in the blood (according to automatic infusion pump) while using TCI method.

Results: Groups were similar in demographic data (fig. 1), remifentanil infusion duration (control - median 1.21 h (1.1,1.4), TCI - median 1.26 h (1.3,1.7), p=0.05) and differed according to BMI (fig. 1). We found that remifentanil consumption in the TCI group was higher (median 1.0 mg (1.1,15), p=0.02). We counted a difference of systolic BP (in percent) before and after anaesthesia and compared it in each group. We didn’t differ (control – median 13.0 (5.7,17), TCI group – median 12.0 (11,15). 9 patients were on antihypertensive treatment preoperatively, there wasn’t any statistically significant difference in arterial BP comparing with those 22 who didn’t use it. The TCI group demonstrated longer recovery time (median 14 min (12.3,15.7) comparing to median 10 min (8.8,11.2), p=0.001).

Conclusions: We found that comparing TCI method with MI, manual infusion showed better results in patients’ recovery after surgery. Moreover, higher doses of remifentanil were consumed using MI. In conclusion, decision of highly qualified anesthesiologist is more convenient for morbid obesity patients in comparison with TCI method.

Fig. 1:

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>TCI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>9</td>
<td>4</td>
<td>p=0.05</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>40 (37,44,3)</td>
<td>45 (37,53,24)</td>
<td>p=0.05</td>
</tr>
<tr>
<td>BMI</td>
<td>36 (0,6,7,4,3,2)</td>
<td>43 (0,6,4(0,9,0,6))</td>
<td>p=0.07</td>
</tr>
</tbody>
</table>

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A comparison of hemodynamic response to pneumoperitoneum in morbidly obese patients during low opioid and opioid based general anesthesia

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Background and Goal of Study: Pneumoperitoneum has important impact on hemodynamic function during general anesthesia. Low opioid anesthesia is new concept of general anesthesia to reduce opioid use which is especially important for obese patients regarding possible postoperative complications. The primary goal of this study was to estimate the impact of two type of anesthesia - Low Opioid Anesthesia and opioid based anesthesia on cardiac function during pneumoperitoneum in morbidly obese patients.

Materials and Methods: 43 patients, aged 18-55 years with BMI ≥35, scheduled for elective laparoscopic bariatric surgery were randomized in two groups : low opioid or opioid based general anesthesia. Haemodynamic function was measured using transaesophageal Doppler probe ODM+ (Deltes Medical, United Kingdom). Pneumoperitoneum pressure was 15 mmHg. In both groups we measured Cardiac Output. Measurements time points: T1 - after induction to anesthesia, T2 - anti-Trendelenburg (Fowler) position and pneumoperitoneum. In every timepoint 5 measurements were taken. Group 1: 30 Patients. Anesthesia was induced with 1,5 mg/kg Lignocaine, FNT 0,1mg, Ketamine 50mg, Propofol 1-5,2mg/kg. Rocuronium 0,6mg/kg. Anesthesia was maintained with desflurane in concentration depending on age of patients. Group 2: 13 Patients. Anesthesia was induced with FNT 5mcg/kg, Propofol 1,5-2mg/kg, Rocuronium 0,6mg/kg. Anesthesia was maintained with desflurane.

Results and Discussion: Changes in measured parameter. Results are Mean ± SD:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group</th>
<th>T1</th>
<th>T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO (l/min)</td>
<td>1</td>
<td>5.6 ± 1.09</td>
<td>5.18 ± 1.32</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6.81 ± 1.13</td>
<td>5.55 ± 1.12</td>
</tr>
</tbody>
</table>

In Group 1 a drop in CO between T1 and T2 was mean 7.5%, in Group 2 -19,33% (p>0.09). Opioid based general anesthesia decreased CO of 11,83% more than low opioid general anesthesia. There are studies showing no advantage of fentanyl over low opioid dexmedetomidine-based general anesthesia in attenuating cardiovascular response during surgery in morbidly obese patients [1]. Our study supports that observations.

Conclusion: Less hemodynamic changes after anti-Trendelenburg position and pneumoperitoneum were observed during Low Opioid Anesthesia – this type of anesthesia probably provide better hemodynamic stability.

Opioid Free Anaesthesia (OFA) was used in group R than group D (23.2 ±24.6mg vs. 3.3±8.6mg p=0.003). The incidence of cough during extubation was comparable between the two groups (Group D 73%, group R 70%). Eye opening time was significantly longer in group D than group R. The proportion of patients with no cough or single cough during extubation was significantly higher in Group R 70% vs Group D 32% (p=0.008) and rescue ketorolac consumption in PACU was significantly higher in Group R 70% vs Group D 32% (p=0.008). The time to first analgesic request in PACU, PONV till 24 hours were comparable. The time to extubation & time to shift to the PACU were 15.76 ± 4.380 min & 18.44 ± 4.253 min in the OBA group, 17.36 ± 4.367 min & 20.52 ± 4.528 min in the OFA group which were significantly different (p=0.043, p=0.046). The time to first analgesic use was recorded. The time to attain the PACU discharge criteria was 99.6 ± 16.197 min in OBA group & 101.8 ± 13.684 min in OFA group which were comparable. The time to extubation & time to shift to the PACU were noted. Post-operatively in the PACU, they were connected to a PCA pump delivering morphine. Pain was assessed with the help of a 0 – 10 cm VAS scale. The time to first analgesic use was recorded. The time to attain the PACU discharge criteria was assessed every 10 minutes. PONV was assessed and treated accordingly. The total analgesic consumption in 24 hours was noted. Data was analysed using Stata software, using standard statistical tests.

Results and Discussion: Demographic data was comparable. The time to attain the PACU discharge criteria was 96.6 ± 16.197 min in OBA group & 101.8 ± 13.684 min in OFA group which were comparable. The time to extubation & time to shift to the PACU was 15.76 ± 4.380 min & 18.44 ± 4.253 min in the OBA group, 17.36 ± 4.367 min & 20.52 ± 4.528 min in the OFA group which were significantly different (p=0.043, p=0.046). The time to first analgesic request in PACU, PONV till 24 hours were comparable. Both the groups received rectus sheath block for analgesia & were maintained with isoflurane. The time to eye opening, time to extubation & the time to shift to the PACU were noted. Post-operatively in the PACU, they were connected to a PCA pump delivering morphine. Pain was assessed with the help of a 0 – 10 cm VAS scale. The time to first analgesic use was recorded. The time to attain the PACU discharge criteria was assessed every 10 minutes. PONV was assessed and treated accordingly. The total analgesic consumption in 24 hours was noted. Data was analysed using Stata software, using standard statistical tests.

Conclusion: OFA technique showed similar time to attain PACU discharge criteria compared to OBA technique with a slightly delayed time to extubation.

References:
2. Opioid free TIVA improves post operative quality of recovery in ambulatory gynaecologic laparoscopy by Hakim KYK et al. PMID: 31198330.

The comparison of dexmedetomidine and remifentanil on perioperative hemodynamics and recovery profile for laryngeal microsurgery; prospective randomized double blinded study

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Background and Goal of Study: Laryngeal microsurgery (LMS) causes hemodynamic instability and postoperative agitation, cough, pain, nausea and vomiting. Moreover, short operation time makes anesthesiologist challenging. The aim of this study is comparing the feasibility between continuous administration of dexmedetomidine and remifentanil during general anesthesia in LMS.

Materials and Methods: The patients were randomly assigned to dexmedetomidine (group D) or remifentanil (group R). Before 5min of induction of anesthesia, dexmedetomidine 1.0 mg/kg bolus (group D) and 0.5mg/kg/hr, remifentanil 0.5mcg/kg bolus and 0.05ucg/kg/min (group R) was administered to each group, keeping mean blood pressure -20~10%. In both groups, administration of propofol 1.5mg/kg and rocuronium 0.5 mg/kg for induction and anesthesia was maintained with desflurane and 50% O2 + 50% N2O 3L / min titrated through the measurement of the Bispectral index. We recorded hemodynamic data during the general anesthesia and the grade of cough, pain score, nausea score during recovery.

Results and Discussion: A total of 61 patient (30 for Group D 31 for Group R) were completed this study. The proportion of patients with no cough or single cough during extubation was comparable between the two groups (Group D 73%, Group R 70%). Eye opening time was significantly longer in group D than group R(599±177.9sec, 493.5±103.6sec 95CI -181.2~30.5, p=0.007). But incidence of more than moderate sore throat is higher in group R than group D (42% vs. 10%, p=0.008) and rescue ketorolac consumption in PACU was significantly higher in group R than group D (23.2 ±24.6mg vs. 3.3±8.6mg p=0.003). The incidence of hemodynamic instability was comparable between the two groups.

Conclusion: Although there was a transient delay on emergence time, dexmedetomidine reduced postoperative sore throat and ketorolac consumption. Dexmedetomidine may be used as an alternative agents to opioid in laryngeal microsurgery.
Postreperfusion syndrome in liver transplantation: incidence and predictors in patients with piggy-back technique

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Background and Goal of Study: Postreperfusion syndrome (PRS) in patients undergoing liver transplantation, was defined as a decrease in the mean arterial pressure (MAP) 30% during the first 5 minutes after unclamping of the inferior portal vein (IPV). The variety of the risk factors presented in several studies suggest that the PRS occurs in an unpredictable manner. So, the primary aim of this study was to determine the clinical predictors factors of the PRS in our patients.

Materials and Methods: After institutional review board approval, this retrospective study was performed. Preoperative variables (age of recipient and donor, etiology of cirrhosis, recipient pathology, Child-Pugh classification, Model for End-Stage Liver Disease score) were analyzed. Intraoperative variables were recorded at each stage of the surgery (acid-base balance, serum electrolytes, systolic volume index, pulmonary capillary pressure, MAP, heart rate, cardiac index, systemic vascular resistance index (SVRI)). The times of each surgical phase, duration of cold-warm ischemia, a portocaval shunt and the weights of the liver (donor/recipient) were recorded too. Prior to graft revascularization, MAP and metabolic status of the recipient were optimized. Association between PRS and preoperative and intraoperative variables were tested. Statistical analysis was performed with SPSS software (IBM, 2016). Bivariate analysis was performed to analyze the association between two variables. Association of continuous variables with nominal variables was tested with paired t-tests after logarithmic transformation. Statistical significance was used for nominal dependent variables. P<0.05 was considered threshold for statistical significance.

Results and Discussion: Of the 149 patients included in the study, 34.9% developed PRS. There were significant differences in the variable “donor liver weight/recipient liver weight” (1.15 ± 0.36 in non-PRS group versus 1.35 ± 0.56 in PRS group; p=0.05); and in the percentage of change in the SVRI, from before clamping of IVC to after clamping (35.6% ± 52.2% increase in the non-PRS group versus 18.39% ± 35.46% (OR 0.44) increase in the PRS group (p=0.045). There were no significant differences between occurrence of PRS and the other intraoperative and preoperative variables analyzed.

Conclusion: In patient undergoing liver transplantation, a low increase in SVRI after clamping of IVC and a greater donor liver weight, are clinical predictors of PRS in our patients.

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Diabetes mellitus aggravates perioperative neurocognitive disorders by inhibiting autophagy via mTOR signaling pathway in rats

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Background and Goal of Study: Perioperative neurocognitive disorders (PND) are commonly observed in diabetes mellitus (DM) patients following surgery and anesthesia, but the exact mechanism has not been fully clarified. It has been reported that the activation of mTOR signaling pathway can inhibit autophagy flux in the progression of PND and DM, respectively. However, the role of autophagy in the surgical-induced hippocampal neuron apoptosis of DM rats remains elusive. The study was designed to investigate the effects of autophagy on the orthopedic surgery-induced cognitive dysfunction in DM rats.

Materials and Methods: Male SD rats were divided into 8 groups randomly (n=15): Con, DM, DM+Vehical (DM+V), DM+Rapamycin (DM+Rapa), PND, PND+Rapamycin (PND+Rapa), DM+PND, DM+PND+Rapamycin (DM+PND+Rapa). Cognitive function was assessed by using Morris water-maze (MWM) test. Immunohistochemistry and Western Blot were used to determine the expression of p-mTOR and Aβ and p-tau. The contents of cleaved caspase3, Bax, Bcl-2, Bcl-xL and LC3 were detected by Western Blot. All data were expressed as means ± SD. P <0.05 was considered statistically significant.

Results and Discussion: The results demonstrated that orthopedic surgery significantly impaired memory performance and inhibit hippocampal neuron autophagy. Similar effects have been found in DM rats. And cognitive function was severely impaired in DM+PND. What’s more, autophagy significantly suppressed in DM+PND compared with PND group, accompanied by the mTOR signaling pathway upregulated. Interestingly, treatment of rapamycin, an autophagy inducer, improved the cognitive deficit observed in the DM rats under orthopedic surgery by improving autophagic flux. Rapamycin treatment led to the inhibition of Aβ and p-tau accumulation, and increased the ratio of LC3-I to LC3-II in hippocampal neurons through inhibiting mTOR signaling pathway. These findings suggest that impaired autophagy in the hippocampal neurons of DM rats after orthopedic surgery contributes to cognitive impairment.

Conclusion: Diabetes mellitus aggravates perioperative neurocognitive disorders by inhibiting autophagy via mTOR signaling pathway in rats.

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Evaluating the influence of propofol or sevoflurane on 1-year recurrence free survival by considering pre- and postoperative neutrophil-lymphocyte ratio

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Background and Goal of Study: The neutrophil-to-lymphocyte ratio (NLR) has been suggested to reflect inflammation and immunosuppressive conditions. It has been used as an independent prognostic factor in primary breast cancer. When compared with sevoflurane, propofol based total intravenous anaesthesia (TIVA) with regional anesthesia (RA) has been suggested to suppress cancer recurrence in primary breast cancer. Sevoflurane is suggested to be immunosuppressive while propofol and RA both have anti-inflammatory properties. The monitoring of NLR increase and postoperative neutrophil-lymphocyte ratio on 1-year recurrence free survival by considering preoperative NLR variance with recurrence-free survival (RFS) at 1-year in primary breast cancer patients receiving sevoflurane or propofol.

Materials and Methods: In this single center, secondary analysis study, we included patients receiving either sevoflurane or propofol for primary breast cancer surgery between 2008 and 2012. Our primary outcome was the association between NLR increase and RFS at 1-year. Recurrence was defined as locoregional recurrence and distal metastasis. Data was compared using paired t-tests after propensity score matching. Propensity scores were calculated using 7 variables (age, sex, BMI, cancer stage, tumor size, intrinsic subtype, and deviation from 1:1 propensity-score matching, 224 patients were analyzed in total. There was no significant difference in 1-year RFSs (sevoflurane group: 8.0% [n=99], and propofol group: 7.1% [n=88]) We found no significant change in NLR(sevoflurane group: preoperative 2.45±1.57, postoperative 2.52±1.57, p=0.76, and propofol group: preoperative 2.6±1.96, postoperative 2.7±1.96, p=0.71). We also did not find a no significant difference in NLR of patients with 1-year recurrence. Our result suggests that the anti-inflammatory properties of TIVA without RA may be insufficient for the suppression of cancer recurrence.

Conclusion: There was no significant difference between perioperative NLR during primary breast cancer surgery with either sevoflurane or propofol based TIVA management.

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Perceptions and knowledge of post-operative delirium in anaesthesiologists in Singapore - a multicentre questionnaire

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Background and Goal of Study: Elderly patients aged >65 years are presenting for surgery at an ever-increasing rate. Post operative delirium (POD) affects quality of life after surgery. It has been associated with higher risk of mortality at 6 months, poorer functional outcome and a longer, more costly hospitalization and advancement to dementia. Due to a lack of effective treatment, awareness is important in the prevention of POD and its consequences. The questionnaire aims to understand the knowledge gap amongst anaesthesia professionals in Singapore. Materials and Methods: A questionnaire on perceptions and knowledge of POD was administered to senior and junior anaesthesiologists working in Singapore. Various response options were used and data was analysed using descriptive statistics.

Results and Discussion: A total of 205 clinicians responded, with a majority from general and university hospitals. 68% had more than 6 years of practice in
anaesthesiology. Majority ranked POD as the 4th-5th most important post-operative complication, after acute myocardial infarction (AMI), stroke and hyperventilation. However, only 44% were aware that low education level is a major risk factor for POD, and 77% were of the impression that delirium only happens in <30% of elderly population. Half of them were unaware that delirium is associated with an increased risk of AMI, stroke and sepsis; however 94% believe it does contribute to longer hospital stay. When asked about personal practices, 66% admit to having never performed delirium screening tools before (Confusion Assessment Method3), and only 41% correctly answered that the most prevalent type of delirium is hypoactive. A majority would use depth of anaesthesia monitoring to prevent awareness, but only 40% would use it with intention to reduce POD, despite 72.9% believing in its utility of doing so.

Conclusion: The responses show a general lack of awareness of prevalence and risk factors for POD. Although clinicians know the importance of POD, they underestimate the severity and significance of its occurrence, and thus are less likely to implement preventive measures. In view of our aging patient population and susceptibility to POD, it is imperative that clinicians are educated and encouraged to maintain a high standard of care for these patients.

Perioperative changes due to Using of the tourniquet for a long time in retrospective study

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Background and Goal of Study: In orthopedic surgery, we often use Tourniquet for prevent bleeding during surgery. The use of Tourniquet is one of the most common complications after general anesthesia, especially in elderly patients. Many studies have reported that dexmedetomidine sedation would reduce the incidence of POD. As the sitting position can decrease the brain perfusion and increase the risk of PODC, the aim of this study was to determine whether intra-operative dexmedetomidine infusion can decrease the incidence of POD and alleviate the neuro inflammatory response in patients over 60 years of age who underwent shoulder arthroscopic surgery.

Materials and Methods: A total of 80 patients, undergoing arthroscopic rotator cuff repair under beach chair position were randomly allocated to either control group (group C) or dexmedetomidine group (group D). Dexmedetomidine (0.6 ug/kg/hr) or comparable amount of normal saline was infused to each group during the surgery. Hernodynamic variables with cerebral oxygen saturation were recorded (1.) before anesthetic induction (2.) 10 minutes after anesthetic induction (3.) 10 minutes after changing to beach chair position (4.) 10 minutes after returning to supine position. Cognitive tests were assessed on the day before surgery and the day before discharge using the Korean version of Mini-Mental State Examination (MMSE-K). Arterial blood samples were collected for S-100β assay to confirm neuro inflammation.

Results and Discussion: There were no differences in hemodynamic variables and cerebral oxygenation between group C and group D during the measured time points. The results of MMSE-K after surgery were significantly lower compared to the results before surgery in both groups (P < 0.05), however, variables with repeated measures did not show significant time by group interaction. Similarly, although results of S-100β measured at the end of surgery (group C, 68.5 ± 22.7; group D, 75.6 ± 45.9) were significantly higher compared to the baseline (group C, 36.7 ± 13.0; group D, 33.6 ± 12.8, P < 0.001) in both groups, there was no significant differences with time by group interaction.

Conclusion: Unlike the previous in vitro and in vivo reports that dexmedetomidine administration is associated with reduced incidence of PODC, our results suggest that intraoperative dexmedetomidine does not prevent PODC.
Prospective cohort study on the perioperative course of Reticulocyte Haemoglobin levels in a cohort of colorectal surgery patients and its use for optimization of preoperative (subclinical) anaemia

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Background and Goal of Study: Pre-operative anaemia increases the risk for perioperative mortality and morbidity. Standard parameters for diagnosing (iron deficiency) anaemia are not optimal and markers for recent erythropoiesis, as the haemoglobin content of reticulocytes (RetHe), were not evaluated in a perioperative setting yet. We aim to evaluate the utility of RetHe as marker for perioperative subclinical (iron deficiency) anaemia

Materials and Methods: A prospective cohort study was performed in 175 adult patients undergoing colorectal surgery from September 2017 until November 2018 at the Maastricht University Medical Center. Anaemia diagnosis including RetHe measurement occurred perioperatively at five predefined time points. Pre-operatively, the iron status was determined and substituted according to the algorithm proposed by Goodnough et al. (2011). A linear mixed-effects model and correlation analyses were performed.

Results and Discussion: RetHe levels were 2.56 and 5.35 pg lower on post-operative day three and five, respectively, compared to baseline. RetHe levels did not differ between genders and patients with different underlying diseases. RetHe positively correlated with haemoglobin and transferrin saturation and negatively correlated with CRP. Additionally, RetHe levels were significantly lower in iron-deficient anaemic patients compared to non-iron deficient, non-anaemic patients. Conclusion: RetHe might be an appropriate marker for iron deficiency anaemia pre- and post-operatively and in patients with inflammatory diseases.

Lamotrigine for Reduction in Psychologic Side-Effect of Perioperative Ketamine: Pilot Randomized Double-blinded Placebo-controlled Trial

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Background: Ketamine, an NMDA receptor antagonist, is an attractive general anaesthetic, but the drug’s psychologic side-effects limit widespread use. Limited evidence suggests that lamotrigine, which inhibits glutamate release, may reduce the psychologic side effects of ketamine. We therefore tested the hypothesis that combining 300 mg of lamotrigine with ketamine reduces psychological side-effects.

Methods: We enrolled 46 adults 18-65 years old who were scheduled for non-cardiac surgery with general anesthesia and planned overnight hospital stay. Patients were randomized to placebo or 300 mg oral lamotrigine given 1 hour preop, with recipients receiving a kidney from a related donor having higher levels than recipients receiving a kidney from an unrelated donor. Recipient’s mtDNA levels 2 h post-op were higher in recipients than those receiving a kidney from a related donor having higher levels than those receiving a kidney from an unrelated donor. Recipient’s mtDNA levels 2 h post-op were higher in recipients than those receiving a kidney from a related donor having higher levels than those receiving a kidney from an unrelated donor. Recipient’s mtDNA levels 2 h post-op were higher in recipients than those receiving a kidney from a related donor having higher levels than those receiving a kidney from an unrelated donor. 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post-op correlated with creatinine levels at 6 and 24 m. In addition, mtDNA levels at 9 d correlated with KIM-1 at 9 d, creatinine levels at 6 and 24 m and glomerular filtration rate at 6 m. Pre-op mtDNA damage was comparable between donors and recipients, while mtDNA damage increased in recipients throughout 9 d post-op. Recipients with high mtDNA damage directly after reperfusion had significantly higher levels of KIM-1 at 1 and 9 d post-op, but lower creatinine levels at 6 and 24 m post-op compared to recipients with low mtDNA damage. Conversely, patients with the highest mtDNA damage at 9 d post-op had lower KIM-1 and NAG levels.

Conclusion: Levels and damage of plasma mtDNA early after kidney transplantation are associated with momentous kidney biomarkers and a long-term accelerated decline in renal function. Measurement of post-op mtDNA levels may aid to the identification of patients at risk for accelerated kidney dysfunction.

4609
The Effect of Inhaled Anesthetics on Myocardial Contractility in Laparoscopic Cholecystectomy: a Single-center Randomized Trial

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Background: Evaluation of the effect of inhaled anesthetics on hemodynamics during laparoscopic cholecystectomy is traditionally carried out by measuring blood pressure and heart rate (HR), which does not give an idea of the change in central hemodynamics in full. Meanwhile, there are non-invasive algorithms for evaluating the parameters of central hemodynamics based on the principle of volumetric compression oscillometry, which have proved themselves to be no worse than invasive techniques.

Goal of Study: To evaluate the effect of sevoflurane and desflurane on myocardial contractility and central hemodynamics in patients undergoing laparoscopic cholecystectomy.

Materials and Methods: A single-centered randomized study was conducted, including 50 patients of both sexes aged 36 to 68 years who underwent laparoscopic cholecystectomy for gallstone disease. Patients were divided into two groups depending on the inhaling anesthetic used: group 1 (n = 25, 53±9 years) - sevoflurane; group 2 (n = 25, 51±11 years) - desflurane. The duration of anesthesia was 60.4 ± 5 min and 57.3 ± 8 min, respectively. Non-invasive monitoring of central hemodynamics by volume-compression oscillography: BP, HR, cardiac output, CI, stroke volume, stroke index (SI), SVR. The assessment of central hemodynamic and functional activity level was carried out at the following stages: I - before induction; II - after induction, intubation and the beginning of the supply of an inhaled anesthetic; III - after application of carboxyperitoneum; IV - after clipping of the gallbladder; V - suturing.

Results and Discussion: The indicators of BP, HR did not have significant differences throughout at all stages of the study. When assessing hemodynamic profile indicators, statistically significant differences were revealed. Group 1 showed lower values (p <0.03) of BMap (103.9 ± 17 and 113.3 ± 24, respectively) and SI (31.7 ± 13 and 44.3 ± 6) at stage III of the study, with higher rates of SVR at the same stage in comparison with group 2 (1526 ± 200 and 1449 ± 205). Differences were also recorded in stage II - lower indicators of SV in group 1 — 82.4 ± 14, in comparison with group 2, where this parameter was — 94.9 ± 15.

Conclusion: Comparison of sevoflurane, desflurane has a less effect on myocardial contractility, both at the stage of saturation with an anesthetic and under conditions of carboxyperitoneum.

4636
The cytokine response of different anesthesia regimens in healthy volunteers

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Background and Goal of Study: Anesthesia is assumed to influence patients' immune response. During cancer surgery, a well-functioning immune response is pivotal. The aim of this study was to examine the immunological response of intravenous anesthetics in healthy volunteers without surgical insult.

Materials and Methods: Serum samples of 93 healthy volunteers, from previously published studies, were collected before and eight hours after induction. Thirty-one received propofol, 30 received propofol/remifentanil, 17 received dexmedetomidine and 15 received dexmedetomidine/remifentanil. The anesthetic regimens were standardized. Serum level of interleukin (IL)-2, IL-4, IL-6, IL-10, IL-17, IL-18, IL-21, IL-22, IL-23, C-X-C motif ligand 8 (CXCL8), Interferon gamma (IFNy), E-selectin, L-selectin, MHC class I chain-polypeptide-related sequence (MICA), MICB, Granzwyne A, and Granzyme B (Table 1), were measured by LUMINEX.

Results and Discussion: After anesthesia with propofol alone, IL-4 (p=0.021), IL-6 (p=0.018), IL-21 (p=0.034), IL-22 (p=0.001), CXCL8 (p=0.004), MIBC (p=0.040) and Granzyme A (p=0.045) were significantly increased. Propofol combined with remifentanil; IL-17 (p=0.027), IFNy (p=0.001) and MICA (p=0.033) were significantly decreased, only L-selectin (p=0.000) was significantly increased. Th1/Th2 ratio was significantly decreased; 0.651 vs 0.434 (p=0.001). After dexmedetomidine alone, IL18 (p=0.002), L-selectin (p=0.010), E-selectin (p=0.002) and Granzyme B (p=0.023) decreased significantly. Dexmedetomidine with remifentanil resulted in no significant changes.

4564
Machine-learned discovery of new genes and pathways associated with postoperative nausea and vomiting (PONV)

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Background and Goal of Study: The high interindividual variability infrequency of PONV suggests genetic susceptibility. System biology can be leveraged to integrate genetic data with molecular processes to generate prioritized candidate gene lists and to understand novel biological pathways. Such data would be key to informing future polygenic studies with targeting genome wide profiling.

Materials and Methods: The literature search by Pubmed (1998-2019) was performed to identify ‘training’ genes set associated with PONV in humans. Candidate genes were identified and prioritized using Topgene suite (topgene.cchmc.org), based on functional enrichment using several gene ontology (GO) annotations. Computational top-ranked candidate genes and literature curated genes were then included in pathway enrichment analyses. Hierarchical clustering was used to visualize select functional enrichment in patients with PONV phenotype.

Results and Discussion: Literature review identified 20 training genes associated with PONV which jointly enriched (p value < 5x10^-10) IFNγ, estrogen, progesterone, and serotonin binding. Candidate genes were prioritized using G protein-coupled amine receptor activity, neurotransmitter receptor activity, ammonium ion binding and serotonin binding. By prioritizing or ranking with machine-learning we identified 262 novel candidate genes based on functional similarity to training gene list. The topology of candidate genes with the similarity score > 0.5 and combined p < 10^-5 comprised 48 genes potentially associated with PONV. Heat map demonstrated significant enrichment of previously reported genes common to PONV phenotype, and several novel GO pathways, mostop being GABA signaling, glutaminergic synapse, adenosine receptors, corticotropin-release pathway, immune processes (chemokine receptors) and tyrosine hydroxylase.

Conclusion: This study demonstrates the utility of functional annotation-based prioritization and enrichment approaches and identifies novel genes and unique/shared biological processes involved in PONV.
Conclusion: In this study with healthy volunteers, cytokine release after propofol alone was associated with pro—and anti-inflammatory immune responses and in combination with remifentanil the Th1/Th2 ratio decreased. Dexametomidine, also in combination with remifentanil, had less immune activation and was shown to have primarily anti-inflammatory properties. Anesthesia with propofol and dexametomidine might be an ideal combination during cancer surgery, but dosage and magnitude of the immune response should be further investigated in prospective adequately powered clinical trials.

**Cytokine/chemokine**

| Cytokine/chemokine | IL-1β (IL-1 family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. | IL-6 (IL-6 family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. | IL-10 (IL-10 family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. | IL-12 (IL-12 family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. | IL-18 (IL-18 family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. | IL-22 (IL-22 family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. | TNFα (TNFα family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. | IFNγ (IFNγ family) released by activated T-lymphocytes, monocytes/macrophages, and NK cells. |
|-------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|

**Table 1. Brief description of the investigated cytokines and chemokines.**

4773

**Sevoflurane but not dexametomidine impairs ipsilateral cerebral blood flow autoregulation in mice after unilateral common carotid artery occlusion**

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**Background and Goal of Study:** Sevoflurane is a widely used general anesthetic. It was reported that 1 MAC (minimum alveolar concentration) of sevoflurane did not influence cerebral blood flow (CBF) autoregulation. Yet evidence is lacking in pathological state with carotid artery disease. Carotid artery disease occurs with a prevalence rate of 2-3% in patients over 60. And it contributes to approximately 10% to 15% of all ischemic strokes. Mouse model of unilateral common carotid artery occlusion (UCCAO) mimics its pathogenesis and results in cerebral hyperperfusion and vascular remodeling. This study aims at investigating the effect of sevoflurane on CBF autoregulation in mice with right UCCAO (rUCCAO).

**Materials and Methods:** 10w male C57 mice were randomly assigned to Sham and rUCCAO group. MAC value of sevoflurane in mice were determined before surgery. MAC was calculated as the average of greatest inspired concentration that prevented movement in response to tail clamp and the smallest concentration that prevented movement. Then, using Bruker BioSpec 9.4T animal MRI system and Pseudo-Continuous Arterial Spin Labeling (pCASL) technique, we calculated cerebral blood flow (CBF) autoregulation in mice with right UCCAO.

**Conclusion:** Our results suggested that CBF autoregulation in ipsilateral hemisphere was disrupted under SEVO anesthesia but not DEX 7 days after UCCAO.

4648

**The investigation of factors associated with postoperative shivering**

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**Background and Goal of Study:** It is well known that the incidence of postoperative shivering is inversely associated with core body temperature. However, it has been reported that the threshold of shivering could be affected by peripheral temperature or anesthetic agents. These reports are dated, though, and anesthesia techniques have since advanced considerably. Thus, the purpose of this study is to investigate the factors associated with postoperative shivering in current practice.

**Materials and Methods:** The institutional clinical research ethics committee of Kyushu University approved the study protocol (IRB Clinical Research number 2019-233). This retrospective study involved 340 patients who underwent radical surgery to treat endocervical or uterus cancer under general anesthesia in our hospital. The patients under 30 years old compared to patients over 50 years old (OR 0.10, 95%CI 0.04–0.27; P<0.001). In a recent randomized triple-blind trial, acetaminophen was reported to inhibit the incidence of shivering, consistent with the results of this study.

**Conclusion:** This study indicated that development of shivering under current anesthesia technique in our hospital was associated with postoperative core body temperature, use of acetaminophen and age.

**Table 1. Brief description of the investigated cytokines and chemokines.**

**Results and Discussion:** Among 340 patients, postoperative shivering developed in 109. The OR of postoperative shivering was significantly smaller in patients whose core temperature was over 37.5°C compared with those whose core temperature was under 37.0°C (OR 0.48, 95%CI 0.24–0.94; P=0.033). Peripheral body temperature was not associated with incidence of shivering. The use of acetaminophen significantly decreased the OR of postoperative shivering (OR 0.46, 95%CI 0.24–0.89; P=0.022). The OR of postoperative shivering were smaller in patients under 30 years old compared to patients over 50 years old (OR 0.10, 95%CI 0.04–0.27; P<0.001). In a recent randomized triple-blind trial, acetaminophen was reported to inhibit the incidence of shivering, consistent with the results of this study.

**Conclusion:** This study indicated that development of shivering under current anesthesia technique in our hospital was associated with postoperative core body temperature, use of acetaminophen and age.
Sevofluane inhalation enhanced thermogenesis of the flower, Nelumbo nucifera (Lotus)

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Background and Goal of Study: Thermogenesis in plants is rare, but some flowering plants like Nelumbo nucifera (Lotus) shows to generate heat to raise the temperature (Temp). Lotus flowers can actively warm up a large obconical flower, Nelumbo nucifera (Lotus) shows to generate heat to raise the temperature (Temp). Lotus flowers can actively warm up a large obconical flower. The present study demonstrated that the impaired STAT3 pathway (DEX) preconditioning on the long-term lesion of synaptic plasticity and neuronal apoptosis in hippocampus induced by neonatal repeated exposure of sevoflurane. Dexmedetomidine alleviates the long-term impact on the synaptic plasticity and hippocampal neurons induced by neonatal repeated exposure of sevoflurane.

Materials and Methods: 60 rats were randomly assigned into sevoflurane group (S), DEX preconditioning group (D) and control group. Rats in group S and D were intraperitoneally injected with 3ml/kg saline or 20μg/kg Dex in 3ml/kg saline respectively before inhaling 2.6% sevoflurane for 4h at P7, P14 and P21. Rats in group C and D at multiple stimulus intervals (FIG.1), suggesting that DEX can protect better in escaping latency and showed more times in crossing the target quadrant than those in group S. The increments of field excitatory postsynaptic potential (fEPSP) slope after high frequency stimulation in group S were remarkably lower than group C and D, while PPF ratio of group S was significantly higher than group C and D at multiple stimulus intervals (FIG.1), suggesting that DEX can protect synaptic plasticity from the adverse effect of sevoflurane. In addition, the number of TUNEL positive cells and the expression of cleaved-caspase-3 in the hippocampus in all groups were tested. Results and Discussion: At both juvenile and adult age, rats in group D performed better in escaping latency and showed more times in crossing the target quadrant than those in group S. The increments of field excitatory postsynaptic potential (fEPSP) slope after high frequency stimulation in group S were remarkably lower than group C and D, while PPF ratio of group S was significantly higher than group C and D at multiple stimulus intervals (FIG.1), suggesting that DEX can protect synaptic plasticity from the adverse effect of sevoflurane. In addition, the number of TUNEL positive cells and the expression of cleaved-caspase-3 in the hippocampus in all groups were tested. 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Prophylactic use of Anti-emetics. Concern for patient safety and outcome

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) is a very common unwanted effect of general anaesthetics leading to prolonged post-anesthesia care unit (PACU) stay, unanticipated delayed discharge from hospital, patient's dissatisfaction along with significant burden on health care facility. The incidence of PONV is between 30% - 80%. Thus appropriate patient risk identification, risk documentation and implementation of interventions may reduce the burden of PONV in both patients and health care system. Aim: Compliance with patient's risk stratification and documentation along with the administration of PONV prophylactic agents against the current recommended given by NHS guidelines.

Materials and Methods: We did prospective audit on 60 patients undergoing general/regional anaesthesia for surgery at Our Lady of Lourdes Hospital, Drogheda, over period of 4 weeks. Patients having Apfel scoring between 0-4 were included after approval from local audit committee. We followed the practice of documenting prophylactic antiemetic intraoperatively and for postoperative period till recovery.

Results and Discussion: In our audit 10/60 patients were having Apfel score 0 for PONV and same number of patients fall into Apfel score of 3, both groups of patients received same prophylactic anti-emetics. None of the patient fulfilled criteria of Apfel Score 4. While the rest were (40 patients) scored 2 and 3 according to Apfel scoring system and surprisingly received the same treatment as compared to others.

Conclusion: We found that there is gap in risk stratification, documentation and compliance with NHS guidelines according to Apfel scoring system for PONV.

Recommendation: Risk Stratification for PONV should be part of pre-op assessment. PONV prophylaxis should be administered according to NHS guidelines to stick with AAGBI patient safety.

References:
1. Risk Stratification for PONV should be part of pre-op assessment.
2. PONV prophylaxis should be administered according to NHS guidelines to stick with AAGBI patient safety.

Saving the Planet and the NHS - Reducing Desflurane use at Forth Valley Royal Hospital

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Background and Goal of Study: Halogenated inhalational anaesthetic agents contribute to global warming. The 20 year global warming potential (GWP), Carbon dioxide equivalent (CDE20) and atmospheric lifetime is significantly higher for Desflurane (3714; 187,186g; 14 years) in comparison to Sevoflurane (349; 6980g; 11.1 years)[1,2]. To reduce this environmental impact, Forth Valley Royal Hospital implemented measures starting in 2017 to reduce the use of desflurane.


Results and Discussion:


The effects of deep neuromuscular blockade in patients undergoing robotic thyroidectomy using a gasless, transaxillary approach

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Background and Goal of Study: In previous studies, continuous deep neuromuscular blockade (NMB) was shown to not only improve surgical conditions during surgery but also attenuate the intensity of postoperative pain and fasten postoperative recovery in patients undergoing laparoscopic or robot assisted laparoscopic surgery. This study aimed to determine whether continuous deep NMB attenuate postoperative pain and facilitate surgical site sensory change recovery in patients undergoing robotic thyroidectomy using a gasless, transaxillary (TAA) approach.

Materials and Methods: Eighty patients undergoing robotic thyroidectomy using a gasless TAA were randomly assigned to a moderate NMB group (Group M) or the deep NMB group (Group D). Patients in both groups received rocuronium infusion until removal of external retractor, maintaining a train of four count of 1-2 in the Group M and a post-tetanic count of 1-2 in the Group D, respectively. Postoperative pain was measured in all patients at three times point (postoperative care unit(PACU), 24 and 48 hours after surgery) and in three surgical sites (neck, chest and axilla area) by using numeric rating scale. Degree of postoperative sensory preservation was measured by comparing to opposite non-surgical site at 24 and 48 hours after surgery.

Results and Discussion: Clinical and pathologic characteristics of patients, perioperative outcomes such as transient voice change, hypocalcaemia, seroma, and hematoma were comparable between groups. Postoperative pain intensity was significantly lower in all measured site at 24 hours after surgery, and in neck and chest area at 48 hours after surgery. The number of patients with moderate to severe pain was also significantly less in all measured site at 24 and 48 hours after surgery. Degree of sensory change tended to be less in the chest area. (Table 1)

Conclusion: Continuous deep NMB during anaesthesia led to attenuate the intensity of pain in patients undergoing robotic thyroidectomy using a gasless, TAA approach, which will contribute to improve the patient's postoperative satisfaction.

Table 1. Postoperative pain and sensory change

<table>
<thead>
<tr>
<th></th>
<th>Group M</th>
<th>Group D</th>
<th>Pooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>PACU Neck</td>
<td>4.0±2.4</td>
<td>3.8±2.0</td>
<td>3.9±2.0</td>
</tr>
<tr>
<td>PACU Chest</td>
<td>4.2±2.6</td>
<td>2.9±2.4</td>
<td>3.0±0.7</td>
</tr>
<tr>
<td>PACU Axilla</td>
<td>5.8±2.3</td>
<td>5.6±2.2</td>
<td>5.7±2.2</td>
</tr>
<tr>
<td>NRS 24h Neck</td>
<td>3.4±2.3</td>
<td>1.3±1.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NRS 24h Chest</td>
<td>3.7±2.0</td>
<td>1.5±1.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NRS 24h Axilla</td>
<td>4.1±2.2</td>
<td>2.4±1.7</td>
<td>0.049</td>
</tr>
<tr>
<td>NRS 48h Neck</td>
<td>1.9±2.0</td>
<td>1.1±1.2</td>
<td>0.001</td>
</tr>
<tr>
<td>NRS 48h Chest</td>
<td>2.2±2.1</td>
<td>0.9±1.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NRS 48h Axilla</td>
<td>2.3±1.9</td>
<td>1.7±1.6</td>
<td>0.516</td>
</tr>
</tbody>
</table>

NRS, Numeric Rating Scale; PACU, post anaesthetic care unit.
Previously published drug interaction models do not predict patient response well in endoscopic submucosal dissection procedure sedation

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Background and Goal of Study: In recent years, endoscopic submucosal dissection (ESD) was developed to be therapeutic procedures of gastric cancer to enable en bloc lesion resection. Proper sedation is required not only for patient’s comfort but also adequate surgical condition to ensure precisely curative resection and reduce surgical complications. The aim of this study was to validate the accuracy of the previously published response surface model (RSM) during ESD in the clinical setting.

Materials and Methods: Twenty enrolled participants from 30 to 80 years old were sedated by propofol combined alfentanil target controlled infusion. We recorded loss of response (LOR), loss of response to esophageal instrumentation (LREI), and intolerable ventilator desaturation (IVD) pharmacokinetic profiles including plasma and effect-site concentrations by using the TIVA trainer simulation program. The modelf was built by plotting the 5%, 50%, and 95% isoboles to predict propofol-alfentanil effect-site concentrations that produced an equivalent effect (figure1). The model prediction accuracy was determined as calculating the difference of accurate predictions percentage between the true response and the model-predicted probability.

Results and Discussion: Our study is the first one to evaluate the accuracy of three response surface models (LOR, LREI, and IVD) in patients undergoing sedation for ESD procedures. The LOR and LREI model seemed to express the trend of probability; however, the prediction accuracy was still poor. Besides, we noted that the patient actually alfentanil-propofol dosage might be lower than what the original model predicted. Although the majority of our patients fall below the 50% isobole, the IVD model did not predict the two inadequate ventilation episodes.

Conclusion: The previously reported drug-interaction RSMs for upper gastrointestinal endoscopy can predict LOR but not LREI in ESD procedure. The IVD model didn’t predict desaturation periods well. Further researches are needed to improve the quality of ESD procedure sedation to aid clinical decision making and practice.

Deep neuromuscular blockade with sugammadex reversal for cervical spine surgery may not be less costly than standard clinical practice of rocuronium bolus and neostigmine reversal

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Background and Goal of Study: Deep NMB blockade, now easily feasible due to sugammadex availability, does not have a wide use because current indications are limited mostly to laparoscopic surgery and because of constraints related to the cost of sugammadex. We recently designed a RCT designed to assess if deep NMB and sugammadex reversal reduced anesthetic requirements in patients subjected to cervical spine surgery. 63 patients were randomized to two groups: 1) rocuronium (bolus-infusion) to maintain 1 to 2 Post-Tetanic Counts until the end of surgical dressing, with sugammadex (4mg/kg) for reversal; 2) rocuronium bolus for intubation and reversal with neostigmine if TOF<90%. We found that deep NMB reduced propofol, remifentanil and ephedrine consumption as well as the duration of the procedures and the time from end of surgery to extubation. Here, we present a sub-analysis of the trial results that examines how the differences between the two study groups in terms of drugs consumed and OR occupancy could impact on costs.

Materials and Methods: The average difference between groups in the doses of propofol, remifentanil, rocuronium, sugammadex and ephedrine were multiplied by their costs according to the prices applied in our National Health Service. The difference, in €, between the added cost of using a rocuronium infusion and sugammadex (A) and the savings obtained by the reductions in the other drugs (B) was calculated (C). The average difference in OR time, in minutes, between the two groups was obtained (D). The formula X=((60*C)/D) was used to obtain the value for the cost per hour of OR occupancy for which the cost of using Deep NMB and sugammadex would be balanced by the savings in drugs used and OR occupancy. The value obtained for X was compared with published values for OR costs at our institution.

Results and Discussion: Average doses (mg) for G1 and G2 were: propofol 715 vs 1082; remifentanil 833 vs 1069; Rocuronium for infusion 55.9 vs 0; Sugammadex 284 vs 0. Ephedrine used in 4 pts in G1 and 11 in G2. Neostigmine used only in 5 patients. Time (min) from end of surgery to extubation was G1 3.9 and G2 7.7. Total procedure time (min) was G1 131 and G2 146. Results were: A 1136; B 4.04E; C 1096; D 18,3min. Xwas 357,4E. Hourly OR costs at our institution are much lower: 474€ and 978€ without or with personnel.

Conclusion: Deep NMB and sugammadex may be cost effective due to less use of drugs and OR time.

Rocuronium for the prevention of incidental surgical movement without deepening laryngeal mask airway anesthesia

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Background and Goal of Study: Neuromuscular blocking agents (NMBAs) like rocuronium are historically associated with postoperative complications such as residual neuromuscular blockade and postoperative recurrarization. These have decreased drastically since the approval of sugammadex. NMBAs are not formally indicated for general anesthesia with laryngeal mask airway (GA-LMA) nor are necessary for lower limb venous surgery. However, NMBAs improve surgical conditions by abolishing intraoperative involuntary reflex movements (IIRM) without increasing anesthetic depth, associated with postoperative delirium and cognitive dysfunction. Our aim was to assess if deep neuromuscular blockade (DNMB) using rocuronium abolished IIRMs and improved surgical conditions while maintaining an appropriate anesthetic depth in patients scheduled for varicose vein surgery under GA-LMA.

Materials and Methods: We conducted a 2-month observational prospective study in patients scheduled for varicose vein surgery under GA-LMA. After informed consent was obtained, demographic, anthropometric and medical data were collected. Some patients’ anesthetic management included rocuronium administration and DNMB. Our primary outcomes included IIRMs, surgical conditions (as assessed by the surgeon on an ordinal 1-5 scale) and mean bispectral index (BIS) values. Secondary outcomes included mean percentual intraoperative time with BIS < 40 and presence/absence of ≥ 1 episode of BIS < 40 for ≥ 5 minutes.

Results: 43 patients were treated, 22 patients received rocuronium plus GA-LMA; 21 had deep NMB and GA-LMA. There were no differences in demographics, anthropometric and medical data. When compared, no differences were found in IIRMs (0.14 vs 0 per surgery, p=0.36), surgical conditions as assessed by the surgeon (4.86 vs 5.00, p=0.36) and mean BIS values (43.0 ± 1.68 vs 48.5 ± 7.5, p=0.08). However, patients who underwent surgery under no NMBA were more commonly oversedated. All (100%) showed BIS values < 40 during > 30% of the intraoperative period (vs 22.2% of patients under DNMB). All (100%) had ≥ 1 episode of BIS < 40 for ≥ 5 minutes (vs 37.5%). At last, mean percentual intraoperative time with BIS < 40 was 39.4% (vs 18.5%, p=0.023).

Conclusion: These results suggest that rocuronium and DNMB avoid an increase in anesthetic depth and correlated adverse outcomes in GA-LMA.
Fish bone impaction in distal oesophagus – a multidisciplinary challenge. Case report

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Background: Fish bone are one of the most dangerous foreign bodies to be removed endoscopically from the upper gastrointestinal (GI) tract. A multidisciplinary approach is essential in potentially fatal scenarios.

Case Report: A 81-year-old male was admitted to the emergency department with retrosternal discomfort and dysphagia after swallowing a fish bone. CT-scan showed a linear foreign body (24mm) with transverse orientation, impacted on the distal oesophagus with the medial tip adjacent to descending aorta. Considering the risk of aortic laceration requiring emergent endovascular aortic repair during fish bone removal, a multidisciplinary discussion between anaesthesiology, gastroenterology, cardiothoracic, general and vascular surgery decided to do endoscopic removal in angiography room. General balanced anesthesia with invasive arterial pressure was performed. Percutaneous femoral access was primarily done by vascular surgeon. Upper GI endoscopy showed multiple blood clots and abundant blood, which led to fish bone mobilisation to the stomach. After initial need of fluid and blood resuscitation to restore intravascular volume, patient gradually became hemodynamically stable. In the end, he was transferred mechanically ventilated to the intensive care unit. He was extubated with no complications 2 days after.

Discussion: Fishbone penetration of the esophagus can cause major vascular trauma, significant hemorrhage or aorto-esophageal fistulas. An integrated, multidisciplinary team approach can help optimize potential life-threatening complications and reduce mortality. This case highlights the relevance of careful planning that conducted to a safe, effective and efficient treatment.

References:

Learning points: Prompt recognition and planned retrieval of ingested fish bones by multidisciplinary teams can reduce morbidity and the mortality.

Procedural packs: Considering the environmental impact

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Background: The National Health Service committed to reducing waste in the NHS Long Term Plan 2019. Procedural packs have become commonplace: simplifying procurement, improving efficiency and potentially reducing costs. We hypothesise that many items in the procedural pack are not used and this generates unnecessary waste.

Methods: We performed a survey of 42 anaesthetists, in October 2019, at Nottingham University Hospital to establish items not commonly used. Individuals were shown photographs of the local CVC procedural packs that includes 30 separate items (excluding the CVC itself). Respondents were asked to state whether they ‘always’, ‘sometimes’ or ‘never’ used each item.

Results and Discussion: Results indicate there is significant waste of unused items. Of 1260 responses, there were 713 ‘always’, 174 ‘sometimes’ and 373 ‘never’. Only three of the items provided in the pack (guidewire, blade and drape) were used ‘always’ by all respondents. In contrast, the forceps, scratch pad, syringe labels and Luer caps provided were ‘never’ used by the majority of respondents. The metal forceps, scratch pad and metal needle holders are provided with the intention of minimising risk of needle stick injury. Whilst 88% reported ‘always’ using the needle holders, only 19% reported ‘always’ using the forceps; likely to reflect variation in teaching of suturing. The syringe labels are rarely used, and we believe this reflects how the majority of respondents were taught to use alternative methods of identifying syringes prior to the introduction of these labels. Hand towels and a gown are present to facilitate the mandated fully sterile technique. However, 36% ‘never’ use the hand towels and 43% ‘never’ use the gown, choosing to use a separate surgical gown pack.

Conclusion: Our results demonstrate that many items in our CVC procedural pack are not used. This is likely to be explained by variation in training and subsequent individual practice. It is essential that we minimise waste where possible through considerate procurement. Items have been included for a specific safety or practical reason. However, there is a clear difference in ‘work as prescribed’ and ‘work as done’. Addressing this by forming a national consensus on items essential for optimal CVC insertion could potentially reduce needlestick injuries, line infections but also waste. In the meantime, we should all consider providing items that are rarely used separately.

Challenges in aesthetic management of cold agglutinin autoimmune hemolytic anemia in a woman undergoing adrenalectomy

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Background: Cold agglutinin autoimmune hemolytic anemia (AIHA) is described as a paraneoplastic syndrome (PNS) mainly associated with lymphoproliferative diseases but also reported in solid tumors. Treatment is difficult once it is highly refractory to corticosteroids and resection surgery of the responsible neoplasia is the best option for remission. Anesthetic management of this patients requires a team work in order to minimize the hemolysis. Our case report illustrates our experience and strategies to avoid this situation.

Case report: A 70-year-old woman with an adrenal tumor diagnosed in a routine exam was undergoing adrenalectomy. During the study of an anemia 7 weeks preoperatively to the surgery a cold agglutinin AIHA was diagnosed, as a probable PNS. Despite all the heat measures and the corticosteroids there was a need to transfuse 10 red blood cell units (RBCU) until the surgery. During perioperative period we needed to reserve RBCU; raise the air temperature of the operation room; place forceps, blankets; cover exposed areas with cotton bandage; heat administer fluids and transport containers; monitoring continuously core and peripheral temperature and use non-invasive hemoglobin measure (Rainbow SET®). During the procedure the minimal core temperature was 37.8°C and hemoglobin ranged from 7.5 g/dL, after a blood loss of 3L and 2 RBCU. The patient was hemodynamically stable until the laceration of inferior vena cava which dictated the needed to start norepinephrine perfusion. She was transferred to the intensive care unit (ICU) sedated, ventilated, with vasoactive support and heating measures. In the ICU they could not reverse the shock, which the cause was not hemorrhagic, despite all the support and she died after 2 days. The result of pathological anatomy revealed diffuse large B-cell lymphoma.

Discussion: In cold agglutinin AIHA all heating measures are very important once it has a high impact in decreasing hemolysis. Plasmapheresis is an option for optimizing these patients before surgery and it could have been helpful. However, we were able to maintain hemoglobin variation between acceptable ranges and we believe that the incomplete exeresis of the mass was the main contribution to the outcome.

References:

Learning points: The cold agglutinin AIHA is an example of how simple measures can have a huge importance in order to optimize the patient to the surgery.

Use of Dexmedetomidine in a patient with Takotsubo Syndrome during laparoscopic surgery, a case report

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Background: The recently described Takotsubo syndrome, clinical presentation similar to an acute myocardial infarction and is triggered by an excess of catecholamines in a situation of physical or emotional stress, such as the current ones during the perioperative period, being of interest to us for timely diagnosis, treatment and prevention.

Case Report: 77-year-old female patient with hypertensive hypertrophic cardiomyopathy and Takotsubo syndrome, proposed for laparoscopic Toupet fundoplication. It is premedicated with Midazolam, Dexmedetomidine 50mcg in charge and we start perfusion at 0.6mg/kg/h. Induction with Lidocaine, Fentanyl, Propofol, Cisatracurium and, Dopamine infusion. Opioid free anesthesia, without incidents. Maintenance with TCI propofol of 0.7-1 mcg/ml, Cisatracurium and fentanyl. After pneumoperitoneum, there is an increase in blood pressure (TAM: 70-90 mmHg), the perfusion of Dexmedetomidine increases to 1 mcg/kg/h, with a return to baseline (65 mmHg). Rest of the surgery and stay in post-anesthesia care unit without incident.

Discussion: 1% of acute coronary syndromes, are Takotsubo syndrome, with an important incidence during the perioperative period, due to-emotional, psychological and non-psychological factors that affect its appearance. The keys to its prevention are: analgesia, mild induction, pain control and intraoperative hemodynamic changes, and avoiding the use of amines. See the use of Dexmedetomidine in its prevention, for its anti-inflammatory effects and inhibition of catecholamine release at the central level.

References:


Learning points: The clinic of Takotsubo Syndrome, similar to acute coronary syndrome, forces to manage following the latter’s therapeutic algorithms, until discarded. The most important thing is its prevention, where Dexmedetomidine acts by inhibiting the release of catecholamines and by its effects of anxiolysis, sedation, analgesia and hemodynamic stability.

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Presentation of reverse Takotsubo cardiomyopathy during laparoscopic adrenalectomy: a case report

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Background: Takotsubo cardiomyopathy (TTC) is an acute often reversible left ventricular (LV) dysfunction triggered by emotional or physical stress (1). Reverse Takotsubo cardiomyopathy (rTTC) is a rare variant of TTC. This is the case of a patient who developed rTTC intraoperatively, during an elective laparoscopic adrenalectomy.

Case Report: A 46 years old asymptomatic woman with no past medical history was planned to have a laparoscopic adrenalectomy for a non-secreting tumour, according to laboratory findings. Intraoperatively, during surgical manipulation of the tumour, a hypertensive crisis occurred, that lasted 40 minutes despite the administration of high doses of sodium nitroprusside, nitrates and remifentanil. After complete surgical excision of the adrenal gland, haemodynamic stability was re-established but a progressive hypoxaemia was noticed, that did not considerably respond to alveolar recruitment manoeuvres, PEEP and O2 inspired fraction increase. A chest X-ray and a transthoracic Echo (TTE) demonstrated pulmonary oedema and rTTC with Left Ventricle Ejection Fraction (LVEF) 25-30%. ECG alterations and troponin increase were also noted when in the Cardiac Care Unit. A week later, TTE showed LVEF:35-40%, mid-ventricular and basal akinesia of the LV, along with a small pleural effusion. Histological examination of the tumour confirmed the suspected diagnosis of pheochromocytoma.

Discussion: Undiagnosed and preoperative untreated pheochromocytoma can cause severe intraoperative complications, due to the extreme catecholamine release, secondary to surgical manipulation of the tumour. Pheochromocytoma-associated TTC is reported, though rTTC is a rare variant (2). It is not recognized as readily as traditional TTC, though early recognition and appropriate management are crucial for survival and avoidance of recurrence. It is characterized by basal akinesia associated with apical hyperkinesia, new ECG abnormalities, elevated cardiac markers and is typically seen in young women. It is often complicated by pulmonary edema, pleural effusion and cardiacogenic shock In this case, hypoxaemia because of pulmonary edema was the first sign of rTTC.

Learning points: Hypoxaemia can be the first symptom of rTTC, a rare variant of TTC presented in young women.

4894

Association between uncontrolled hypertension before induction of anesthesia and postoperative acute kidney injury

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Background and Goal of Study: Since the development of postoperative acute kidney injury (AKI) is associated with worse outcomes, it is important to evaluate the risk factors of postoperative AKI. Chronic hypertension (HT) has been recognized as one of the important risk factors. Whereas uncontrolled HT before the induction of anesthesia is often encountered, there are few reports conducting the relationship between HT and postoperative AKI. The aim of this study is to elucidate the relation between uncontrolled hypertension before the induction of anesthesia and prevalence of postoperative AKI and to identify perioperative risk factors of that.

Materials and Methods: We conducted a retrospective observation study of 213 patients with uncontrolled HT who underwent scheduled non-cardiac surgery with general anesthesia from January 2016 to December 2018. AKI was diagnosed in accordance with the Kidney Disease Improving Global Outcomes (KDIGO) classification within 48hr after the surgery. Patient demography coexistent diseases, anesthetic data, and laboratory data were extracted manually from the patients’ electronic medical records. We investigated the prevalence and significance of postoperative AKI as primary outcome and perioperative risk factors for postoperative AKI as secondary outcome. Perioperative risk factors for postoperative AKI were extracted by using multivariable logistic regression analysis.

Results and Discussion: Twenty-six (12.2%) patients with AKI were found in our patient group, which was higher than that previously reported prevalence of the disease in non-cardiac surgery. Multivariable analysis showed an independent association between postoperative AKI and preoperative low eGFR (9.8±18.1 versus 69.6±18.8, p<0.05) and the high amount of fluids during surgery (1912±1383 versus 1441±1033, p<0.05). Conversely, preoperative chronic HT was not found as an independent risk factor in patients with uncontrolled HT before induction of anesthesia.

Conclusion: Uncontrolled HT before the induction of general anesthesia may be related with higher prevalence of postoperative AKI. In addition, lower eGFR in preoperative term might induce postoperative AKI.

References:

General Anaesthesiology

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Anesthesia management for adult patient with congenital heart disease for non-cardiac surgery: case report

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Background: Ventricular septal defect (VSD) and atrial septal defect (ASD) are common congenital heart diseases (CHD) rarely encountered in adult patients presenting for elective non-cardiac surgery. Adults with CHD demonstrates specific and complex anatomy and physiology (1). Therefore, anesthetic management is very challenging, multimodal and multidisciplinary.

Case Report: We present ASA III, 62 year old woman scheduled for right nephrectomy, without cardiac symptomatology, but with systolic murmur on physical exam and ECG bradycardia. Pre-operative investigations revealed signs for pulmonary hypertension, ASD on echocardiography and VSD confirmed with pulmonary angiography. She received combined general and epidural anesthesia. We placed invasive hemodynamic monitoring and started infusion with magnesium sulfate. Due to perioperative hypotension and bradycardia, we started continuous phenylephrine infusion. Intraoperative, the surgeon found thrombus invasion in the inferior vena cava (IVC), an additional factor for complication and possible hemodynamic destabilization. After clamping IVC and evacuation of the thrombus, we continued with radical nephrectomy without significant hemodynamic destabilization. The mean arterial pressure (MAP) was above 80 mm/hg. Patient was extubated in OR and transferred to WARD. The postoperative period was uneventful and she was discharged from the hospital on the fifth postoperative day.

Discussion: Acyanotic CHD may be relatively asymptomatic until later in life, due to balance between systemic and pulmonary circulation. Such patients could be presented in OR for non-cardiac surgery. The main goal is maintaining hemodynamic stability and balance between systemic and pulmonary vascular resistance, avoiding predisposing factors that lead to pulmonary hypotension, excessive airway pressures, use of adrenergic agents and correction of reversible factors.

References:

Learning points: Patients with CHD, undergoing non-cardiac surgery have increased risk of mortality and morbidity (2). Anesthetic management is complex and it depends on the experience of the anesthesiologist, type of non-cardiac surgery and hemodynamic condition of the patient.
Clevidipine infusion for haemodynamic management during laparoscopic pheochromocytoma resection in a young man

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Background: Pheochromocytoma extirpation poses significant challenges for anaesthetists in blood pressure (BP) control. If undiagnosed, mortality can reach 50% during anaesthetic induction. Correct preoperative pharmacological preparation is necessary to prevent haemodynamic instability. Intraoperative events such as intubation, pneumoperitoneum and surgical manipulation of the tumour often cause massive catecholamine secretion and a peak in BP. Hypotensive episodes may occur after tumour clamping due to rapid decrease of blood circulating catecholamines or to the residual effect of hypotensive drugs.

Case Report: Preoperative alpha and beta blockade was used. Clevidipine 0.45 mcg/Kg/min infusion was started prior to induction in laparoscopic left adrenalectomy of a nineteen year old male. No changes in HR or BP were registered during laryngoscopy and endotracheal intubation. For haemodynamic changes see Fig. 1 below. As pneumoperitoneum was removed clevidipine and esmolol infusion were stopped. There were no hypotensive episodes or evident hemodynamic changes after adrenal vein clamping and tumour removal. The patient was extubated without complications and was transferred to ICU and discharged to the ward 24 hours later.

Discussion: Clevidipine butyrate is a dihydropyridine calcium channel blocker with a two to four minutes onset of action, allowing for rapid titration to control BP. Fast metabolism by plasma and tissue esterases provides a short duration of action, avoiding hypotensive episodes after tumour clamping. It compares well to sodium nitroprusside, but it has a lower risk of excessive hypotensive episodes due to its shorter half-life and greater arterial specificity. Compared to nicardipine, it has a faster offset.

References:

Learning points: Intraoperative clevidipine has better response in patients who are resistant to other antihypertensive drugs, more rapid distribution as well as less hypotension after tumour clamping due to shorter half-life.
Ischemic vascular disease and 8-year mortality in emergency abdominal surgery patients

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Background and aim: Emergency abdominal surgery patients carries a high mortality. Surgery carries a high risk of perioperative cardiac instability. Surgery patients are elderly and often have co-existing diseases. We aimed to examine the association between ischemic vascular disease and long-term mortality.

Methods: We included adult emergency major abdominal surgery patients operated on 13 Danish hospitals between 1st January 2009 and 31st December 2010. Appendectomies were excluded. The surgical procedure codes were retrieved from the National Patient Register (NPR) and linked to the Danish Anaesthesia Database (DAD) by the civil registry number. Preoperative ischemic vascular disease status (IVD) was defined as both cardiac vascular disease and extra-cardiac vascular disease and was retrieved from the NPR using ICD-10 codes registered five years before the index surgery. The primary outcome, all-cause mortality one year postoperative to eight years postoperative (1-8 year), was retrieved from the Danish Civil Registry System (CRS).

Results: A total of 4864 patients underwent emergency abdominal surgery, mean age 67 (IQR 54 – 78) and 50.7% female. Some, 20.9% (1019/4864) had preoperative IVD. In the IVD-group 72.8% of patients had registered ASA-score at 3 or above compared to 40.3% in the non IVD-group. Surgical characteristics did not vary between groups. Overall-mortality were 18.2% at 30 days, 15.6% at 31-365-days, 32.9% at 1-8-years and cumulative mortality was 53.7%. Mortality rates per 100 person years at risk after surgery for IVD patients were 374.2 at 30 days, 28.3 at 31-365-days and 10.8 at 1-8-years. The corresponding age and sex adjusted hazard ratios (95% CI) comparing IVD patients with non-IVD patients were 1.27 (1.10 - 1.47), 1.31 (1.09 - 1.57), 1.52 (1.33 - 1.74) and cumulative eight year HR 1.37 (1.26 -1.50).

Conclusion: Emergency abdominal surgery patients have a high long-term mortality. Preoperative ischemic vascular disease was associated to increased mortality risk at both short and long-term.
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Takotsubo cardiomyopathy after thyroidectomy – a surprise diagnostic due to atypical presentation

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Background: Takotsubo cardiomyopathy (TTC) is characterized by transient left ventricular dysfunction in patients without coronary artery disease. Clinical presentation includes chest pain or dyspnea with ECG changes and mild elevation of cardiac enzymes(1). We report a case of TTC with an atypical presentation after a total thyroidectomy.

Case Report: A 59 year-old female, ASA II, was submitted to a total thyroidectomy and had normal preoperative evaluation. Monitoring was according to ASA standards and surgery was performed under general anesthesia. Surgery and anesthesia were uneventful, despite an increase in heart rate at the end of the procedure. In Post-Anaesthesia Care Unit, she remained tachycardic and showed low peripheral O2 saturations, without dyspnea, chest pain or other symptoms, lung sounds were normal and there was no response to FiO2 increase. CT angiography showed bilateral pulmonary opacity. We considered the hypothesis of negative pressure pulmonary edema, started non-invasive ventilation with only mild response and she was admitted to ICU. Investigation showed T wave inversion and troponin elevation leading to suspicion of acute myocardial infarction. Echocardiography and cardiac catheterization showed left ventricular dysfunction and changes of contractility, excluding coronary artery disease. TTC was suspected and the patient managed accordingly. Respiratory dysfunction was solved and analytic cardiac markers normalized. At day 8, left ventricular function was normal and contractility restored. The patient was discharged clinically asymptomatic and oriented to outpatient Cardiology for follow-up.

Discussion: This case satisfied InterTAK Diagnostic Criteria(2). Although enhanced sympathetic stimulation due to surgery seems to be the pathogenesis, the mechanism by which catecholamine excess precipitates myocardial stunning is still unknown(2). In this case the diagnostic was unexpected because the patient lacked the classical symptoms such as dyspnea and chest pain and we assumed the low PaO2 was due to a respiratory cause related to anaesthesia and the tachycardia was a consequence of hypoxia.

References:

Learning points: Although typical signs and symptoms of TTC are mostly present, some cases have an atypical presentation and a high grade of suspicion is needed. Despite increased awareness to TTC, it remains an exclusion diagnosis.

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Correlation between intraoperative hypotension and high sensitivity troponin T level in joint replacement surgeries

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Background and Goal of Study: It is hypothesized that myocardial injury demonstrated by changes in high sensitivity troponinI (hsTnT) may be caused by intraoperative hypotension (IOH). The aim was to investigate the association between intraoperative hypotension and postoperative changes in high sensitivity troponin T levels.

Materials and Methods: Totally, 33 orthopedic patients ASA II – III, 8 male, 25 female, with average age 67 ± 8.4 years were included in prospective observational study, 63.3% undergoing knee replacement (n=21) and 36.4% hip replacement surgery (n=12). Demographical data, co-morbidities, routine medications, ECG changes were fixed. All patients presented chronic compensated cardiovascular diseases in their anamnesis. HsTnT was evaluated at two time points: T1 in operating room before the surgery and T2 - on the first postoperative day. Intraoperative data as non-invasive mean arterial blood pressure (MAP), ECG and heart rate were obtained. IOH was defined as MAP >95 mmHg lasting at least 5 minutes. Significantly increased hsTnT level was defined as >14 ng/L or >20% from T1 measurement if it was >14 ng/L.

Results: Preliminary results from 33 patients demonstrates that significantly increased levels of hsTnT postoperatively were in 24.2%. One patient had high hsTnT levels 268.9 ng/L at T1 and was excluded from further analyse. The average operation time for hip replacement was 79 ± 23.6 minutes and for knee replacement 84 ± 25.8 minutes without intergroup difference. Major blood loss was not detected during surgeries. Mean hsTnT level at T1 was 9.91 ± 6.13 ng/L and at T2 12.7 ± 9.36 ng/L without significant difference. For 8 patients hsTnT level at T2 increased by 56.7% when compare to T1. The incidence was equal between those who underwent hip and those with knee replacement 4/12 vs. 4/21; p = 0.3. Elevated hsTnT levels postoperatively were demonstrated in 21.4% for those with IOH compared to 26.3% in those without IOH, p = 0.72. There was not found significant correlation between IOH and postoperative hsTnT changes (p = 0.77). In postoperative period any cardiovascular events were not recorded.

Conclusion: HsTnT levels increases after joint replacement surgery and IOH seems significantly not to affect the increment of hsTnT levels. For future results a greater sample size should be analysed.

6417

Incidence and risk factors for new onset atrial fibrillation following major abdominal surgery. A retrospective analysis

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Background and Goal of Study: Atrial fibrillation (AF) after cardiac surgery is associated with increased morbidity and hospital length stay.(1) There are few data on postoperative AF after non cardia surgery. The purpose of this study was to investigate the incidence of the postoperative AF after major abdominal surgery in patients without preexisting AF.

Materials and Methods: The present study was designed as a retrospective analysis of patients between January 2017 and November 2019. All consecutive elderly patients undergoing major abdominal surgery (age>68) at Hippocrates General Hospital, Athens were screened for this observational study. Elective, urgent or emergency, open or laparoscopic procedures were all included. Patients with a preoperative history of supraventricular arrhythmias requiring treatment were excluded. The primary endpoint of the analysis was the incidence of postoperative AF and the identification of risk factors. The data set included demographic, clinical outcome characteristics such as, duration of surgery and anesthesia, the occurrence of postoperative atrio-ventricular block, epinephrine or dobutamine administration during the surgery, anaesthetic technique and length of in-hospital stay were also investigated. Statistical analysis was computed using SPSS version 20 statistical software (IBM SPSS Inc.).

Results and Discussion: The final sample consisted a total of 1845 patients. The profile for patients affected by postoperative AF was considerably different with regard to demographics and operative data. Patients affected by postoperative F in the overall surgery were older than those who were not affected (74,7±4,9 versus 68,1±1,8,years,p<0.0001). The rate of postoperative AF varied by operation and was highest in abdominal aortic aneurysm surgery 912,2%) and lowest in open colectomy surgery (1,1%). The most patients who developed postoperative AF have used general anesthesia. Postoperative AF mainly occurred within 48th postoperatively (median 2 days). Perioperative drug regimen influence the development of AF. The use of β-blockers (p<0.05) was associated with a decreased AF risk, but not the use of calcium antagonists,angiotensin-converting enzyme inhibitors and statins (p>0.05).

Conclusion: New onset postoperative AF are associated with adverse clinical outcome of major abdominal surgery patients.

4399

Liver transplantation in patient with hereditary hemorrhagic telangiectasia or Rendu-Osler-Weber disease: case report

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Background: Hereditary hemorrhagic telangiectasia (HHT) is a disorder in vascular endothelial growth factor causing angiodysplastic lesions in various organs, Liver involvement (LI) causes serious and mortal complications (biliary ischemia, portal hypertension (PHT), heart failure (HF)). The only definite cure is orthotopic liver transplantation (OLT).

Case report: 40y old woman with HHT type 2, presenting epistaxis, mucocutaneous telangiectasias, liver arteriovenous malformations (AVM), chronic hypertrophribinemia and elevated cardiac output (CO) with hyperdynamic systolic function and pulmonary hypertension (PH). OLT is suggested. Before OLT her condition worsens, with admissions due to decompensated HF, GIT bleeding, respiratory infections and hepatic encephalopathy. For OLT basic monitoring is set and pulmonary artery catheter is placed before induction of general anesthesia (GA). The initial data shows moderate PH and hyperdynamic state. After the GA a transesophageal ultrasound shows moderate dilation of right cardiac chambers and hyperdynamic contractions. During hepatectomy there is moderate bleeding with signs of PHT. In anhepatic phase there is no need for vasopressors. In reperfusion phase epinephrine, ephedrine, calcium chloride and sodium bicarbonate are used for hemodynamic changes and metabolic acidosis. There was no postperfusion syndrome. In nehepatic phase norepinephrine infusion (0.2 mcg/kg/min) was initiated. Treatment with blood products was guided by ROTEM®. Lactic acid was descending at the time of transfer to the ICU.

Discussion: The worst complication in HHT patients with LI is HF due to shunts generated by AVM that raise CO by 25-58%. Right cardiac catheterization should be done preoperatively to assess pulmonary and cardiac pressures and to evaluate the shunt and contractile function. Possible treatment, when cardiopulmonary involvement is embolization or ligature of the hepatic artery, with side effects such as liver necrosis or failure. The OLT should be considered at an early stage to improve cardiopulmonary function and avoid the risk for hepatobiliary sepsis and offer a better life quality.

References:

4391

Comparison of the use of fresh frozen plasma during liver transplantation in three different liver transplant centres

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Background: We identified 79 patients at Leeds Teaching hospital, 181 patients at King’s College Hospital and 117 patients at Royal Free Hospital undergoing liver transplant surgery. Recipient characteristics were obtained through patient notes and online charts. This included age, gender, PLT and MELD scores. Transplant characteristics were also collected including the use of a donor, type of graft and use of FFP. We divided our patients into re-do transplantation and non-re-do transplantation with their respective characteristics. We then focussed on the use of blood products for all patients and compared these characteristics between the three hospitals. For statistical analysis, we compared each of the three hospitals with One-Way ANOVA with Tukey post hoc testing, Mann-Whitney U and Chi-square testing.

Case report: It was found that KCH used significantly more Cell Saver, FFP, cryotherapy and colloid as compared to Leeds Teaching hospital and the Royal Free hospital. This significant difference was found in both non-re-do transplantations and re-do transplantations. KCH was found to have more re-do transplants as compared to Leeds Teaching hospital and the Royal Free hospital.

Discussion: There is obvious disparity between the three hospitals with the use of blood products, especially in regard to the use of FFP. Possible explanations for such include KCH being an incredibly large transplant centre and thus dealing with more complex cases. In addition, KCH have a larger amount of paediatric cases and thus would have more re-do transplantations as donated liver tissue does not last forever. Lack of uniform protocols across the different sites could also explain the difference in the use of blood products. Influences of the use of blood products are vast, and include center volume, surgical skills, low CVP strategy and the use of FFP. We divided our patients into re-do transplantation and non-re-do transplantation with their respective characteristics. We then focussed on the use of blood products for all patients and compared these characteristics between the three hospitals. For statistical analysis, we compared each of the three hospitals with One-Way ANOVA with Tukey post hoc testing, Mann-Whitney U and Chi-square testing.

Conclusions: Results for such difference in the use of blood products are large, many of which would require extensive research into. We believe that the reason for such difference lies in the difference in size between the three centres and the lack of uniform protocols. We hope that this study would aid the development of protocols for fluid replacement that would be rolled out across the UK and thus unify practice in the whole country with the six liver transplant centres.

4743

A case of intraoperative massive bleeding in patient with cranial metastasis of hepatocellular carcinoma on prone positioning

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Background: Neurosurgical procedures are often performed in the prone position for improved surgical access. Unexpected bleeding while in such an unusual position represents an additional challenge for anesthesiologists. We report a case of intraoperative massive bleeding from cranial metastatic tumor and difficult management of intravenous line because of prone positioning.

Case report: A 61-year-old female presented with enlargement of cranial metastatic Telangiectasia. N Engl J Med 2000; 343:931-936. The initial data shows moderate PH and hyperdynamic state. After the GA a transesophageal ultrasound shows moderate dilation of right cardiac chambers and hyperdynamic contractions. During hepatectomy there is moderate bleeding with signs of PHT. In anhepatic phase there is no need for vasopressors. In reperfusion phase epinephrine, ephedrine, calcium chloride and sodium bicarbonate are used for hemodynamic changes and metabolic acidosis. There was no postperfusion syndrome. In nehepatic phase norepinephrine infusion (0.2 mcg/kg/min) was initiated. Treatment with blood products was guided by ROTEM®. Lactic acid was descending at the time of transfer to the ICU.

Discussion: The worst complication in HHT patients with LI is HF due to shunts generated by AVM that raise CO by 25-58%. Right cardiac catheterization should be done preoperatively to assess pulmonary and cardiac pressures and to evaluate the shunt and contractile function. Possible treatment, when cardiopulmonary involvement is embolization or ligature of the hepatic artery, with side effects such as liver necrosis or failure. The OLT should be considered at an early stage to improve cardiopulmonary function and avoid the risk for hepatobiliary sepsis and offer a better life quality.

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References:
Effect of noradrenaline infusion on hepatic and portal pressures: preliminary results of a prospective observational trial

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Background and goal: Noradrenaline is used as treatment for intraoperative hypotension.1 Animal studies have shown that noradrenaline has minimal effect on hepatic pressures,2 but human studies are lacking. The aim of the present study was to evaluate the effect of noradrenaline infusion on hepatic and portal pressures.

Materials and Methods: After ethical committee approval and written informed consent, 12 patients scheduled for pancreatectoduodenectomy were included. Anaesthesia consisted of a target-controlled infusion of propofol and remifentanil. Goal-directed haemodynamic therapy was guided by PulsoflowTM. After measurement of baseline haemodynamic variables (T1), noradrenaline infusion was started. Mean arterial pressure (MAP) was titrated to respectively 10 – 20% (T2) and 20 – 30% (T3) of baseline MAP. After reaching target MAP, portal and caval vein pressures were measured using a 25-gauge needle, which was directly placed in the vein and connected to a pressure transducer. To calculate portal vascular resistance (PVR), portal hepatic blood flow (HBF) was measured using ultrasound transit time flow measurements (Medi-Stim AS) and related to portal pressure. Hence, the PVR equals portal HBF divided to the portal pressure. Data were analysed using ANOVA for repeated measurements.

Results and Discussion: Noradrenaline significantly increased MAP (p < 0.01) but had no effect on central venous, caval or portal vein pressures. Both cardiac output and portal HBF remained similar. Although SVR significantly increased (< 0.01), noradrenaline had no effect on PVR (p = 0.17).

Conclusions: Noradrenaline had no effect on central venous, caval and portal pressures. SVR increased significantly while PVR remained unchanged. The underlying mechanisms for this different response on vascular resistances remains to be elucidated.

References:

Effect of somatostatin on system haemodynamics and hepatic blood flow

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Background and Goal of Study: Previous studies have suggested that somatostatin may affect hepatic blood flow (HBF) in the presence of presence of portal hypertension1. The clinical effects of somatostatin administration on HBF however remain ill-defined2. In the present study we aimed to assess these effects by comparing HBF in patients with and without intra-operative somatostatin administration.

Materials and Methods: After ethical approval and written informed consent, patients scheduled for pancreatectoduodenectomy were included and divided in 2 groups, according to the surgical indication for somatostatin administration. Anaesthesia was provided for all patients using propofol TCI (Schnider model) and remifentanil TCI (Minto model). All patients received goal-directed haemodynamic therapy guided by PulsoflowTM (Gelinge Group). HBF was measured using ultrasound transit time flow measurements (Medi-Stim AS). Arterial, portal and total HBF, indexed to the cardiac output, were compared using Wilcoxon rank sum-test.

Results and Discussion: A total of 22 patients were included. 13 patients received somatostatin (group S) whereas 9 patients did not (group C). Cardiac output, systemic and portal pressures were similar in both groups. Total HBF was significantly lower in group S (14.5% [13.3 – 16.0]) compared to group C (22.6% [19.5 – 24.1]) (p = 0.04). The difference between portal HBF’s (10.6% [9.0 – 11.5] vs 14.9% [11.1 – 18.2] (p = 0.04)) revealed a statistical significant difference between both groups. Arterial HBF’s (4.8% [2.1 – 5.4] vs 5.8% [3.6 – 9.2] (p = 0.21)) were similar in both groups (see figure).

Conclusion: Somatostatin had no effect on systemic haemodynamic variables but significantly reduced total HBF. The present study suggest that this is related to a reduced portal HBF with somatostatin.

References:
Influence of inhalation anesthetics on liver function of patients with toxic hepatitis during surgical treatment of pulmonary tuberculosis

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Background and Goal of Study: Leading place among 29% of patients with adverse reactions after polychemotherapy (PCT) for treatment of tuberculosis (TB) is occupied by toxic hepatitis (TH). Therefore, 30% of the patients require surgical treatment under general anesthesia, as a result of therapy. However, there is less information about influence of inhalation anesthetics on liver function, in case TH. The aim of this study was to evaluate effects of sevoflurane (SF) and desflurane (DF) on liver function of patients with toxic hepatitis caused by anti-TB PCT during surgical treatment of pulmonary TB.

Materials and Methods: 45 patients with combination of TB and TH were studied for liver function after anesthesia with SF (23 patients) or DF (22 patients). Groups were similar with respect to sex, age, ASA status, forms of TB, duration of anesthesia. Level of aspartate aminotransferase (AST), alanine aminotransferase (ALT), total bilirubin (TBil), alkaline phosphatase (ALP), gamma-glutamyl transpeptidase (GTP), lactate dehydrogenase (LDH), alpha-glutathione S transferase (alphaGST) were measured before, 1, 6, 24 hours, 7, 14 days after surgery. Hemodynamic monitoring with PICCO technology was carried out during operation to prohibit reduction of hepatic blood flow.

Results and Discussion: ALT level was 4 times higher than normal in both groups at start of the study. In the future, there was a tendency to decrease. It had reached near normal levels by 14 days after surgery. Initially AST level was 2 times above norm and then it was remaining within these limits in both groups throughout the study. Before intervention, level of GTP was twice reference range in both groups. In the group of SF, there was a decrease it to normal values, during 1 hour after the operation, followed by increase after 6 hours and normalisation to 24 hours. In the desflurane group, level of GTP had a steady downward trend. Level of alphaGST was initially comparable in both groups and it was 3 times higher than normal. In desflurane group, level of alphaGST was rising during first hour with subsequent reduction to the norm level after 24 hours. SF group indicator was descending. Levels of ALP, LDG, Tbil were remaining within reference intervals throughout the study.

Conclusion: SF and DF do not worsen the studied markers of liver function in case of stable hemodynamics during operation in patients with combination of TB and TH both in the early and late postoperative period.

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Transperitoneal versus extraperitoneal robot-assisted laparoscopic radical prostatectomy on the postoperative hepatic and renal function

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Background and Goal of Study: Through retrospective method, we evaluated the hepatic and renal function changes of patients undergoing robotic-assisted laparoscopic radical prostatectomy (RALP) during and after surgery. We also aimed to describe the effects of pneumoperitoneum via transperitoneal (TP-RALP) and extraperitoneal (EP-RALP) approaches on liver and kidney function in patients after operation. To provide clinical data support for anesthesia management of patients with RALP and choose the appropriate surgical scheme for ones with hepatic insufficiency.

Materials and Methods: This study retrospectively collected 159 prostate cancer patients who met the inclusion criteria from 2015 to 2019. By comparing the laboratory tests of hepatic and renal function before and after surgery in patients with different surgical approaches (transperitoneal or extraperitoneal).

Results and Discussion: Postoperative total bilirubin (TB) and bound bilirubin (CB) in the two groups were both significantly higher than before surgery, while total protein (TP), albumin (ALB), and globulin (GLO) were significantly less than before surgery (p<0.05). There were no statistical differences in the preoperative hepatic function between the two groups. But TP, ALB and GLO of the EP-RALP group were significantly higher than TP-RALP group after operation (p<0.05). In TP-RALP group, urea, serum creatinine (Scr) and uric acid were significantly less than before surgery (p<0.05). In EP-RALP group, urea and uric acid were significantly less than before surgery (p<0.05). There were no statistical differences in estimated glomerular filtration rate (eGFR) and Creatinine Clearance (CCR) in the two groups. There were no statistical differences in the renal function between the two groups whether before or after surgery.

Conclusion: RALP has a significant effect on hepatic function after transperitoneal and extraperitoneal approaches. TP, ALB, and GLO of EP-RALP group were significantly higher than TP-RALP group. It is suggested that different pneumoperitoneal pathways may have different effects on protein consumption in the body. But it may have less effect on renal function.
Post-operative laboratory findings in patients submitted to orthotopic liver transplantation

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Background and Goal of Study: There is no single laboratory test capable of detecting complications after liver transplantation, however, they can be used to monitor the patient both by their absolute value and by analyzing their trend values. We evaluated the laboratory profile of patients in the first 30 days after orthotopic liver transplantation (OLT), aiming to analyze their tendency over the days, as well as the moment of return to normality.

Materials and Methods: This is a retrospective study in which laboratory exams were collected from 50 patients from the 1st to the 30th day after transplantation in the Fortaleza General Hospital, from January 2016 to December 2016, of both genders, at 18 years and over, with varied causes of loss of liver function. Included were hemoglobin, hematocrit, platelet count, INR, Partial Thromboplastin Time (PTT), Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), total bilirubin, urea, creatinine, alkaline phosphatase (AF), gamma glutamyl transpeptidase (GGT).

Results and Discussion: In this study, INR and PTT presented normalization on average on the 3rd and 5th days after OLT, respectively, with a significant reduction in their values from the 3rd day. Other studies have shown that the persistence of coagulopathy indicates severe organ dysfunction. Transaminases did not return to normal within 30 days following liver transplantation. However, there was a reduction in the value with statistical significance from the 5th postoperative day for the AST and the 7th day for the ALT. Regarding bilirubins, the mean was not normalized at 30 days postoperatively, however there was a statistically significant reduction from the 12th day. AF and GGT did not have their means normalized during the study period, however they showed an upward trend from the first day after OLT. This pattern is similar to that observed in other studies, where it was found that AF and GGT are the last to normalize. Elevation of AF, bilirubins, AST, ALT are known to be typical of acute but nonspecific rejection, also occurring in other conditions such as hepatobiliary dysfunctions.

Conclusion: In the present study it was possible to follow with statistical significance the variation of the values during the time of most of the evaluated exams (7 from a total of 12). The importance of knowing this patient profile stems from the fact that complications inherent to surgery can be detected early by laboratory tests.

References:
1. Huang SY, Lee YM, Tzeng ST, Su CP, Huang SF, Wu YK, et al. Gorham's disease: a case report of three surgeries and anesthetic wound infiltration was performed. Aims in the therapy of patients with MELAS syndrome.

4371

Anesthetic considerations in patients with Gorham's disease: a case report of three surgeries and postoperative follow-up for 7 years

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Background: Gorham’s disease (vanishing bone disease) is a rare disorder characterized by massive bone resorption. It mostly affects the mandible, ribs, and spine. To date, there are only around 200 cases reported, with little data regarding anesthetic management or long-term postoperative follow-up.

Case presentation: Seven years ago, a 42-year-old Asian male with Gorham’s disease was admitted to our hospital due to persistent low back pain. Image study showed severe kyphosis and bony destruction over the T12-L1 vertebrae and the left lower ribs. The patient then underwent his first surgery, T12-L1 vertebral column resection and TS-L4 posterior fusion with instrumentation. A rescue and revision surgery was arranged a year later due to the loosening of some fixing rods. General anesthesia with endotracheal intubation was performed in these two surgeries. This patient had anuveentful recovery without any neurological sequelae [1]. He was admitted again in October 2019 for cystostomy due to necrogenic bladder with concomitant urinary tract infection. Because of the worsening pulmonary function from progressive chest wall deformity, only light intravenous sedation with local anesthetic wound infiltration was performed.

Discussion: Anesthetic considerations mainly lie in airway management, ventilation setting, and postoperative pain control. A difficult airway is often anticipated when a patient has mandible lesions with limited mouth opening. Manual in-line stabilization during intubation should be applied for C-spine protection. Positioning can be difficult if the patient presents severe kyphosis. Patients with Gorham’s disease often develop restrictive lung disease because of kyphosis and chylothorax. Pressure-control mode ventilation with lung protective strategy including low tidal volumes (6-8 kg/mL) and optimal driving pressures is preferred. Multimodal analgesia should be considered, while epidural analgesia can be troublesome due to spine lesions.

References:

Learning points: Anesthesia for patients with Gorham’s disease can be challenging due to the extensive involvement of the skeletal system, particularly airway management. Increased risks of anesthesia due to worsening pulmonary function necessitates special care.

4459

Successful therapy of an intraoperative lactic acidosis by using high-caloric parenteral nutrition in a patient with MELAS-syndrome

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Background: Mitochondrial encephalomyopathy, lactic acidosis and stroke-like episodes syndrome (MELAS syndrome) is one of the most frequent mitochondrial disorders due to a defect of mitochondrial phosphorylation, there is an impaired mitochondrial energy production with consecutive metabolic disorders, especially in situations with increased stress, e.g. during an operation. With regard to the anesthesiological management, MELAS syndrome patients therefore represent a challenging cohort. To date, literature concerning the correct treatment of these patients is rare so that this case report is supposed to support decision making for anesthesiologists in the therapy of patients with MELAS syndrome.

Case Report: We report the case of a 34-years old female with known MELAS syndrome who underwent an elective laparoscopy due to endometriosis that changed in a laparotomy in the course of the operation. General anesthesia was induced with Remifentanil, Thiopental and Rocuronium. Arterial and central venous catheters were inserted. General anesthesia was maintained with Desflurane and Remifentanil. The first arterial lactate value at the beginning of the operation was 1.4 mmol/l. In the following two hours, the patient developed a lactic acidosis with increasing lactate levels (arterial lactate concentrations every 30 minutes, [mmol/l]: 1.4; 2.0; 2.5; 3.7; 3.9). A liberal crystalloid infusion therapy and the application of Glucose 40% (10ml/h) could not stop this progress. At a lactate level of 4.2 mmol/l high-caloric parenteral nutrition was started (SMOFakabiven 1600 kcal, 60ml/h). This therapy led to a normalization of lactate level (arterial lactate concentrations every 30 minutes, [mmol/l]: 3.8; 3.0; 2.4; 1.6). After 4 hours of operation time, the patient could be extubated without any complications and was transferred to the intensive care unit.

Discussion: In this case report, the application of high-caloric parenteral nutrition was associated with the normalization of a progressive lactic acidosis. Possibly, a prophylactic parenteral nutrition may reduce the risk for the development of lactic acidosis in patients with MELAS syndrome. Further research is needed to investigate this aspect in the future.

Learning points: The application of high-caloric parenteral nutrition seems to be a suitable approach in the therapy of patients with MELAS syndrome and intraoperative lactic acidosis.

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Anesthetic management of an insulinoma: a case report

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Background: Insulinoma is a functioning pancreatic neuroendocrine tumor and a rare cause of recurrent hypoglycemia. It’s manifested by recurrent episodes of hypoglycemia and adrenergic symptoms, with low blood glucose levels, correlated with a pancreatic lesion suggestive of insulinoma. She was submitted to laparoscopic enucleation of the lesion under balanced general anesthesia. Monitored by the ASA standard, blood glucose was measured every 30 minutes until tumor resection and then every 15 minutes. These levels were titrated by crystalloid infusion with 5% glucose. There were no postoperative complications.

Discussion: Pancreatic neuroendocrine tumors are rare and insulinoma is the most common subtype. Laparoscopic resection is the gold-standard treatment. However, the hemodynamic changes caused by pneumoperitoneum lead to the release of...
catecholamines, vasopressin and, indirectly, cortisol, which stimulate endogenous glucose production, whose perioperative levels are already uneven. 1 Anesthetic evaluation should include documentation of neurological damage resulting from severe hypoglycemic episodes. 1 Intraoperatively, the anesthesiologist should prevent hypoglycemic episodes during tumor management and post-resection hyperglycemia. The most accepted approach is that the patient should start on a 10% glucose solution continuously and that glucose levels should be assessed every 30 minutes to maintain glycemic levels between 100–150 mg/dL. 1 Anesthetic technique should include drugs that decrease the cerebral metabolic rate of oxygen, such as propofol or thiopental.

References:

Learning points:
Despite its rarity, an insulinoma represents a major challenge, particularly due to the variation of intraoperative blood glucose. Anesthesiology plays a crucial role in these patients' management because, although the ultimate treatment is the surgical removal, proper control of glucose levels can prevent neurological damage, providing a better outcome for the patient.

Effect of 10 min-prewarming on core body temperature during gynecologic laparoscopic surgery under general anesthesia

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Background and Goal of Study: Previous research has shown beneficial effect of prewarming on preventing inadvertent perioperative hypothermia. Nevertheless, there are not many researches on effects of short period prewarming, especially in gynecologic laparoscopic surgery.

Materials and Methods: Fifty-four patients are randomly assigned to 2 groups (Fig.1). Patients in non-prewarming group was warmed only intraoperatively with forced air warming device and for those in prewarming group, warming started 10 min before anesthetic induction. The primary outcome was incidence of intraoperative hypothermia.

Results and Discussion: Intraoperative hypothermia was observed in r. s. 1 percent in non-prewarming group, while it occurred in 24 percent of patients in prewarming group (P <0.001). There were significant differences in changes of core temperature between the non-prewarming group and all the prewarming groups (p < 0.001). Postoperative shivering occurred in 8 out of 26 (30.8%) in non-prewarming group, and in 1 out of 25 (4.0%) in prewarming group (P = 0.024).

Conclusion: Forced air warming for 10 min before induction combining with the intraoperative warming is effective method to prevent hypothermia in patients undergoing gynecologic laparoscopic surgery.

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Evaluation of comfort under moderate/deep sedation with dexmedetomidine/propofol during endoscopic ultrasonography: a prospective, randomized, controlled study

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Background and Goal of Study: Endoscopic ultrasonography (EUS) is a more complicated procedure than conventional endoscopy. Dexmedetomidine (DEX) and propofol are common sedatives for endoscopy, both of them have advantages and disadvantages, we chiefly aimed to compare the patients' comfort of dexmedetomidine (moderate sedation) and propofol (deep sedation) undergoing the EUS.

Materials and Methods: This is a prospective, randomized and controlled study. patients who underwent the EUS and the EUS-FNA were randomly allocated to received dexmedetomidine (group D) or propofol (group P). Group D received DEX at a loading dose of 1 ug kg⁻¹ lasting for 10 min followed by a maintenance infusion rate of 0.2-0.3ug kg⁻¹ h⁻¹ throughout the whole procedure. When the Modified Observer's Assessment of Alertness/Sedation Scale (MOAA/S) reached 3 to 4, starting the procedure. Patients in the group P were given propofol 1mg kg⁻¹ intravenously, and the practice was started when the MOAA/S reached 1 to 2. A single dose of sufentanil 1 ug kg⁻¹ was administered before the procedure in all patients. The primary endpoint was patients' comfort score based on visual analogue scale (VAS), and the secondary endpoints included postoperative comfort index, sedation related adverse events and endoscopists' satisfaction.

Results and Discussion: 60 patients were eventually enrolled each group in the current study. The patients' comfort score was lower in the group D than that in the group P (P <0.001). There was no significant difference about postoperative comfort index excepted nausea and vomiting which were more common in patients with DEX after the procedure (p <0.05). The incidence of desaturation, hypotension and apnea were significantly higher in patients with propofol (all P <0.05), but there were more patients had bradycardia in the group D (P <0.05). And the endoscopists' satisfaction score was also significantly lower in the group D (P <0.05).

Conclusion: Compared with Propofol, DEX provided lower patients' comfort and endoscopists' satisfaction during EUS. But it was relatively safer for patients with DEX undergoing EUS and caused less hemodynamic and respiratory depression.
Anaesthetic management in IrreversibleElectroporation (IRE): Four year experience

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Background and Goal of Study: IRE is a non-thermal ablation technology based on the application of electrical energy to the target cells. It is often used as an alternative of surgery in unseetable, locally advanced malignant disease. The aim of this study was to evaluate perioperative anaesthetic management and safety of this technique.

Materials and Methods: Retrospective review was performed of patients who received IRE by percutaneous or laparotomy approach between July 2015 and November 2019. Anaesthetic management, perioperative complications, stay in Postanesthesia Care Unit (PACU) and survival per year were analyzed.

Results and Discussion: 19 patients were included: 6 pancreatic, 5 liver, 7 kidney and 1 thyroid cancer. The descriptive analysis showed a mean age of 62.05 (± 9.21 SD) and most patient were ASA III. We evaluated two different groups: percutaneous (8) and laparotomy approach (11). All patients required high doses of opioids and neuromuscular blockade to avoid cardiac arrhythmias and muscle contractions. All patients underwent a Train Of Four ratio and double ECG monitoring, one to synchronize the IRE pulses with the ECG. Most patients in the percutaneous group (kidney and thyroid IRE) had no intraoperative incidences. However, 2 patients had cardiac events related to the electric impulse (arterial hypertension or tachycardia). 3 patients in the laparotomy group (pancreatic and liver IRE) had arterial hypertension too and 2 patients had accidental sections of large vessels adjacent to tumour during surgery. The mean surgical time was 270 min (± 1.05 SD). No patient developed severe complications due to the IRE such as a malignant arrhythmia, rhabdomyolysis or seizures. Incidence of postoperative complications due to surgical technique was similar in both groups (37%). However, the severity of these complications in the laparotomy group, resulting in a higher mean PACU stay. Overall, one year survival rate was of 73.7%.

Conclusion: The main advantage over other ablative methods is that there isn’t heating or freezing damage surrounding tissues and that the heat sink effect does not occur. It is considered a safe procedure to treat tumours near vital vascular and ductal structures. Given the anatomic location of pancreas and liver, an open technique is indicated, however, the rate of complications increases. The Analgesia Nociception Index (ANI), could be used to measure sympathetic activity during application of electrical impulse.

What’s the best anaesthetic aproach in a patient with amyotrophic lateral sclerosis?

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Background: ALS is a rare neurological disorder characterised by degeneration of higher and lower motor neurons with progressive muscle weakness. One should be aware of the risks and benefits of performing any kind of anaesthesia in this patients in order to not aggravate or exacerbate their previously condition.

Case report: A 54 year-old male of ASA physical status class 4, with advance Preoperative weight loss facilitates surgery.

Discussion: ALS has multiple anaesthetic concerns that makes the preoperative review of functional status a imperative guide for decision-making in the optimal anaesthetic management of these patients. In this case, we choose a propofol based sedation in order to avoid more serious complications of general anesthesia as life-threatening hyperkalemia if succinylcholine is used or residual muscle weakness that require postoperative mechanical ventilation1. PEG placement under propofol sedation in patients with ALS is safe and acute respiratory complications are rare2. Also, the use of a propofol bolus rather than bolus for propofol and remifentanil 1 µg/kg as an intravenous bolus followed by 0.5 µg/(kg × min) as intravenous infusion until the end of the surgery. The hemodynamic parameters and bispectral index (BIS) values of the patients were examined before anesthesia, 10 min before osteotomy, during osteotomy, and 10 min after osteotomy.

Conclusion: Osteotomy directly affects hemodynamic parameters and depth of anesthesia. Hence, it is of utmost importance that the analgesic need and depth of anesthesia are adequately monitored and adjusted during osteotomy. By suppressing hemodynamic stress responses, the amount of bleeding can be reduced, thus increasing the surgical success.

Effect of pretreatment with a low-calorie diet on liver function in obese patients undergoing laparoscopic sleeve gastrectomy

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Background and Goal of Study: Preoperative weight loss facilitates surgery. This retrospective study of laparoscopic sleeve gastrectomy (LSG) investigated the effect of pretreatment with a low-calorie diet on liver function during the perioperative period.

Materials and Methods: We recruited 26 adult obese patients (16 women and 10 men; age, 46 ± 10 years; body mass index, 39.2 ± 6.4 kg/m2) who underwent LSG consecutively from January 1, 2017 to October 31, 2019. Their medical and anesthetism records were retrospectively reviewed and data pertaining to the serum concentrations (IU/L) of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were collected as an index of liver function. A low-calorie diet was prescribed individually to approximate 1000 kcal/day for 2 weeks. The serum concentrations of AST and ALT were measured four times on the admission day (baseline value, within 5 days before the surgery (T1)), and on the 1st and 7th postoperative day (T2 and T3). Serial changes in AST and ALT concentrations were analyzed by repeated-measures analysis of variance and followed by a post-hoc test. P < 0.05 was considered statistically significant.

Results and Discussion: Pretreatment with a low-calorie diet yielded a weight loss of 5.2 ± 1.6%. The duration of the surgery was 171 ± 34.9 min. A significant related adverse outcomes is needed to raise awareness and to develop clinical pathways to approach these patients in the best way possible. Sedation in patients with ALS is safe and acute respiratory complications are rare.
difference was observed between ALT concentration at T1 and the baseline value. A subgroup analysis regarding sex and %weight loss revealed that, in men, the mean AST concentration at T1 and T2 (62.2 ± 3.82 and 73.6 ± 35.1) and the mean ALT concentration at T1 (99.0 ± 67.9) were significantly higher than their respective baseline values (42.5 ± 29.0 and 69.4 ± 49.2). In patients with weight loss exceeding 5% (n = 15), the mean AST concentration at T1 and T2 (54.2 ± 39.9 and 64.5 ± 32.9) and the mean ALT concentration at T1 and T2 (72.5 ± 59.0 and 75.5 ± 52.1) were significantly higher than their respective baseline values (41.5 ± 30.9 and 56.6 ± 46.5). The significant preoperative increase in both AST and ALT concentrations did not worsen by surgically associated insults and up to the 7th postoperative day, liver function almost improved.

Conclusion: This study suggests that a low-calorie diet administered preoperatively for 2 weeks may temporally deteriorate liver function, particularly in males and patients with weight loss exceeding 5%.

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Evaluation of Effect of Intra Abdominal Pressure to Optic Nerve Sheath Diameter on Total Laparoscopic Hysterectomy

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Background and Goal of Study: Pneumoperitoneum (PP) and the consequent increased intraabdominal pressure can have many systemic physiological consequences. There is growing evidence that demonstrates a positive correlation between intra-abdominal pressure (IAP) and intra-cranial pressure(ICP). Ultrasonographic evaluation of optic nerve sheath diameter (ONSD) has been shown to be especially valid in cases where the ICP>20mm Hg. The study objective was to evaluate the changes in ICP and correlate those by means of ONSD in a controlled model of acute elevation of IAP and in Trendelenburg position (TP) who were undergoing total laparoscopic hysterectomy procedure.

Materials and Methods: Data was prospectively collected from patients who underwent Total Laparoscopic Hysterectomy procedure between April and November 2017. The ONSD was measured by ultrasound sagittally with a 10-MHz transducer 4 times: T0: immediately after induction of general anesthesia in hemodynamically stable patient in the horizontal position for baseline; T1-3 min. after PP at 20 mm Hg on horizontal position; T2-3 min. after PP at 15 mm Hg on TP;T3: After deflation of PP on horizontal position. And each time measured by three trained anesthesiologists separately. And parallel to these measurements simultaneously were measured mean arterial pressure (MAP), EtCO2 and PaCO2. Statistical analysis was performed using SPSS version 23.0 software. Tests were considered statistically significant if P<0.05.

Results and Discussion: There were 59 female between 22-74 years old, ASA I-II-III patients. Basal value of (T0) ONSD measured as 5.63 ± 0.53 mm; After 20 mm Hg PP, there was a statistically significant increase in the horizontal position (T1) (5.97 ± 0.49 mm) and 15 mm Hg PP with TP (T2) (5.95 ± 0.57 mm) (p<0.05). At the end of the operation (T3) was determined that the value of ONSD (5.72 ± 0.47 mm) was approaching the baseline value again (p = 0.05). There was no correlation between ONSD and MAP, EtCO2 and PaCO2 values (p> 0.05).

Conclusion: In laparoscopic procedures, we showed that both the position and especially the elevated intraabdominal pressure increases ONSD and at the end of the operation the ONSD values reached the basal values. We believe ultrasound guided measurement of ONSD could be used during laparoscopic procedures or clinical follow-up especially in patients at risk for intracranial hypertension.

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Oxygenation monitoring using Oxygen Reserve Index (ORI™) in Major Ambulatory Surgery in a humanitarian aid environment

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Background: Oxygenation is fundamental during induction and under general anesthesia. The unique indicator that can evaluate the adequate oxygenation status is end-tidal oxygen concentration (EtO2). More than 90% of EtO2 has been considered as an adequate oxygenation status. Oxygen saturation is the fraction of oxygen-saturated hemoglobin relative to total hemoglobin (unsaturated + saturated) in the blood. At around 90% oxygen saturation increases according to an oxygen-hemoglobin dissociation curve and approaches 100% at partial oxygen pressures of >10 kPa. Pulse oximetry is a method used to estimate the percentage of oxygen bound to hemoglobin in the blood. It is particularly convenient for noninvasive continuous measurement of blood oxygen saturation. This approximation to SaO2 is designated SpO2 (peripheral oxygen saturation). Oxygen reserve index (ORI), is a novel noninvasive indicator of blood oxygenation, measured with an index between 0.00 and 1.00.

Materials and Methods: ORI increases with oxygen administration, but is not a measurement of partial pressure of oxygen (PaO2). We therefore investigated the correlation between Radical-7 Pulse Co-Oximeter (Masimo) ORI and SpO2 during oxygenation during surgery. Twenty-seven ASA 1 and 2 patients undergoing herniorrhaphy surgery in humanitarian aid provided in the Hospital of Redentor Love in Danbo, Republic of Benin, were included in analysis. After obtaining surgery informed institutional ethical consent, patients were consented and signed. Patients was managed with ambi aura once disposable laryngeal mask, and normal end-tidal carbon dioxide partial pressure (35-45 mmHg). We measured the time to peak of ORI and time to 90%, determined when the ORI increased by...
We emphasize the importance of maintaining spontaneous breathing avoiding either any airway intervention in case of GA or a cardiovascular collapse due to a neuroaxial technique. That is why we chose ketamine over other drugs. Also, ketamine has a bronchodilator effect, beneficial in this particular situation. It could be discussed that ketamine can increase pulmonary vascular resistances and thus not be the most suitable option. We defend that, at low dose, this effect would not be of that importance and, prioritising its respiratory advantages, led us to a successful technique. That is why we chose ketamine over other drugs. Also, ketamine has a bronchodilator effect, beneficial in this particular situation. It could be discussed that ketamine can increase pulmonary vascular resistances and thus not be the most suitable option. We defend that, at low dose, this effect would not be of that importance and, prioritising its respiratory advantages, led us to a successful technique.

Background: Anaesthetic management of patients with a mediastinal mass is always challenging. Mediastinal metastases entail a high risk of airway obstruction and/or cardiopulmonary collapse during general anaesthesia (GA). Preoperative symptoms can vary widely, but some such as dyspnoea, supraventricular arrhythmia, and syncope should alert of an increased perioperative risk. In these cases, GA should be avoided whenever possible.

Case Report: A 42-year-old female presenting with acute right lower limb ischemia due to critical supraceliac stenosis. Compression of left cardiac chambers induces right chambers dilatation. All of this led to a severe pulmonary hypertension (PSP 85 mmHg) and posterior pericardial effusion on TTE with normal systolic function. Clinical manifestations included dyspnoea and stridor. A thoracotomy via femoral artery was performed. Prior basic and intra-arterial blood pressure monitoring, we proceed with local anaesthetic infiltration of puncture point and sedation with midazolam (2mg total). For emergency reperfusion having a previous diagnosis of Small Cell Lung Cancer stage IV metastasized as an anterior mediastinal mass: may spontaneous breathing be allowed whenever possible.

Discussion: Our aim was to maintain spontaneous breathing avoiding either any airway intervention in case of GA or a cardiovascular collapse due to a neuroaxial technique. That is why we chose ketamine over other drugs. Also, ketamine has a bronchodilator effect, beneficial in this particular situation. It could be discussed that ketamine can increase pulmonary vascular resistances and thus not be the most suitable option. We defend that, at low dose, this effect would not be of that importance and, prioritising its respiratory advantages, led us to a successful outcome.


Learning points: We emphasize the importance of maintaining spontaneous breathing and avoiding airway manipulation if possible, in a patient with a mediastinal mass. Ketamine pharmacodynamics and sedation profile are useful to prevent respiratory depression.

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Unexpected perioperative desaturation due to subcutaneous emphysema in a patient undergoing laparoscopic cholecystectomy

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Background: Laparoscopic cholecystectomy (LC) has been considered the «gold standard» for the surgical treatment of gallstone disease over the past 25 years. (1) Optimal anesthetic management requires thorough knowledge of the complications generated by the pneumoperitoneum, to manage adverse perioperative effects. (2) We present the case of a patient who underwent LC, complicated by subcutaneous emphysema, leading to unanticipated perioperative desaturation.

Case Report: A 63-year-old, ASA II, female patient was scheduled for LC due to cholecystitis. After uneventful induction of anaesthesia and endotracheal intubation, the patient was mechanically ventilated and anaesthesia was maintained with desflurane in O2/air mixture. Ten minutes following initiation of pneumoperitoneum (IAP 14 mmHg), pulse oximetry saturation (SpO2) dropped from 100% to 87%, confirmed by blood gas analysis. Inspired O2 concentration was increased to 100%, the airway was checked and no obvious cardiac, automatic rhythm irregularities started at the end of the 40 minute procedure, improving O2 saturation (92%). During emergence, uncovering of surgical drapes revealed subcutaneous emphysema on the upper part of right hemi –torax, extending to the neck, while postoperative chest computed tomography was diagnostic of pneumomediastinum. The patient was managed conservatively and was discharged from hospital 7 days post –surgery.

Discussion: This case report aims to alert anaesthesiologists towards the possibility of subcutaneous emphysema after LC, which may be complicated by pneumomediastinum or pneumothorax. (3) Along with published preventive measures (3), awareness and prompt recognition of the potential of CO2 extravasation beyond the intrabdominal cavity are crucial to modify anaesthetic management, ensuring patient safety during LC.


Learning points: Extravasation of CO2 beyond intra -abdominal cavity must be kept in mind during laparoscopy. The anaesthesiologist should be aware of the potential of subcutaneous emphysema, which may appear in conjunction with pneumomediastinum or pneumomediastinum.

Conclusion: Hypotension after induction of general anaesthesia is very common. In particular, diabetic patients often have cardiac autonomic neuropathy. Therefore, it is hard to keep proper blood pressure in those patients. Recently, several studies have been attempted to predict patient’s hemodynamic instability through deep-learning methods. In this study, we try to develop a machine-learning model for prediction of postinduction hypotension(PIH) in diabetics.

Materials and Methods: We extracted data from the electronic health record of a single tertiary care center from January 2006 to December 2018 for patients over age 18 diagnosed with diabetes that underwent general anesthesia. We designed a deep learning model constituted by feedforward neural networks(FFN) with a multimodal input layer and four hidden layers. Deep learning model was used to predict PIH (mean arterial pressure lower than 20% of baseline or use of vasopressor within 3 minutes of induction) as primary outcome. Severe hypotension was defined as lower than 40% of baseline or need continuous infusion of vasopressor. Preoperatived medical history, medication, laboratory and echocardiographic findings, intraoperative factors such as induction agents, vital signs were used as features.

Results and Discussion: Out of 25,055 cases, 15,523 (62.0%) experienced PIH and 4,652 (18.5%) of them were severe hypotension. Area under the receiver operating characteristic curve (AUROC) using FFN model was 0.811 for overall hypotension with specificity of 75.4% and sensitivity of 73.4%. AUROC for severe hypotension was 0.885 with specificity of 81.0% and sensitivity of 79.5%.

Conclusion: We successfully predicted PIH by machine learning model in diabetic
patients. Further study can be performed by external validation of our model in other center to prove feasibility for clinical application.

Results and Discussion: There was no statistically significant difference in blood pressures, EICO2, PEEP, PIP, SpO2 and ONSD values between groups (p>0.05). In contrast, there was a significant increase in ONSD value from T0 to T1 (p<0.01) in both groups. Furthermore, a statistically significant decrease was observed in ONSD values from T1 to T2 and from T1 to T3 (p<0.01).

Conclusion: While there was no significant effect of desflurane and total intravenous anaesthesia, intraabdominal insufflation caused a rise in ONSD measurements in both methods. However, in our study this rise did not lead to any significant increase in ICP. This result might be changed in patients with slightly increased ICP during pneumoperitoneum. We are in the opinion that studies with larger sample size are required before considering ONSD measurement as a standard procedure in routine monitoring of laparoscopic surgery patients.

A Randomised Trial To Compare Two Different Types Of Anaesthesiaology Methods On Optic Nerve Sheat Diameter And Intracranial Pressure In Elective Laparoscopic Cholecystectomy Surgery

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Background and Goal of Study: We aim to compare the effects of TIVA and desflurane-maintained general anaesthesia on optic nerve sheath diameter (ONSD) and intracranial pressure (ICP) in patients undergoing elective laparoscopic cholecystectomy.

Materials and Methods: After the Ethics Committee approval and written informed consents were taken from all patients. The data of 80 ASA I-II patients undergoing laparoscopic cholecystectomy were recorded. Patients were randomised into two groups (n=40, each). Anesthesia induction was performed using propofol 2 mg/ kg, fentanyl 1mcg/kg, rocuronium 0.6 mg/kg and lidocain 1 mg/kg iv. After tracheal intubation, mechanical ventilaton was initiated in controlled mechanical ventilaton (CMV) mode. In Group 1 desflurane (1.0 MAC) and remifentanil (0.05-2 mcg/kg/dk) were used for the mainteinance of anaesthesia. After induction of CO2 pneumoperitonium was applied, patients were put into reverse-Trendelenburg position in order to provide optimal surgical vision. Electrocardiogram, heart rate, systolic, diastolic and mean blood pressure, SpO2, peak inspiratory pressure (PIP), PEEP, intraabdominal pressure, and BIS values were recorded. Maintenance of anaesthesia was adjusted to keep BIS values between 40-65%. Patients’ ONSDs were measured using ocular ultrasound before anesthesia induction (T0), following pneumoperitoneum (T1), after desufflation (T2) and after the end of anaesthesia (T3).

Results: There was no statistically significant difference in blood pressures, EICO2, PEEP, PIP, SpO2 and ONSD values between groups (p>0.05).

Conclusions: TIVA and desflurane-maintained general anaesthesia had no effect on optic nerve sheath diameter and intracranial pressure in patients undergoing laparoscopic cholecystectomy.
Utility of CPAP in obese patients with Obstructive Sleep Apnea

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Background: The obese patient has a high risk of OSA (Obstructive Sleep Apnea) and would take multiple benefits with the use of preoperative CPAP.

Materials and methods: A retrospective review of our recorded data were analyzed. Were enrolled 24 patients with BMI > 40 kg/m2 started to general anesthesia for abdominal surgery. All patients underwent preoperative respiratory (STOP-BANG) and CPAP evaluation. The group was divided into 2 groups. Group A: They were planned preoperative CPAP therapy if indicated after polysomnographic examination in patients with respiratory disease and the presence of risk factors (sleep apnea, BMI > 35 kg/m2, neck circumference > 40 cm). Group B: In the absence of the criteria previously exposed was not carried preoperative CPAP. It was also evaluated the occurrence of respiratory complications (SpO2 < 90% in air, upper airway obstruction, pulmonary edema, bronchospasm, pneumothorax).

Results: According to the above criteria 112 patients were included in Group A and 130 patients in Group B. In Group A 67 patients with pulmonary restrictive pathology, hypoxemic chronic respiratory failure, STOP-BANG > 3, underwent a polysomnography (PSG) and early CPAP with diagnosis of OSA; 45 patients with major risk factors to STOP-BANG questionnaire were undergoing treatment for peroperative auto-CPAP. In Group B 52 patients required respiratory monitoring (1-12h) after extubation for obstruction of the upper airways (SpO2 < 90% on air) and respiratory care by CPAP with improvement of EDA; in 9 patients was required reintubation and the use of invasive ventilation due to bronchospasm.

Discussion and conclusion: Studies report the benefits of CPAP in the perioperative period: improves SpO2, reduces complications, hospitalization, the need for reintubation, allows to handle the administration of analgesic without complications. In the patient with morbid obesity to be subjected to intervention, it is essential the use of PSG to make diagnosis of OSA and start CPAP therapy or simply clinical judgment and the use of devices APAP (Automatic Positive Airway Pressure, auto-CPAP).

Effects of CO2 pneumoperitoneum during laparoscopic cholecystectomy and appendectomy on the lung dynamic compliance, A prospective study

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Background and Goal of Study: As a minimally-invasive procedure, laparoscopy has many benefits in the overall patients' treatment. However, the pneumoperitoneum has a great impact on the respiratory system. The function of the pneumoperitoneum significantly decreases the dynamic compliance and increases the PIP. As anesthesiologists we should take these changes into consideration, in order to prevent or minimize the complications that may occur.

Expiratory flow-limitation during laparoscopy surgery in Trendelenburg position is associated with increased risk of postoperative pulmonary complications

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Background: Expiratory flow-limitation (EFL) is a pathological condition characterized by a reduction of expiratory flow, associated with small airways instability and co-inflammatory mechanisms. Patients experiencing EFL after induction of general anesthesia are at increased risk of post-operative pulmonary complications (PPC), while the clinical effects of occurrence of intraoperative EFL are less known. Both laparoscopy and Trendelenburg position can increase the risk of developing EFL through a reduction in FRC. The aim of this study is to describe the incidence of EFL during laparoscopic surgery in Trendelenburg position and to analyze its clinical effects.

Methods: Patients undergoing laparoscopic gynecological surgery with expected mechanical ventilation > 2 hours were enrolled. Exclusion criteria were: age < 18, hemodynamic instability, ASA > 3, heart failure, COPD GOLD stage ≥ 2. All patients were ventilated with a tidal volume of 7 ml/kg and a PEEP between 3-5 cmH2O before pneumoperitoneum and 5-7 cmH2O during pneumoperitoneum. The presence of EFL was evaluated with PEEP test, while the V/Q variations with ALPE system. All measurement were taken after anesthesia induction (T1), after pneumoperitoneum with a 30° Trendelenburg (T2) and at the end of surgery in supine position (T3). Spirometry was performed before and after surgery; PPC development was evaluated over 7 post-operative days.

Results: Sixty-six patients were enrolled in the study; 9 (13%) already had EFL at induction while 16 (25%) developed EFL during surgery. Patients with EFL were older (64±10 vs 56±9; p=0.02), had greater BMI (32±9 vs 25±5; p=0.003) and more rate of hypertension (52% vs 19%; p=0.02). The median PEEP value able to reverse EFL was 8±2 cmH2O in the supine position and 13±4 cmH2O in the Trendelenburg position (p=0.001). During surgery, patients with EFL experienced greater V/Q mismatch, had higher driving pressure and lower PaO2/FIO2 ratio (Figure 1,2). In the post-operative period, patients with EFL were more likely to develop hypoxemia (44% vs 17%; p=0.03) and hypercapnia compared to non-EFL patients (80% vs 32%; p<0.001). During the follow-up, patients with EFL showed higher rate of PPC (24% vs 0%; p=0.002).

Conclusion: The development of EFL during laparoscopic surgery was associated with higher incidence of PPC, and worse intra-operative V/Q mismatch. The PEEP value able to reverse intraoperative EFL during laparoscopic surgery in Trendelenburg position is higher than usual.

that was in correlation with the duration of the pneumoperitoneum. The Pearson correlation coefficient was -0.3149, p<0.05, which meant that there was a statistically significant negative correlation between the pneumoperitoneum duration and the dynamic compliance. There was a positive correlation between the PIP and the duration of the pneumoperitoneum, 0.3813, p<0.05. There was no correlation between the duration and the changes in the MAP. From the time of intubation until 15 – 30 min after CO2 insufflation there was a 17% increase in the etCO2, 28% increase in the PIP and 2.2% decrease in the MAP.

The development of EFL during laparoscopy surgery was associated with increased risk of postoperative pulmonary complications.

Background:
Expiratory flow-limitation (EFL) is a pathological condition characterized by a reduction of expiratory flow, associated with small airways instability and co-inflammatory mechanisms. Patients experiencing EFL after induction of general anesthesia are at increased risk of post-operative pulmonary complications (PPC), while the clinical effects of occurrence of intraoperative EFL are less known. Both laparoscopy and Trendelenburg position can increase the risk of developing EFL through a reduction in FRC. The aim of this study is to describe the incidence of EFL during laparoscopic surgery in Trendelenburg position and to analyze its clinical effects.

Methods: Patients undergoing laparoscopic gynecological surgery with expected mechanical ventilation > 2 hours were enrolled. Exclusion criteria were: age < 18, hemodynamic instability, ASA ≥ 3, heart failure, COPD GOLD stage ≥ 2. All patients were ventilated with a tidal volume of 7 ml/kg and a PEEP between 3-5 cmH2O before pneumoperitoneum and 5-7 cmH2O during pneumoperitoneum. The presence of EFL was evaluated with PEEP test, while the V/Q variations with ALPE system. All measurement were taken after anesthesia induction (T1), after pneumoperitoneum with a 30° Trendelenburg (T2) and at the end of surgery in supine position (T3). Spirometry was performed before and after surgery; PPC development was evaluated over 7 post-operative days.

Results: Sixty-six patients were enrolled in the study; 9 (13%) already had EFL at induction while 16 (25%) developed EFL during surgery. Patients with EFL were older (64±10 vs 56±9; p=0.02), had greater BMI (32±9 vs 25±5; p=0.003) and more rate of hypertension (52% vs 19%; p=0.02). The median PEEP value able to reverse EFL was 8±2 cmH2O in the supine position and 13±4 cmH2O in the Trendelenburg position (p=0.001). During surgery, patients with EFL experienced greater V/Q mismatch, had higher driving pressure and lower PaO2/FIO2 ratio (Figure 1,2). In the post-operative period, patients with EFL were more likely to develop hypoxemia (44% vs 17%; p=0.03) and hypercapnia compared to non-EFL patients (80% vs 32%; p<0.001). During the follow-up, patients with EFL showed higher rate of PPC (24% vs 0%; p=0.002).

Conclusion: The development of EFL during laparoscopic surgery was associated with higher incidence of PPC, and worse intra-operative V/Q mismatch. The PEEP value able to reverse intraoperative EFL during laparoscopic surgery in Trendelenburg position is higher than usual.
The effects of Gynaecologic Oncologic Surgery on lung aeration and oxygenation monitored with Lung Ultrasonography

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Background and Goal of Study: Atelectasis formation is considered the major cause of hypoxemia during general anesthesia (GA). Gynaecologic oncologic surgical procedures (GOS) often requires pneumoperitoneum and steep bed angulation that further reduce lung compliance by shifting bowels and diaphragm. The aim of our study was to assess the impact of intraoperative variables on lung aeration using Lung Ultrasonography (LUS) and their correlation with postoperative oxygenation in women undergoing GOS.

Materials and Methods: 80 patients scheduled for GOS were enrolled. After pre-anesthesia and standard mechanical ventilation (MV) were administered (tidal volume of 8 ml/kg of predicted body weight, FiO2 40%, I:E ratio of 1:2 and PEEP 5 cm H2O). LUS (considering 12 pulmonary areas) and arterial blood gas analysis were performed before GA (T1) and in recovery room (T2).

Results and Discussion: T test for dependent samples for normally distributed data, Wilcoxon and Mann-Whitney tests for non-normally distributed data, and Pearson’s and Spearman’s correlation to correlate changes in LUS (ΔLUS) with the other parameters were used. Linear regression analysis was performed to determine whether Trendelenburg (TR) time was related to ΔLUS. LUS increased significantly between T1 (1.79±2.39) and T2 (11.08±4.40, ΔLUS=9.29±4.10, p<0.05), mostly in basal and posterior areas (fig1A). Changes in LUS correlated significantly with time of MV (r=0.246, p<0.05), cumulative time in TR (r=0.321, p<0.05) and worsening in oxygenation (ΔPaO2/FiO2, r=-0.260, p<0.05). ΔLUS significantly correlated with colloid infusion. The linear regression analysis showed that TR time can predict ΔLUS (F1.78=8.97, p<0.004). The slope of the regression line was 0.014 (fig1B): for every 71.43-minute increase in TR time ΔLUS increased by 1 point. No correlation was found with pneumoperitoneum, apnoea time at induction and TR angle.

Conclusion: Aeration loss after GOS detected using LUS correlates with TR time, MV time, colloid infusion and worsening in oxygenation.

References:

Iatrogenic tracheal wall disruption after endotracheal intubation: a case report and literature review

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Background: Tracheal rupture is a rare (1/20000) iatrogenic complication of endotracheal intubation (ETI) more prevalent in women. Clinical manifestations include subcutaneous emphysema, dyspnea, dysphonia, pneumothorax and pneumomediastinum, which usually appear during surgery or in the immediate postoperative period.

Case Report: A 65yo woman with no significant medical history and no risk factor for difficult intubation was planned for frontal meningioma resection surgery. After IV induction of anesthesia and rocuronium administration, a single-lumen internal diameter endotracheal tube (ETT) was placed on the 1st attempt using a Macintosh n°3 blade with a Cormack grade I. The intra-cuff pressure wasn’t measured. TIVA was used for maintenance. The patient was extubated after the procedure and transferred to the ICU. 24 hours after extubation, she developed a thoracic and cervical subcutaneous emphysema and nasal voice. CT scan showed a posterior tracheal rupture 36mm long from T1 to T3 with pneumomediastinum. Conservative therapy was applied successfully and the patient was discharged home on postoperative day 11.

Discussion: Tracheal rupture after ETI consists most frequently in longitudinal laceration in the posterior pars membranosa. Risk factors may be mechanical (multiple forced attempts, intubation with stylet, overinflation of the ETT cuff, double-tumen and oversized ETT, coughing while the patient is intubated) or anatomic factors (tracheal abnormalities, inflammatory lesions). In this case, tracheal injury was probably induced by overinflation of the ETT cuff. Diagnosis is usually confirmed with bronchoscopy or CT scan. Treatment between conservative or surgical repair is controversial. Conservative management is associated with a better outcome and should be considered in clinically stable patients with small tears and no air leakage on spontaneous breathing.

References:
1. Warner et al Direct Laryngoscopy and Endotracheal Intubation Complicated by Tracheal Rupture after Endotracheal Intubation: a case report and literature review
2. Mitiambras et al Tracheal rupture after endotracheal intubation: a literature systematic review

Learning points: This case serves as a reminder to avoid overinflation of the ETT cuff. A tracheal rupture should be suspected in any patient with subcutaneous emphysema or respiratory distress after extubation.
The Effect of Two Different Ventilation Modes on Lung Aeration in Patients Undergoing Robotic Radical Prostatectomy: An Ultrasonographic Evaluation

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Background and Goal of Study: During laparoscopic procedures under general anesthesia, positioning and pneumoperitoneum lead to pulmonary aeration loss. The aim of this study is to compare the effects of pressure and volume controlled ventilation on oxygenation and lung ultrasound (LUS) findings in patients undergoing robot assisted laparoscopic radical prostatectomy (RALRP).

Materials and Methods: In this randomized, prospective, double blind study 74 ASA I-3 patients, with ages of 18-75, undergoing RALRP surgery were randomly divided into two groups; volume (VCV), (Group P, N=37) and pressure controlled (PCV), (Group P, N=37). The operations were performed with 10-12 mmHg intraabdominal pressure and at 30° Trendelenburg position. Lung ultrasonography was performed in 12 quadrants of the thorax at 5 time points; before anesthesia induction (T1), after intubation (T2), at the end of surgery (Trendelenburg position) (T3), at the end of surgery (supine position) (T4), 60 minutes after the surgery (T5). At the same periods hemodynamic, respiratory and mechanical ventilation parameters were recorded. Transverse LUS images were recorded, and evaluated off-line by a radiologist, blinded to the time point and patient group.

Results and Discussion: In the statistical analysis of the data, there were significant differences in LUS scores, in both groups when compared T1 to T3 and T4. In the Pcv group there were also significant LUS score increase between T1 to T2 and T5. PaO2/FIO2 values were significantly decreased in Group VCV compared to T1 in all periods except T5 and in Group PCV in all periods (p<0.05). There was no difference between the groups in terms of LUS scores and PaO2/FIO2 values. Moderate significant correlation was found between LUS score and PaO2/FIO2 values in both groups (r=0.440 and p=0.0001).

Conclusion: During the operation, oxygenation was impaired in both groups as a result of position and pneumoperitoneum, and LUS-detected lung parenchymal changes were correlated with this. It was concluded that ventilation modes were similar in this respect.

Prognostic value of carboxyhemoglobin and methemoglobin in postoperative pulmonary complications

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Background and Goal of Study: COHb and MetHb imped O2 transport and shift the oxygen dissociative curve to the left. Postoperative pulmonary complications (PPC) are still one of the major cause for postoperative morbidity and mortality. Therefor we evaluated the predictive value of COHb and MetHb as prognostic markers for PPC.

Materials and Methods: In this single center observational prospective study 120 consecutive patient from 18 until 60 years of age, ASA II, who denied any known respiratory related medical history, were included. All patient underwent surgical intervention under general endotracheal anesthesia. Levels of COHb and MetHb were determined from arterial blood samples with spectrophotometer, at four time points. T0 – preoperative under respiration with room air; T1 - after pre-oxygenation, T2 – intraoperative and T4 in PACU under respiration with room air or oxygen inhalation with or without endotracheal intubation. The outcome were PPC recorded and analyzed for 30 postoperative days (1). We tested the statistical significance with univariate and multivariate logistic analysis.

Results and Discussion: The mean value for COHb was 1.07±0.97SD, and for MetHb was 0.34±0.25SD. With univariate binary logistic regression for predicting value of COHb we found ≥0.5% to be statistically significant for PPC. We confirmed all findings with multivariate logistic regression for MetHb p=0.024. PCC were noted in 19 patients for the whole period of investigation and the most maintained were pneumonia and persistent cough. Other authors investigated the prognostic values of COHb and MetHb in pulmonary embolism and asthma. They found correlation between COHb/ MetHb and severity of illness in ICU patients.

Conclusion: Our analysis indicated that COHb/ MetHb could serve as markers for PPC. Although our preliminary observations require further validation to clarify the underlying mechanisms of COHb and MetHb as prognostic markers for PPC.

References:

Preliminary study of PEEP setting based on transpulmonary pressure in robot-assisted laparoscopic prostatectomy

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Background and Goal of Study: In the robot-assisted laparoscopic prostatectomy (RALP), formation of atelectasis and reduced functional residual capacity often become anesthetic concerns. PEEP is necessary against steep Trendelenburg position and pneumoperitoneum, however, how to set PEEP levels during RALP is not determined. Usefulness of PEEP based on transpulmonary pressure (Ptp; airway pressure - esophageal pressure) has been reported in the ventilatory management of ARDS. The relationship between PEEP and Ptp during RALP is unclear, therefore, we have examined the usefulness and safety of the PEEP setting based on Ptp.

Materials and Methods: We conducted a prospective intervention study on patients who were scheduled for RALP from April to September in 2019. Following placing a patient in a steep Trendelenburg lithotomy position with pneumoperitoneum, PEEP was stepwisely increased from 0 to 15 cmH2O in step of 5 cmH2O at an interval of 30 minutes. Then PEEP levels where end-expiratory Ptp exceed 0 (Ptp>0) were determined. Measurements were performed after 30 minutes at each end of PEEP step. Airway pressure, esophageal pressure, cardiac index, blood gases and cerebral oxygen saturation (rSO2) were measured and Ptp, PaO2/FIO2 (P/F) ratio and thoracic lung compliance (Cs) were calculated. Statistical analysis was performed using the one-way analysis of variance and Dunnett test was performed. A p value <0.05 was considered significant.

Results and Discussion: Fourteen patients were eligible. The esophageal pressure at PEEP 0 was 115±4.7cmH2O. The values of P/F ratio at PEEP10 or more were higher than those of PEEP0. The PEEP levels which showed PtpEEP0 was 14.6±2.7cmH2O. Cs was significantly higher at PEEP10 or more compared to PEEP0. Cardiac index showed no significant change. Considering oxygenation and compliance, it is desirable to add PEEP of 10 cmH2O or more during RALP. Cs ratio and P/F rate at such levels was superior without disturbing circulation or cerebral oxygenation.

Conclusion: PEEP setting based on Ptp may be safe and rational. It seems to be worth conducting randomized controlled trial to investigating the usefulness PEEP based on PtpEEP during RALP.

Effects of lung-protective ventilation combined with Deep Neuromuscular Blockade on postoperative pulmonary complications during low pneumoperitonemum pressure laparoscopic colorectal surgery: a randomized controlled trial

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Background and Goal of Study: Pulmonary complication is one of the most common postoperative complications. This study aimed to estimating the effects of lung-protective ventilation combined with deep neuromuscular blockade on postoperative pulmonary complications during low pneumoperitonemum pressure laparoscopic colorectal surgery (LCRS).

Materials and Methods: 120 patients undergoing LCRS were enrolled and randomized to receive eitherconventional pulmonary ventilation + moderate neuromuscular blockade + conventional pneumoperitoneum pressure (CMC group) or protective pulmonary ventilation + deep neuromuscular blockade + low pneumoperitonemum pressure (PDL group). The modified Clinical Pulmonary Infection Score (mCPIS) and the visual analogue scale (VAS) Pain Score after surgery were measured. The time of anus exhaust defecation after operation, the

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length of hospital stays, anesthesia-related complications and so on were also evaluated.

Results and Discussion: The postoperative mCPIS and the serumconcentrations of
neutralophil elastasein patients with PDL strategywere significantly lower than that of
CMC, especially when performing rectum/sigmoid colon surgical procedures,
or patients were older than 70 years. For the patients undergoing transverse/ ascending colon surgical procedures or BMI < 24, PDL strategy provided a better surgical condition. The time of anaux exhale defecation after surgery was also significantly earlier in PDL strategy. Furthermore, PDL strategy reduced postoperative pain and the use of opioids.

Conclusion: PDL strategy can effectively provide an optimal surgical condition and enhance postoperative recovery in certain patient subsets.

Materials and Methods: After ethics committee approval 143 patients between
15-65, BMI<30, ASA II-III who underwent laparoscopic bariatric surgery between October 2017 and November 2019 at Marmara University Pendik Training and Research Hospital were included in our prospective observational study. According to lung US protocol, both hemithorax (front, side and back areas which are divided into upper and lower zones) were scanned for a total of 12 areas preoperatively and in the postoperative first hour. In the perioperative period, vital parameters, blood gas analysis, and mechanical ventilation parameters were recorded. The images were evaluated blindly by two anesthesiologists experienced in the use of lung USG according to the modified lung ultrasound scoring system (LUS).

Results and Discussion: When the preoperative and postoperative USG scores were compared, we observed an increase in the LUS score in all areas except for both anterior upper areas (p<.001). This increase was more pronounced especially in the posterior and inferior parts of the lungs (Figure 1). We found the frequency of atelectasis to be 81.1% in patients undergoing laparoscopic bariatric surgery. The p<0.02 values were increased (p<.001) while the p<0.02 values were decreased (p<.001) during the pneumoperitoneum and postoperative period as compared to the post-intubation period. During pneumoperitoneum, peak values were increased while compliance values were decreased.

Conclusion: Lung ultrasound can be used in the diagnosis of atelectasis in obese patients. Atelectasis is seen at a high rate in patients undergoing laparoscopic bariatric surgery.

Background and Goal of Study: Preoxygenation and apneic oxygenation have shown to be an essential component of the airway management. Although 15L O2 is available from the mechanical ventilators, regular preoxygenation is performed with 6L facial mask. We hypothesize that medium- flow nasal airway (HFNA) oxygenation with 15L O2, may increase oxygen reserve and extend safe apnea time in resource limited countries.

Materials and Methods: We conducted a prospective randomized evaluation in 22, ASA I/II healthy patients, undergoing elective surgery. Patients were allocated in two groups. Group I (n=11) was preoxygenated with 6L O2 facial mask and Group II (n=11) was preoxygenated with 15L O2 facial mask. Following general anesthesia induction, nasal airway was inserted and continuous positive airway pressure of 5cmHg was set in all patients. During the apnea period, Group I received 8L of O2 and Group II 15L of O2 via HFNA. All patients were intubated at 91-95% desaturation, or after an hour of apnea duration if no desaturation occurred. We measured SpO2 three times: before preoxygenation, after preoxygenation and after intubation. We took arterial blood gas analysis two times: T1- after preoxygenation and T2- after intubation. ETCO2 was noted immediately after intubation. Statistical analysis was made with two-tailed t-test at a significance level of <0.05.

Results and Discussion: Patients do not differ in age, sex, ASA score, BMI, or apnea duration. Patients on 15L O2 flow have an average of 12.04±0.1% higher PaO2 levels at the end of apnea, than patients on 6L flow. Higher level of O2 in the blood do not affect the SpO2 at the end of apnea, but affects the fall in SpO2 after intubation- in patients on 15L O2 flow is 2% lower. In addition patients on 15L flow have 6.27 mmHg lower ETCO2 levels after intubation, than patients on 6L flow. Consistent with the initial hypothesis, whether 15L O2 oxygenation can allow more time for airway manipulation, these results are in support of the hypothesis. High flow technique has certain limitations in our country. Equipment that provides O2 flow rate greater than 15L per minute, is not available. The further question that needs to be addressed is: Do we have benefits of using all available O2?

Conclusion: The effects of the change in PaO2 and ETCO2 are high between the
management intervals. After preoxygenation, the fall in SpO2 after intubation is more pronounced and the oxygenation of the patients at the end of apnea is adequate. Patients intubated with 15L O2 had significant differences as compared to the group L. The assembly time for the group R was longer than the group L and the assembly took more time in group R as assembly passing through the nasopharynx was more difficult. Patients in group L need jaw thrust assistance during assembly passing through the nasopharynx, jaw thrust to increase airway space, intubation related side effects were analyzed.

Results and Discussion: 42 out of 50 patients in group R and 34 out of 50 patients in group L need jaw thrust assistance during assembly passing through the oropharyngeal space into trachea. Total intubation time spent in group R more than the group L and the assembly took more time in group R as assembly passing through nasal cavity. There is no statistical difference between groups on intubation related nasal bleeding and other side effects.

Conclusion: Due to shortening of intubation time spent without increased nasal bleeding and side effects, the left nostril is more suitable for Trachway assisted nasotracheal intubation as patients undergoing orofacial surgery. The left nostril is more suitable for Trachway-assisted nasotracheal intubation as patients undergoing orofacial surgery.

References:

Anesthetic management of a patient with hypertrophic cardiomyopathy for major pancreatic surgery

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Background: Hypertrophic cardiomyopathy (HCM) is an autosomal dominant disease with asymmetric left ventricular hypertrophy (LVH) and left ventricular outflow tract (LVOT) obstruction. Clinical presentation ranges from asymptomatic to sudden cardiac death. 1-3 Understanding the pathophysiology and anesthetic implications is needed for successful perioperative outcome, especially in major surgery.

Case Report: A 58-year-old male, ASA IV, was scheduled for duodenopancreatectomy. He had HCM, paroxysmal atrial fibrillation, hypertension, diabetes mellitus, hyperuricemia and presented an ECG with sinus rhythm and LVH. The echocardiogram was compatible with HCM. He stopped apixaban according to guidelines and maintained amiodarone and verapamil. After premedication (midazolam), monitoring was initiated with ASA standard, BIS, invasive arterial and central venous pressures. Non-invasive cardiac output monitoring was used (Starling SV). Defibrillating pads and pneumatic compression stockings were placed. A phenylephrine perfusion was initiated. General anesthesia was induced with remifentanil, lidocaine, propofol and rocuronium and maintained with sevoflurane. After reversal of neuromuscular block with sugammadex, the patient was extubated and reintubated due to the ICU, with no major complications reported.

Discussion: Duodenopancreatectomy has significant morbimortality, especially in patients with comorbidities. In HCM, LVOT obstruction and secondary mitral regurgitation worsen with hypovolemia, vasodilatation and tachycardia, with risk of hemodynamic collapse, myocardial ischemia and tachyarrhythmias. Preload must be maintained/increased (maintenance of sinus rhythm is crucial) while avoiding hypovolemia and afterload reduction. 1-3 In this setting, hemodynamic monitoring is of vital importance in estimating the response to inotropes, vasopressors and fluid load, thus guiding goal-directed fluid administration. 2,3

References:

Learning points: Anesthetic management in patients with HCM requires understanding hemodynamic changes and prevention of LVOT obstruction. It can be achieved by preoperative examination, optimization with intraoperative hemodynamic monitoring and target-directed therapy, especially in major surgery.

Acute intermittent porphyria (AIP) and general anesthesia. Case report

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Background: Porphyria is a group of diseases related to the heme metabolism. Clinical findings during porphyrias’ crisis (abdominal pain, vomiting, arrhythmias, etc.) are frequently masked by the general anesthesia (1); these could be prevented by a correct perioperative management.

Case Report: 39 years old female, active smoker with gastrointestinal intolerance to acetylsalicylic acid and scopolamine. Previous diagnosis of AIP since childhood and several renal colics with nephrolithiasis. In a CT scan, a parathyroid adenoma was shown associated to high levels of parathyroid hormone and hypercalcemia. She is proposed for adenoma resection; 24h before surgery, an IV infusion of 10% glucose (1500 ml.) was given. Anesthetic iv induction with midazolam (1,5 mg), atropine 1 mg, fentanyl 0,2mg, propofol 120 mg and cisatracurium 12 mg. Intubation was performed with a 7.0 mm orotracheal tube. Monitoring is of utmost importance for avoiding complications in patients with WD. Early assessment of neurological status postoperatively. Meticulous perioperative care and existing neurological symptoms are critical.

Learning points: 1) Neurological involvement in WD can complicate anaesthetic handling. 2) Detailed preanaesthetic evaluation, careful intraoperative choice and titration of drugs and meticulous monitoring can lead to a successful outcome in patients with WD.

References:
Anaesthetic management of a GSD type III patient with hip fracture

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Background: Glycogen storage disease type III (GSD III) is a hereditary disease caused by deficiency of the glycogen debranching enzyme and characterized by severe muscle weakness and liver disease. Clinically, patients may present hypoglycaemia from the first year of life. They may also show hepatomegaly, stunted growth and occasional seizures associated with hypoglycaemia. Symptoms may improve with puberty, except in some cases which evolve to myopathy or cirrhosis with liver failure or hepatocellular carcinoma. About 80% of patients have severe fasting hypoglycaemia.

Case Report: 59-year-old woman who started developing muscle weakness at the age of 50, so that she was diagnosed with GSD III. History of surgery for Scheuermann’s disease with general anaesthesia, without incidents. She was admitted to our facility for perteochanteric fracture repair. Blood test was irrelevant but presented low platelet count (99,000/ml) secondary to liver disease (ALT 56 U/L, LUS 121 U/ml, bilirubin 1.25 mg/dl). According to protocol for hypoglycaemia control, once she was nil per os, intravenous 10% dextrose infusion at 110 mL/h started the night before. Firstly, we got a blood glucose measurement (160 mg/dl). Sedation with 2 mg of midazolam and 25 mcg of IV fentanyl was given. We performed a subarcobranchial block with 7 mg 0.5% levobupivacaine and 10 mcg fentanyl. We kept normothermic conditions, hemodynamic constants (MAP 70 mmHg, PR 80 bpm) and strict control of glycaemia. In PACU, according to the protocol, the infusion of dextrose was maintained for up to 4 hours after oral tolerance.

Discussion: Perioperative management of GSD patients is an unknown challenge for anaesthesiologists. We decided to avoid general anaesthesia because of the unpredictable drugs clearance. Spinal puncture provided anaesthesia with hemodynamic stability and optimal postoperative pain control. The dextrose infusion was decisive for hypoglycaemia prevention.

References:

Learning points: Once npo begins, dextrose infusion should not be stopped until 4 hours after the onset of pain/stach tolerance. Stress situations (hemodynamic instability, pain or cold), which can cause blood glucose changes, should be avoided. Avoid if possible hepatic metabolism drugs and sucralfyl in patients with myopathy. If general anaesthesia is given, we recommend TOF monitoring.

Lamellar Ichthyosis: The importance of anesthetic approach

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Background: Lamellar ichthyosis is a rare, autosomal recessive genodermatosis (incidence 1:300,000) caused by a mutation of the transglutaminase-1 (TGM1) gene, located on chromosome 14 with variable expression. It is part of a group of 5 hereditary types of ichthyosis, characterized by erythroderma, xeroderma and excessive skin peeling. Hyperproliferation and hyperkeratinization of the corneal layer may be present. Typical manifestations of this disease conditions the preparation and adaptation of anesthetic procedures.

Case Report: 10-year-old male patient (42kg) with lamellar ichthyosis as the only relevant personal antecedent, proposed for draining and excision of the upper eyelid chalazion of the left eye. To mention, extreme peeling from birth without paternal inbreeding or known family history. On observation, peeling was evident on almost total body surface, with particular incidence on the face, limbs and scalp, as well as bilateral ocular ectropion. The mouth opening was limited to about 1.5cm due to the scaling and angular cheilits with a Mallampatti III. Also the cervical extension was limited by discomfort to the cutaneous stretch. A G22 venous access was established with special care in its fixation using narrow bandages rather than adhesives. Because it's a short-term procedure and the patient had adequate fasting, induction with intravenous alfentanil, lidocaine and propofol was chosen after premedication with midazolam per os. After abundant hydration of the facial skin with petroleum jelly and occlusion of the right eyelid, manual ventilation with face mask was performed. The possibility of tracheal intubation or the use of a supraglottic device would condition the choice of a wide ribbon for its fixation. No venous access loss occurred during the procedure, the postoperative period was uneventful.

Discussion: Timely assessment and planning of the various anaesthetic considerations in the case of a lamellar ichthyosis patient influence the success of the entire procedure. It includes adequate hydration and protection of the scaling areas, eye protection, venous access establishment and fixation, monitoring techniques, maintenance of normothermia, airway approach and nutrition, beyond others.

References:

Laparoscopic cholecystectomy under total intravenous anaesthesia (TIVA) in a patient with Myotonic Dystrophy type 1 (Steinert’s disease) - a case report

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Background: Patients with Steinert’s Disease (SD) are highly sensitive to the common anaesthetics which may induce muscle rigidity. These patients are prone to cardiac and pulmonary complications. Malignant hyperthermia and myotonic episodes are also possible. Hypothermia, shivering and mechanical or electrical stimulation can also trigger myotonic reactions.

Case Report: 44-year-old male diagnosed with SD and cholelithiasis underwent laparoscopic cholecystectomy under general anaesthesia. Preoperatively, the patient had weakness and atrophy of cranial muscles and upper and lower limb fatigue. His physical status was classified as ASA 3 (ECG, chest X-ray, echo, spirometry and lab results were normal). No history of anaesthetic procedures. Ondansetron (8mg) and onmeprazole (40mg) were received 30 minutes before surgery. Rapid sequence intubation with midazolam (1mg), propofol (200mg) and rocuronium (50mg). Anaesthesia was maintained with O2 mixed with air at 50%, and continuous infusion of propofol (4mg/kg/h) and remifentanil (0.2μg/kg/h), with continuous monitoring. The operation theatre and the patient were adequately heated. Paracetamol (1000mg) and lornoxicam (8mg) were administered 30 minutes before the end of the procedure. Sugammadex (200mg) reversed muscular relaxation with an uneventful postoperative period.

Discussion: Our strategy (TIVA, short-acting opioid drug and normothermia) was effective and safe for this patient with SD. No postoperative complications were observed due to fast reverse of neuromuscular blockade, careful administration of remifentanil, and NSAIDs, which resulted in adequate recovery from anaesthesia and postoperative pain control.

References:

Learning points: Avoiding triggering factors for myotonic reactions like hypothermia, use of monitoring, and careful selection of anaesthetic drugs and appropriate doses, resulted in a successful general anaesthesia to a patient diagnosed with SD.
Balancing the safest approach for a patient with Steinert Myotonic Dystrophy undergoing general anaesthesia: a case report

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Background: Steinert myotonic dystrophy (DM1) is a multisystem myotonic syndrome marked particularly by myotonia, muscular dystrophy and cardiac conduction abnormalities. By affecting variable muscle groups, DM1 predisposes patients to perioperative respiratory complications, as a result of pharyngeal muscle and diaphragm weakness and decreased central respiratory drive, as well as delayed gastric emptying, a risk factor for aspiration. We report the first case of an adult DM1 patient undergoing total intravenous anaesthesia (TIVA) with endotracheal intubation without use of neuromuscular blocking drugs (NMBDs), and complete immediate postoperative respiratory recovery.

Case Report: 47-year-old male, ASA II, with DM1 presented with palpebral ptosis for elective blepharoplasty. Preanaesthetic evaluation revealed dysphagia, dysphonia and sleep apnoea requiring CPAP. Ranitidine and metoclopramide were administered preoperatively and TIVA was the chosen anaesthetic technique. Propofol and remifentanil infusions were used for induction and maintenance of general anaesthesia, avoiding long acting opioids, NMBDs and reversal agents. Endotracheal intubation was uneventful. Deepness of anaesthesia was guided by bispectral index monitoring. Hemodynamic and ventilatory stability was observed throughout. Anaesthetic emergence and extubation occurred without incident. Postoperative pain management was achieved with an opioid free strategy. Full recovery of ventilatory function was observed and there was no record of respiratory complications.

Discussion: DM1 patients may show enhanced sensitivity to the respiratory depressant effects of anaesthetic medications. Anaesthetic and analgesic medications should be carefully titrated to effect. This case was successful in attaining anaesthetic conditions without the need for NMBDs and showed full respiratory recovery, rendering our strategy a safe alternative for DM1 patients undergoing general anaesthesia.

References:

Learning points: DM1 predisposes patients to respiratory complications. Safe general anaesthesia can be achieved with TIVA without unnecessary use of NMBDs.

5885

Jackknife position and epidural anaesthesia in a patient with a pre-existing lumbosacral radiculopathy: a case of double-crush phenomenon

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Background: Double-crush phenomenon is a susceptibility to nerve injury in patients with pre-existing neural compromise when a second insult is practiced. In this case, pre-existing LR increased the susceptibility to new possible nerve injuries underlying each positioning, take the appropriate measures to prevent it and consider the risks and benefits of a neuraxial approach in these patients.

References:

Learning points: Pre-existing neurologic deficits should be documented before any anaesthetic approach, since patients with this background are at increased risk of postoperative neurologic complications. The anaesthesiologist should consider possible nerve injuries underlying each positioning, take the appropriate measures to prevent it and consider the risks and benefits of a neuraxial approach in these patients.

6008

Case report: thyroid storm during total thyroidectomy surgery

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Background: Thyrotoxic crisis are rare, life-threatening, emergency endocrine diseases with various clinical manifestations. Here we report a case of a patient who simultaneously developed thyrotoxic crisis during total thyroidectomy.

Case report: 40-year-old woman who undergoes total thyroidectomy secondary to Graves-Basedow disease. The patient was under medical treatment with Thiamazol 30 mg and Propranolol 10mg daily. During the induction with general anaesthetic and orotracheal intubation without incidents, the patient presents an episode of severe bronchospasms which reverses after intensive treatment. Approximately 1 hour after induction, Sinus tachycardia is recorded at 140 bpm and hyperthermia of 38.5°C. Thyroid hormone levels are requested during the intervention with the following results: TSH=0.01 uU/mL and T4L 4.10 ng/dL. Esmolol 30mg is administered for the control of sinus tachycardia and Paracetamol 1gr and Metamizol 2gr for the control of hyperthermia. After finishing the surgery without incident, the patient is transferred to ICU for later control.

Discussion: Graves’ disease is characterized by the presence of autoantibodies directed against the thyrotopin receptor in patients’ serum that cause overproduction and release of thyroid hormones. The diagnosis is based on characteristic clinical features and biochemical abnormalities. The serum TSH is low and T4L and T3 are increased. Thyroid storm is an endocrine emergency which is associated with high mortality (10%) if not promptly recognized and treated. Multidisciplinary treatment in an intensive care setting is usually needed. Thyroid surgery was previously the most common precipitant of storm. Pretreatment with antithyroid drugs in order to promptly achieve the euthyroid state is recommended to avoid the risk of precipitating thyroid storm during surgery. For the majority of patients, euthyroidism is achieved after few weeks of ATD treatment. Beta-blockers, such as propranolol, are often effectively added to control hyperthyroid symptoms.

References:

Learning points: The thyrotoxic crisis is a very serious adverse event that can occur during surgery in those patients who have not achieved an euthyroid state prior to surgery.
Anesthetic technique in a patient with leiomyosarcoma of the inferior vena cava. A case report

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Background: A leiomyosarcoma of the inferior vena cava is a rare tumor with a poor prognosis. Since the first description in 1871, only 400 cases have been reported in the literature. Due to their low prevalence, no real consensus has been reached on the proper treatment of these tumors. The prognosis is bad and directly depends on the extent of the surgical resection.

Case Report: This report presents the case of a 48-year-old woman, diagnosed with inferior vena cava leiomyosarcoma, who is operated on a scheduled basis for resection. Rapid sequence induction is performed with Diazepam, Fen tyanyl, Propofol and Rocuronium, without incidents. The central venous line is cannulated in the left internal jugular vein and the 7F volume venous access. In addition, invasive monitoring is placed with Swan-Ganz catheter. The anesthetic management is performed with Sevofluran, Remifentanil and Rocuronium. Tumor resection is performed, with a donor graft of infrarenal cava and an autologous graft with a falciform ligament in the left renal vein. Duodenal resection is also performed with mechanical latero-lateral duodenal-jejunal anastomosis. The patient presents hemodynamic stability throughout the surgery, with a tendency to hypertension and tachycardia, requiring administration of beta blockers and nitroglycerin during the intraoperative period to get hemodynamic stability. Abundant bleeding of difficult quantification (approximately three liters are estimated), requiring protamine transfusion. Guided transfusion is monitored at all times with ROTEM. Good tolerance to clamps and resection of the inferior vena cava.

Discussion: Lower vena cava leiomyosarcoma has a low incidence, hence the importance of reporting all those cases that occur on a daily basis, due to the limited literature on this tumor and its management. From the anesthetic point of view, it can be a challenge due to all the pathophysiology that is associated with this type of lesion, both during induction, as well as intraoperatively and postoperative management.

References:
2. Lower cava leiomyosarcoma is a very rare tumor with poor prognosis. The anesthetic management for resection of this tumor can be very complex, due to all the pathophysiological changes that both the tumor and its resection imply.

Cholinesterase deficiency: a forgotten complication

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Background: Succinylcholine associated pronglonted paralysis appears in 1 of 2800 cases. Among 5 to 19% surgical patients show decreased cholinesterase activity preoperatively.

Case Report: Gastroscopy to remove a foreign object was sceduled on a 30 years-old male without known diseases. Induction with propofol, fentanyl and suxamethonium. Non incidecnt endotracheal intubation. The procedure was finished after 30 minutes but no spontaneous breathing was achieved. Bispectral index showed values around 80 and there was no improvement to apnoic reversion with naloxone. There was no availability of devices monitoring muscular relaxation to confirm our suspicion on delayed succinylcholine metabolism. The patient was transferred under remifentanil sedation and mechanical ventilation to Intensive Care Unit. Two hours later showed complete spontaneous neuromuscular reversal and was extubated successfully. Blood samples were analyzed, observing low levels of plasmatic cholinesterase (2852U/L, reference levels 5990-12220). That deficiency may be related to genetic causes as well as diseases or drugs. Nevertheless, literature tell us that apneas longer than 60 minutes after succinylcholine treatment are probably related to atypical genetic traits. Dibucaine testing is currently undergoing in order to acurate diagnosis.

Discussion: The rise of rocuronium as the election drug for rapid sequence induction due to the appearance of sugammadex, has led to a drastic decrease in the use of succinylcholine. Adverse effects and contraindication are sparse but well-known. Prolonged paralysis by succinylcholine is a potentially severe entity that every anesthesiologist should identify and treat, as well as conducting proper differential diagnosis.

References:

About a rare disease: congenital erythropoietic porphyria

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Background: Congenital Erythropoietic Porphyria (CEP) is a rare autosomal recessive disorder, with 200 cases reported, caused by altered activity of uroporphyrinogen III synthase within the heme biosynthetic pathway.1 The reduced activity of the enzyme leads to accumulation of porphyrins in red blood cells, plasma, teeth and bones causing haemolytic anaemia and severe cutaneous photosensitivity which represent anesthetic concerns in the management of these patients.2,3

Case Report: A 67-year-old man, Jehovah’s Witness, with CEP diagnosed at the age of 33, was admitted for an elective hepatic resection due to a hepatocellular carcinoma. Physical examination revealed generalized skin tightening, facial deformities, nose and ears ulcercations, missing eyelids, blindness and mutilation of digits by phototoxic damage. The airway examination showed limited cervical extension, limited mouth opening, protruding brown coloured teeth and Mallampati class 3. Medical records described a non-demyelinating axonal polyneuropathy and multiple corneal transplants. The anaesthetic plan was a combined general anesthesia (TIVA with OT intubation under videolaringoscopy and spinal morphine) evicting drugs documented as unsafe in patients with porphyria, avoiding operating/ recovery room lights and covering the exposed areas. The procedure was uneventful and the patient was admitted to the intermediate care unit.

Discussion: Porphyrinogenic drugs have been implicated as causes of acute porphyrin crisis so we checked the data of safe drugs to use in the porphyria patient’s group.2 Although morphine has been documented as a safe drug, this is the first report in literature describing spinal administration of morphine on CEP patients. The range of safe pharmacological agents available is wide so the choice of agent may be based more on the patient’s anaesthetic and surgical requirements rather than governed by specific requirements imposed by porphyria.
Anesthetic approach of a patient with Amyotrophic Lateral Sclerosis

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Background: Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease that affects the upper motor neuron, causing muscle atrophy of the respiratory and bulbar muscles. Although data concerning the anesthetic approach is scarce, these patients appear to be more susceptible to anesthetic complications than the general population.

Case Report: A 61 years old man diagnosed with ALS in 2015, with bulbar and respiratory dysfunction, currently underriluzole treatment, was submitted to a radical prostatectomy due to a prostate adenocarcinoma, under intravenous general anesthesia with remifentanil and propofol delivered by target-controlled infusion (TCI), myorelaxation with 30 mg of rocuronium with train of four monitoring. We followed a multimodal analgesia strategy with conventional analgesia using paracetamol, parecoxib and tramadol and regional analgesia performing a bilateral transversus abdominis plane (TAP) block with 20 ml of ropivacaine 0.2%. The intraoperative period was uneventful. Neuromuscular block reversal was done with sugammadex. Right after the surgery, the patient was successfully extubated and transferred to postoperative anesthesia care unit. No complications occurred in the postoperative period.

Discussion: Postoperative respiratory failure seems to be the main problem, particularly in patients who already have bulbar involvement. In a study of 18 patients who underwent general anesthesia, 4 remained intubated and had to be transferred to the Intensive Care Unit. Many authors favor the use of intravenous anesthesia with remifentanil and propofol over balanced anesthesia because of the higher rates of respiratory depression. Regional techniques should be privileged because they are opioid sparing, lowering the respiratory depression. However, neuromuscular blockades are not recommended because they may exacerbate the disease. This underlying mechanism is unknown. Some authors believe that the demyelination of the spinal cord makes it more susceptible to toxicity by local anesthetics.

References:

Learning points: Use reversible, short acting agents. Sugammadex is effective in reversing the neuromuscular blockade.

Myasthenia gravis - Rare but be aware!

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Background: Myasthenia gravis is an autoimmune disorder, mediated by antibodies directed to acetylcholine receptors in the neuromuscular junction, resulting in weakness of the skeletal muscle. Due to the characteristics of the disease, its specific therapy and probable involvement of the bulbar and respiratory muscles, there are critical features in the anaesthetic management of these patients.

Case Report: 32 years old patient with past medical history of myasthenia gravis, under corticosteroid therapy and pyridostigmine 60mg prn, recently aggravated with paracetamol 0.3mg/kg and TOF of 2 were enough to avoid mechanical complications.

Discussion: Myasthenia gravis has an important impact on the anaesthetic management of these patients.
approach. In the preoperative evaluation it is essential to assess bulbar or respiratory symptoms and, with the neurologist, consider intensive care in the postoperative period. Regarding the anaesthetic technique, regional anaesthesia is the preferable and safest approach and, whenever possible, it should be chosen. In this case, we opted for neuro-axial anaesthesia, with good results. When general anaesthesia is required, preference should be given to short-acting drugs and avoidance of neuromuscular junction blockers. Postoperative analgesia is another fundamental concern, as surgical aggression and postoperative pain are important factors that can lead to disease decompensation and evolution to myasthenic crisis.

References:

6300
Anaesthetic approach in a patient with Madelung’s Disease – A Case Report
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Background: Madelung’s Disease, also known as Multiple Symmetric Lipomatosis (MSL) or the Launois-Bensaude syndrome, is characterized by nonencapsulated subcutaneous lipid deposits. Tumors are usually located in the neck and upper body. MSL usually affects Mediterranean males with history of chronic alcohol abuse. It can range from an asymptomatic disease, to severe cosmetic deformity and neck immobility, and in the worst cases, to dysphagia or dyspnea. The most effective treatment is surgical resection. Due to the fact that MSL is an uncommon disorder and could be very challenging for the anesthesiologist, associated with the lack of studies in this field, we decided to report this case.

Case Report: 49-year-old male, ASA III, alcoholic habits with MSL who was scheduled to anterior cervical décollementomy. Our main concern was the airway management due to the multiple predictors of difficult airway (DA): macroglissia, Mallampati IV, reduced mobility of the neck due to the lipid deposits (approximately with 10 cm diameter) and it was impossible to evaluate trómontinian distance. We performed an awake nasal fiberoptic intubation. We kept the equipment for difficult airway ready in the OR. Endotracheal intubation was successful performed at first attempt. The surgery and emergence were uneventful, and he was discharged after 3 days.

Discussion: Décollementomy in MSL represents a challenge for anesthesiologists because it requires optimal capabilities in the management of airway. The gold standard is awake fiberoptic intubation. These patients also have more risk of bleeding in the post-operative period, and the emergence is also challenging. It is becoming more important for an anesthesiologist to develop different skills to manage a difficult airway. Pre-anaesthetic evaluation, knowledge of the patient and of his predictors of DA were essential in the coordination and management of the case.

References:

Learning point: Treatment of patients with MSL is challenging for anesthesiologists, difficult airway management and possible postoperative complications are major problems. A proper advanced plan to insure safe induction and emergence, to avoid any airway complication is of paramount.

6371
Management of bilateral vocal cord palsy after total thyroidectomy – Case report
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Background: Recurrent laryngeal nerve damage (RLND) after thyroid surgery is a rare complication, ranging from hoarseness to life-threatening respiratory distress. Although the incidence of bilateral RLND (BRLND) following total thyroidectomy (TT) is as low as 0,5%, it is still the most common cause of bilateral vocal cord palsy (BVCP).

Case Report: A 59-year-old male with Graves disease was proposed for a TT. Prior to surgery, the patient was euthyroid, had no obstructive symptoms or difficult airway stigmas. On laryngoscopy the vocal cords had normal movement. The CT scan showed a large goiter with reduction of the tracheal lumen. General anesthesia with intubation via direct laryngoscopy was performed in a single attempt. TT was completed with an uneventful intra-operative period. At the end of the procedure, neuromuscular block was reversed. Immediately after smooth extubation, the patient developed stridor and respiratory distress. Positive pressure ventilation was applied. As the symptoms did not improve, a fiber optic laryngoscopy was performed, revealing BVCP in the paramedian position. The patient was immediately reintubated. Later that day a tracheostomy was performed under GA.

Discussion: RLND is a rare and troublesome complication of TT that must be promptly treated. The injury can occur by ischemia, contusion or actual transection. This patient had two risks factors: a large goiter and TT. The ENT examinations are important to determine pre-operative vocal cord status. Although RLND is the most obvious cause of stridor after TT, other causes to be considered are residual NM blockade, stroke, anaphylaxis and even hypocalcemia. In the presence of stridor and respiratory distress, urgent reintubation is required and if vocal cord palsy is confirmed, tracheostomy must be performed.

References:

Learning Points: Careful preoperative vigilance is mandatory, allowing for a timely response. The gold standard for prevention of RLND is still surgical visual confirmation. Other causes of post-thyroidectomy stridor should be considered. In face of BRLND, urgent reintubation must be performed.

6073
Lewis-Sumner Syndrome – Challenges on the anaesthetic management of an orphan disease
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Background: Lewis-Sumner Syndrome (LSS) or Multifocal Acquired Demyelinating Sensory Motor neuropathy is a rare immune neuromuscular disorder without any published reports in anaesthesiology. We describe the anaesthetic management of a patient suffering from the disease, using total intravenous anaesthesia (TIVA), rocuronium and sugammadex.

Case Report: A 63-year-old, ASA III, diabetic woman presented for lumbar decompression surgery. She had a previous diagnosis of LSS with neurogenic bladder and sensory-motor polyneuropathy as well as severe degenerative lumbosacral polyradiculopathy. A pre-anaesthetic evaluation with emphasis on neurological deficits was performed. Surgery was performed under general anaesthesia with spontaneous ventilation, including invasive blood pressure, neuromuscular monitoring and bispectral index. General anaesthesia was induced with fentanyl, propofol and rocuronium (0,4mg/Kg) and maintenance was assured with TIVA. No further muscle relaxant was given. Surgery lasted 110 minutes. Before emergence the train-of-four (TOF) ratio was 49, so neuromuscular block was reversed with 2mg/ kg of sugammadex. Blood gas analysis performed in the recovery room showed no respiratory insufficiency and the patient remained stable without worsening of sensory-motor deficits. She was discharged home 3 days later. On her neurology follow-up, she reported pain relief and better mobility of the lower limbs.

Discussion: There are no reported cases on the anaesthetic management of LSS. There is some doubt regarding LSS classification and some authors point out similarities with Chronic Inflammatory Demyelinating Polyradiculoneuropathy (CIDP). Theoretical concerns with the use of neuromuscular drugs in patients with demyelinating neuropathies have been raised.1 There is a report of prolonged effect of vecuronium in a patient with CIDP.2 In our case, rocuronium effect was also prolonged and low dosage was sufficient to provide intubation conditions (TOF count 0). Sugammadex allowed total reversion of neuromuscular block and no respiratory complications occurred. The combination of rocuronium and sugammadex proved to be a good choice for patients with LSS.

References:

Learning Points: LSS is an orphan disease with no reported cases of anaesthetic management. Lower dose of rocuronium and sugammadex were safely used in a patient with LSS.

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Learning points:
- Sugammadex: A protective agent for short-acting drugs and maintenance.
- Ropivacaine: A safer alternative for long-acting drugs.
- Bupivacaine: A highly potent agent used in the case of severe pain.
- Propofol: A versatile agent used for induction and maintenance.
- Ropivacaine: A highly potent agent used in the case of severe pain.
- Vecuronium: A muscle relaxant used in the case of severe muscle spasms.
- Bupivacaine: A highly potent agent used in the case of severe pain.
- Propofol: A versatile agent used for induction and maintenance.
- Sugammadex: A protective agent for short-acting drugs and maintenance.

Learning points:
- Sugammadex: A protective agent for short-acting drugs and maintenance.
- Ropivacaine: A safer alternative for long-acting drugs.
- Bupivacaine: A highly potent agent used in the case of severe pain.
- Propofol: A versatile agent used for induction and maintenance.
- Ropivacaine: A highly potent agent used in the case of severe pain.
- Vecuronium: A muscle relaxant used in the case of severe muscle spasms.
- Bupivacaine: A highly potent agent used in the case of severe pain.
- Sugammadex: A protective agent for short-acting drugs and maintenance.
- Propofol: A versatile agent used for induction and maintenance.
- Vecuronium: A muscle relaxant used in the case of severe muscle spasms.
- Bupivacaine: A highly potent agent used in the case of severe pain.
The Carbon Footprint of Anaesthetic Agents: An LCA Case Study in the UK

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Background and Goal of Study: Anaesthetic gases emit a significant amount of carbon dioxide equivalent (CO2E) at every stage of their life-cycle. The implementation of a technology that recycles wasted anaesthetic gases requires an early understanding of its environmental impact. The greenhouse gas (GHG) captured by such technology may significantly exceed the emissions generated in the other stages of the life-cycle combined.

Materials and Methods: This study employs a life cycle assessment (LCA) model and discusses the environmental implications of using a recycle and reuse technology. LCA applies a cradle-to-grave approach to assess the environmental impacts associated with all stages of a product’s life cycle, including manufacturing, transporting, utilisation, and residues.

Results and Discussion: The LCA results indicate that the emissions generated during manufacturing are the highest for Sevoflurane while Desflurane produces the highest total emission once the wasted vented gases are considered. The CO2E generated can be reduced by almost 80% if one uses Desflurane with the sustainable technology instead of using Sevoflurane without recycling the wasted gases. In the case of low-flow rate, Sevoflurane produces the highest total emission followed by Desflurane in our model. Moreover, data collected in all acute NHS Trusts in the UK under the Freedom of Information Act 2000 shows that while the number of surgery cases keeps growing the use of anaesthetic gases is not slowing down. Recycling wasted anaesthetic gases is crucial to reduce the carbon footprint of health services.

Conclusion: If the reuse and recycle technology is successfully implemented at a large scale, our results indicate a large decrease in volatile anaesthetic agents going into the environment. This shifts the current policy from the use of Sevoflurane instead of Desflurane to the opposite spectrum.


5090

A phase II clinical trial to study the efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment

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Background and Goal of Study: To evaluate the efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment.

Materials and Methods: A phase II multi-center, randomized, single-blinded, dose-exploration and active comparator-controlled trial was conducted. A total of 156 patients (18-60 years old) with grade I or II ASA score and 18-30kg/m2 BMI who underwent conventional gastroscopic diagnosis and treatment were selected. Using centralized randomization procedure, they were randomized into 5 groups, including the 5mg, 7mg, 8mg remimazolam tosylate and 5mg remimazolam tosylate + furazanyl treatment groups and the 1.5mg/kg propofol control group. Observation indexes included sedation success rate, sedation recovery time and incidence rates of hypotension, hypoxia, respiratory depression, injection pain, adverse event and adverse reaction during sedation.

Results and Discussion: There was no statistically significant difference in the sedation success rate between the treatment groups and the control group (P>0.05). However, the sedation recovery time was significantly shorter in the treatment groups than in the propofol control group (P<0.05). In addition, there were no statistically significant differences in the incidence rates of hypotension and respiratory depression during sedation between the treatment groups and the control group (P>0.05). The incidence rates of hypoxia, injection pain, adverse event and adverse reaction during sedation were significantly lower in the treatment groups than in the control group (P<0.05). Serious adverse event was not observed in any group.

Conclusion: Remimazolam tosylate had equivalent success rate of sedation but lower incidence rates of adverse event and adverse reaction than propofol. Remimazolam tosylate did not cause serious adverse reactions and was safe for patients.

5098

A phase III multi-center, randomized, single-blinded, active comparator-controlled clinical trial to study the sedation efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment

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Background and Goal of Study: To evaluate the efficacy and safety of intravenous remimazolam tosylate injection in gastroscopic diagnosis and treatment.

Materials and Methods: A phase III multi-center, randomized, single-blinded and active comparator-controlled trial was conducted. A total of 378 patients (18-65 years old) with grade I or II ASA score and 18-30kg/m2 BMI who underwent conventional gastroscopic diagnosis and treatment were selected. They were randomized into the 5mg remimazolam tosylate group or 1.5mg/kg propofol group. The primary efficacy endpoint was sedation success rate, and secondary efficacy endpoints included sedation induction time, sedation recovery time, and incidence rates of hypotension and respiratory depression during sedation.

Results and Discussion: The sedation success rate of remimazolam tosylate was not inferior to that of propofol in patients during colonoscopic diagnosis and treatment. The sedation induction time of the remimazolam tosylate group was significantly shorter than that of the propofol group (P<0.05). The recovery time was significantly shorter in the remimazolam tosylate group than in the propofol group (P<0.05). The incidence rates of sedation-induced hypotension and respiratory depression during sedation were significantly lower in the remimazolam tosylate group than in the propofol group (P<0.05). Furthermore, the incidence rates of adverse event (AE) and adverse reaction (ADR) were also significantly lower in the remimazolam tosylate group than in the propofol group (P<0.05). No serious adverse event (SAE) was observed in any group.
Conclusion: The sedation success rate of remimazolam tosylate is not inferior to that of propofol. Remimazolam tosylate has lower incidence rates of sedation-induced hypotension and respiratory depression than propofol. Remimazolam tosylate did not cause serious adverse reactions and was safe for patients.

Comparison of the degree of sympathetic nervous system suppression during general anesthesia using Sevoflurane/O2 vs Sevoflurane/N2O with the same MAC

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Background and Goal of Study: N2O may stimulate the sympathetic nervous system at end-tidal concentrations FA> 40%. We examined whether an anesthetic consisting of sevoflurane/N2O versus sevoflurane only at equipotent MAC would offer a similar degree of sympathetic suppression in patients undergoing robot assisted radical prostatectomy (RARP).

Materials and Methods: 19 ASA I-III patients undergoing RARP were randomized to receive sevoflurane/Sevo/O2 group, n=10 (Sevo/O2 group, n=9). Patients taking drugs altering sympathetic tone were excluded. Anesthesia was induced with propofol (1-2mg/kg), remifentanil continuous infusion (4ng/ml), rocuronium (0.5mg/kg) or cisatracurium (0.15mg/kg), the trachea intubated and mechanical ventilation started. The Zeus anesthesia machine (Dräger, Lübeck, Germany) was used in target control mode. The FAO2 target was 40% in (Sevo/O2 group) and 50% in (Sevo/N2O), with initial 5 min high fresh gas flow denitrogenation to ensure maintaining FAN2O at 45-47%. MAC target was set at 0.8 in both groups at all times. The degree of sympathetic suppression was measured by parameters known to be affected by the sympathetic/parasympathetic balance (Figure): ANI (Loos, France), qNOX (Quantum Medical, Mataro, Spain), SSI, SE, RE, MAP and HR. The study started with first intra-abdominal electrocautery incision. Data were collected every 8 seconds for an arbitrary 20 min period (RUGLoop, Demed, Temse, Belgium). The study was stopped if a vasopressor or atropine was used. T-test at 1 min intervals was used to compare groups, with P<0.05 indicating statistical significance.

Results: (Figure) The difference between all compared parameters was highly significant. Mainly, with less sympathetic suppression in (Sevo/N2O) group. No vasoactive drugs were needed.

Conclusion: When anesthesia in patients undergoing RARP is maintained at 0.8 MAC, substituting part of the sevoflurane by 50% N2O decreases sympathetic suppression. Whether this is caused by the lower sevoflurane partial pressure or higher N2O partial pressure or both, cannot be determined by this study.

References:

Use of magnesium sulfate in general anesthesia as a coadjuvant, a review

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Background and Goal of Study: We performed an analysis of magnesium sulfate used in continuous infusion in the perioperative situation, taking great importance today thanks to the OFA.

Materials and Methods: We have carried out a bibliographic research in the main biomedical databases (PUBMED, WOS, Cochrane) to analyze the main studies and their results in the use of magnesium sulfate as an adjuvant in general anesthesia.

Results and Discussion: We have carried out a bibliographic research, we found more than 50 articles where we have been able to see how magnesium sulfate has demonstrated how its use in continuous perfusion allows us to reduce anesthetic doses during the surgical intervention, as well as greater control over postoperative pain. An important article is a meta-analysis made by Albrecht et al, which is the first systematic review on this topic demonstrating a clinically significant decrease in mortality, consumption of opioids and decreasing the doses of anesthetics used and adrenergic response during the orotracheal intubation.

References:
1. Albrecht et al. | Peri-operative intravenous magnesium and postoperative pain. Laura Rodríguez-Rubio et al. Influence of the perioperative administration of magnesium sulfate on the total dose of anesthetics during general anesthesia.

Efficacy and safety of remimazolam tosylate for general anesthesia in elective surgery: A clinical trial

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Background and Goal of Study: This study aimed to assess the efficacy and safety of intravenous remimazolam tosylate in Chinese patients undergoing elective surgery under general anesthesia, comparatively to propofol.

Materials and Methods: The patients were randomized into 4 groups to receive remimazolam tosylate (6, 12 and 18 mg/kg) or propofol in this Phase II multicenter, randomized, double-blind, dose-finding, positive drug parallel controlled trial. The primary efficacy endpoint was the success rate of achieving anesthesia/sedation depth. The secondary efficacy endpoints included changes in bispectral index score (BIS), anesthesia recovery time, anesthesia induction time, and safety profile.

Results and Discussion: The results showed that the rates of successful anesthesia were not significantly different among the four groups (P>0.05). During anesthesia, BIS values in the remimazolam (6, 12, and 18 mg/kg) and propofol groups fluctuated between 40 and 60. The anesthesia induction time was gradually decreased with increasing dose of remimazolam tosylate. Recovery time was longer with remimazolam administration at 6 and 18 mg/kg groups compared with the propofol group (all P<0.05). The incidence rates of deep sedation, inadequate sedation, hypotension, and hypoxemia were not significantly different among the four groups (all P>0.05). There was no serious adverse event.

Conclusion: Remimazolam tosylate was not inferior to propofol in terms of anesthesia success and adverse event occurrence. This study was registered with ClinicalTrials.gov (NCT02406872), CFDA clinical trial register number CTR20150191, and CFDA clinical trial document numbers 2013L00702, 2013L00703, 2013L00704, and 2015L01799.
A lipid-free etomidate formulation based on designed self-assembling peptide

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Background and Goal of Study: Etomidate and propofol lipid emulsions are widely used in induction and maintenance of anesthesia, but the use of lipid as carrier also causes some drawbacks including pain on injection, bacteria contamination and hypertriglyceridemia. Thus, a lipid-free formulation based on self-assembling peptides would be promising to prevent these side-effects.

Materials and Methods: Self-assembling peptide GQY was dissolved in 0.9% normal saline and 5 mM GQY solution was obtained. After that, etomidate was added into the GQY solution at the concentration of 2 mg/mL equal to the clinical lipid emulsion. Nanoparticles formed in the etomidate-GQY formulation were observed by TEM. Healthy adult male SD rats divided 2 groups (GQY group and lipid group) were used in further pharmacodynamic experiments. Rats were placed supine in the cage after single injection of etomidate through the lateral caudal vein. Loss of righting reflex (LORR) occurred when rats failed to right themselves. Up-and-down method was applied to find the hypnic median effective dose (ED50). ED50 was taken average of three tests. ED50 of two formulations was administered (n=24 each group). And the time to act, LORR duration, sedation duration and adverse events was observed and recorded.

Results and Discussion: Etomidate-GQY solution was white turbid liquid with nanoparticle size of less than 50 nm. The ED50 (95%CI) of etomidate-GQY solution and lipid emulsion was 0.80 (0.75-0.86) mg/kg and 0.68 (0.64-0.72) mg/kg, respectively, which indicated that the potency of etomidate in two different formulations was similar. And the onset time [0.12 (0.12, 0.13) min vs. [0.12 (0.12, 0.13) min] was not different, duration for LORR (5.74±1.34 min vs. 6.22±1.37 min, P=0.23), and sedation duration (12.58±2.18 min vs. [11.71±2.47] min, P=0.20) of etomidate-GQY solution and lipid emulsion had no difference. The incidence of myoclonus was 10/24 in GQY group and 6/24 in lipid group (P=0.36). No respiratory depression or other adverse reaction was observed.

Conclusion: Hydrophobic etomidate could be successfully encapsulated by self-assembling peptide GQY and form stable nanoparticles. And the GQY formulation of etomidate had the similar efficacy in anesthesia induction to lipid emulsion. We are going to study further about this lipid-free formulation, as well as to develop lipid-free propofol formulation based the peptide.

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Propofol wastage and disposal: doing the right thing

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Background and Goal of Study: Propofol is believed to have a greenhouse gas impact 4 orders of magnitude lower than desflurane or nitrous oxide [1]. However, a comprehensive life cycle analysis of its environmental impact was not mandatory at the time of its discovery and was not performed. Nevertheless, it is known that propofol does not biodegrade, accumulates in fat and can be toxic to aquatic organisms [2]. Unused propofol, including empty ampoules and glassware, must therefore be disposed of by incineration to prevent it from entering the watercourse.

In 2012, a study in New York demonstrated that 45% of all propofol dispensed was wasted [2]. Avoidance of unnecessary waste and disposal of propofol are of paramount importance.

Materials and Methods: We sought to establish a baseline for propofol waste at Queens Medical Centre Nottingham, UK. We recorded the volume of propofol dispensed and the volume administered in 50 cases. We used a questionnaire to ascertain knowledge about propofol disposal and its environmental impact amongst anaesthetists and operating department practitioners (ODPs).

Results and Discussion: Overall, we found that 23% of dispensed propofol was wasted.10 ODPs and 41 Anaesthetists completed the questionnaire. Of these, 75% of anaesthetists and 70% of ODPs did not know how to correctly dispose of propofol within our Trust. 51% of participants were not aware of the major environmental hazard of wasted propofol.

Conclusion: The state of the environment is a major public health crisis which we cannot ignore. This audit has shown that increased awareness is required amongst our peers to help overcome the environmental impact propofol has. Waste propofol must be disposed of by incineration and all anaesthetists and ODPs have a responsibility to ensure this happens. We believe this and other environmental issues should be integrated within the anaesthetic curriculum.

References:

5698

The efficacy and safety of ciprofol versus propofol for deep sedation during colonoscopy: A phase III, multi-center, randomized, double-blind, non-inferiority trial

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Background and Goal of Study: Ciprofol (HSK3486) is a close analog of propofol, which acts on GABA receptors to induce sedation and general anaesthesia. We aimed to compare the efficacy and safety of ciprofol and propofol for deep sedation during colonoscopy.

Materials and Methods: A phase III, multi-center, randomized, double-blind, non-inferiority trial was performed at 17 sites in China. Participants were randomly assigned to receive ciprofol (0.4 mg/kg) or propofol (1.5 mg/kg). The primary outcome was the success rates of colonoscopy, and analysed by intention to treat.

Results and Discussion: A total of 289 eligible participants were encountered in the comparator group. The success rates of colonoscopy in ciprofol group and propofol group was 100% and 99.2%, a difference of 0.8% (95%CI:2.2~4.2) that did not exceed the predefined 8% margin. There was no significantly different observed in induction time between the two groups (1.09±0.41 vs. 1.13±0.41 min, P=0.05). Fully alert time was longer in ciprofol group (3.2±1.18 min) than that of in propofol group (1.83±2.01 min, P<0.001). Time to readiness for discharge was significantly longer in ciprofol group (7.2±3.18 vs. 5.8±3.28 min, P<0.001). Although the fully alert time and time to readiness for discharge was statistically significant, the time to readiness for discharge from end of the procedure in ciprofol group is still within 10 minutes, and this delay has been estimated as the minimal clinically important difference in patients undergoing colonoscopy. The overall rates of adverse events
Quantitative assessment of Cytochrome C oxidase patterns in muscle tissue by the use of near-infrared spectroscopy (NIRS) in healthy volunteers

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Background: Cytochrome C oxidase (CCO) acts as final electron acceptor in the respiratory chain and may provide information concerning intracellular oxygen consumption. CCO is a chromophore with an absorption peak in the near-infrared spectrum (NIRS) in its reduced, deoxygenated state. However, this absorption peak overlaps with deoxygenated haemoglobin (HHb) which is present in much higher concentrations(1). NIRO300 (Hamamatsu Photonics, Tokyo, Japan) measures the CCO signal but did not receive FDA approval for this use due to lack of independency of the measured CCO changes. In this study, we hypothesized that the NIRO 300 provides a HHb independent measurement of CCO concentration changes in the near-infrared spectrum.

Methods: In this single center randomized controlled trial in healthy volunteers, subjects were randomized to receive arterial occlusion to the left arm (n=5) and venous stasis on the right arm (n=5) or vice versa during 5 minutes. After a resting period of 30 minutes, the opposite to the former condition was applied to each arm. We placed the NIRO 300 optodes bilateral at the level of the brachioradial muscle. We designed the intervention as collecting NIRS data continuously during 1 minute of occlusion and venous stasis with a final interval for reactive hyperaemia and return to baseline. All NIRS data were time aligned to cuff release for data comparison. CCO was analysed using a generalized additive mixed model with HHb, Time and their interaction as independent variables, Subject and Side as nested random effects. A P value < 0.05 was considered statistically significant.

Results: The characteristics of the volunteers were comparable between both groups. We found a significant non-linear effect of HHb (p < 0.0001) and a temporal influence of the effect of HHb (p < 0.0001) on CCO measurements during arterial occlusion. For venous stasis, we found a significant non-linear effect of HHb (p < 0.0001) on CCO measurements. Elapsed time did significantly mediate the effect of HHb on CCO (p < 0.0001).

Conclusion: We demonstrated that the measured CCO concentration changes are affected by the HHb concentration changes in the brachioradial muscle during two different blood flow alterations. Our results indicate that the NIRO 300 may not be a reliable tool to monitor cellular hypoxia in a clinical setting.

Reference:

5720
Volatile anesthetics versus propofol based total intravenous anesthesia on biochemical recurrence in patients undergoing robot assisted radical prostatectomy

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Background and Goal of Study: Recurrence after cancer surgery is a major concern in cancer patients. Growing evidence from preclinical studies has revealed that various anesthetics can influence the immune system in different ways. The current study compared the long-term recurrence of prostate cancer after robot-assisted radical prostatectomy (RARP) in terms of selection of anesthetic agents between propofol-based total intravenous anesthesia (TIVA) compared to balanced anesthesia with volatile anesthetics and remifentanil (VA).

Materials and Methods: We followed-up oncologic outcomes of patients who underwent RARP and had participated in two previous prospective randomized controlled trials, and compared outcomes of those who received TIVA (n = 64) to those who received VA (n = 64). The follow-up period was between November 2010 and March 2019.

Results and Discussion: TIVA and VA groups showed identical biochemical recurrence-free survival at all-time points after RARP (Figure 1). The predictive factors of prostate cancer recurrence were determined by cox regression as follows: colloid input (1.002, 1.000-1.003; P = 0.011), initial PSA level (1.025, 1.007-1.044; P = 0.006), and pathological tumor stage 3b (4.217, 1.207-14.735; P = 0.024), but not anesthetic agent (1.227, 0.860-2.283; P = 0.518). Propofol has been reported to have helpful immunomodulatory effects, and better survival has been reported after cancer surgery with TIVA than VA. However, other recent studies have shown different results regarding the influence of anesthetic agents on the recurrence of cancer, and different oncologic outcomes have been demonstrated depending on the type of cancer. This is the first study to compare oncologic outcomes after RARP in prostate cancer patients administered propofol-based TIVA or VA groups.

Conclusion: Our findings demonstrate that the effects of propofol-based TIVA are comparable with those of VA with regards to postoperative recurrence in patients with prostate cancer.

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The effect of propofol on rat lung mesenchymal stem cell

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Background and Goal of Study: Pulmonary diseases are an important cause of morbidity and mortality. Allogeneic lung transplantation is the only treatment for advanced chronic lung diseases. Because of insufficient number and tissue rejection, stem cell therapy will be the hope in lung diseases. Propofol is a frequently used agent in anesthesia practice. Propofol may be administered to patients with end-stage lung disease who are candidates for stem cell therapy due to the need for anesthesia or sedation. Therefore, the aim of our study was to investigate the cytotoxic / proliferative effect of propofol on lung mesenchymal stem cell (MSC).

Materials and Methods: With the permission of G.U.ET-18.003 from the local ethics committee of animal experiments; MSCs were isolated from the lungs of two Wistar Albino rats. In the second stage, these cells were transformed into adipocytes, chondrocytes and osteocytes, identified according to surface antigens in flow cytometry and they proved to be MSCs. Cells were placed in 32-well e-plates on the Xcelligence Reel Time Cell Analyzer (RTCA) (Roche, Germany) with 5000 cells per well. The doses of propofol 25(n=6), 50 (n=9) and 100 µM (n=9) was used agent in anesthesia practice. Propofol may be administered to patients with advanced chronic lung diseases. Because of insufficient number and tissue rejection, stem cell therapy will be the hope in lung diseases. Propofol is a frequently used agent in anesthesia practice. Propofol may be administered to patients with end-stage lung disease who are candidates for stem cell therapy due to the need for anesthesia or sedation. Therefore, the aim of our study was to investigate the cytotoxic / proliferative effect of propofol on lung mesenchymal stem cell (MSC).

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Results and Discussion: In our study, it was shown that propofol reduced the growth of cells compared to low doses (25 µM) when used at high doses (50 and 100 µM) and when used at 100 µM dose, it was cytotoxic to the cells at 24 hours but this effect was not seen at following times (Table 1).

Conclusion: Propofol can be used in anesthesia practice as a safe agent that does not affect the proliferation of MSCs in the lung. However, we recommend that propofol should be used in low doses because it has better cell proliferation values when used in low doses compared to high doses.
Allogeneic lung transplantation is the only procedure need for sedation, analgesia and anesthesia. Dexmedetomidine did not affect proliferation of lung mesenchymal stem cells at all doses and durations used (Table 1).

Results and Discussion: Normalized cell index (NCI) at 6th, 24th, 48th and 72th hours were compared for wells per group (n:3). Dexmedetomidine was applied at doses of 0.1, 1 and 10 µM. Time Cell Analyzer (RTCA) (Roche, Germany) with 5000 cells per well and three studies aimed to investigate the impact of dexmedetomidine on lung mesenchymal stem cells which has never been investigated before.

Materials and Methods: With the permission of G.U.ET-18.003 from the local ethics committee of animal experiments; mesenchymal stem cells were obtained from the lungs of 2 newborn Wistar Albino rats, were produced in stem cell culture medium. Lung mesenchymal stem cells were differentiated to adipocyte, osteocyte and chondrocytes; surface markers were identified in flow cytometry, proving that these cells were mesenchymal stem cells according to International Society Cells & Gene Therapy (ISCT). Cells were placed in 16-well e-plates on the Xcelligence Reel (M2/M3 types) via G-proteins, activation of which initiates cholinergic excitation-contraction coupling in the small intestine. In our work, we demonstrate for the first time that clinically relevant concentrations of ketamine strongly inhibit both carbachol- and GTPγS-induced muscarinic cation current (mICAT) in mouse ileal myocytes with IC50 ~ 3 µM. We show that this action of ketamine is associated with altered mICAT deactivation kinetics and voltage-dependence, thus suggesting that ketamine inhibits G-protein signalling rather than muscarinic cation channels.

Conclusion: This study shows a dose-dependent attenuation of a LPS-induced inflammatory reaction in human effector and target cells using HFIP. Moreover, our data reveal, that inhibition of NF-κB p65 transmigration might be the molecular mechanism responsible for HFIP-mediated protection.

References:
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Background: Hexafluoroisopropanol (HFIP), the primary sevoflurane metabolite, is detected in blood samples of patients after sevoflurane anesthesia.1 Sevoflurane-mediated protection has been described decades ago, recently an immunomodulatory effect of HFIP has been demonstrated in septic rodents, attenuating inflammation and improving survival.2,3 Immunomodulation was not yet confirmed in humans and the mode of action has to be investigated. This study aimed to determine the impact of HFIP on inflammation in human blood samples, representing the effector cell compartment and to evaluate the interference with the inflammatory NF-κB pathway in human pulmonary microvascular endothelial cells (HPMEC) as target cells.

Methods: Blood samples from healthy volunteers were stimulated with LPS and treated with HFIP (4 and 8mM). Interleukine-6 (IL-6) as an important biomarker in the cascade of severe inflammation was determined. For NF-κB pathway analyses, HPMEC were stimulated with LPS and treated with 8mM HFIP. IL-6 was measured in cell supernatant. Cytoplastic and nuclear proteins were harvested, and Western blots allowed quantifying phosphorylation of IKK-complex, degradation of IκBα, as well as nuclear transmigration of NF-κB. Results are expressed as relative values of the LPS treated samples. Means and standard deviation were calculated and one-way ANOVA and Dunnet post-hoc test were used to compare groups. Statistical significance was set at p<0.05.

Results: HFIP dose-dependently attenuated the LPS-induced inflammatory response in human blood samples (LPS vs. LPS+HFIP 4mM: 100±0 vs. 63±16%, p<0.001; LPS vs. LPS+HFIP 8mM: 100±0 vs. 77±9%, p<0.001). Likewise, the LPS-induced IL-6 expression was attenuated in HPMEC representing the vascular compartment (LPS vs. LPS+HFIP 8mM: 100±0 vs. 54±12%, p<0.001). HFIP accentuated the LPS-mediated phosphorylation of the IKK complex and degradation of IκBα, but impaired nuclear transmigration of the p65 subunit (LPS vs. LPS+HFIP 8mM: 100±0 vs. 44±17%, p<0.001).

Conclusion: This study shows a dose-dependent attenuation of a LPS-induced inflammatory reaction in human effector and target cells using HFIP. Moreover, our data reveal, that inhibition of NF-κB p65 transmigration might be the molecular mechanism responsible for HFIP-mediated protection.

The alteration of miCAT in small intestinal myocytes by ketamine after X-ray coronary artery stenting

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Background and Goal of Study: Some of the unwanted frequent complications of surgical procedures are nausea and vomiting. Ketamine is an antagonist of glutamate NMDA receptors. However, ketamine has other multiple targets, among which there are TRPC4 channels coupled with muscarinic receptors (M2/M3 types) via G-proteins, activation of which initiates cholinergic excitation-contraction coupling in the small intestine. In our work, we demonstrate for the first time that clinically relevant concentrations of ketamine strongly inhibit both carbachol- and GTPγS-induced muscarinic cation current (miCAT) in mouse ileal myocytes with IC50 ~ 3 µM. We show that this action of ketamine is associated with altered miCAT deactivation kinetics and voltage-dependence, thus suggesting that ketamine inhibits G-protein signalling rather than muscarinic cation channels.

Also, to determine the incidence of nausea and vomiting among patients, we have performed retrospective analysis of 60 cases of analgesedation in X-ray theater during coronary artery stenting with different anesthetic agents, including ketamine.

Materials and methods: To investigate the mechanisms of the inhibitory effects of ketamine on miCAT we have performed electrophysiological studies and calcium imaging using the calcium-sensitive dye, fura-2-AM in isolated mouse ileal myocytes.
The retrospective analysis of 60 cases of analgesedation in X-ray operation room during stenting of coronary arteries was done for 3 groups (20 patients in each group). Group #1 – Fentanyl 2 mg/kg + Dizepam 3 mg/kg, Group #2 – Fentanyl 1.5 mg/kg + Propofol 3-4 mg/kg, Group #3 – Fentanyl 1 mg/kg + Propofol 2-3 mg/kg + Ketamine 0.3 mg/kg.

**Results and Discussion:** In ileal myocytes ketamine (100 μM) strongly inhibited both carbachol- and GTPγS-induced mICAT. The inhibition (IC50 of about 3 μM) was slow and practically irreversible. It was associated with altered voltage dependence and kinetics of mICAT. Ketamine abolished carbachol-induced calcium oscillations in tura-2AM loaded myocytes. The retrospective analysis showed that there were no incidences of vomiting in all groups, but there were cases of intra/postoperative nausea: group #1 – 55%, group #2 – 0/5%, group #3 – 15/10%.

**Conclusion:** Thus, intra and postoperative nausea in group #3 could be explained, at least in part, by the action of ketamine on small intestinal smooth muscles.

## 6058

**The influence of low s(+) ketamine doses on electroencephalogram during total intravenous anesthesia**

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**Background and Goal of Study:** S-Ketamine (SK) plays an important role in pain modulation in surgical patients. However, its intraoperative use may not validate electroencephalogram (EEG) anesthetic adequacy indices. This study aims to evaluate the EEG derived parameters: bispectral index (BIS) and electromyographic activity (EMG) in relation to varying doses of SK.

**Materials and Methods:** Forty patients, male and female, aged between 20 and 45 years, who underwent controlled effector site (eS) total intravenous anesthesia (TIVA), with BIS maintained between 45 and 55, before SK, were randomly assigned to 5 equal groups. In the control group k 0, the patients did not receive SK; k 1, k 2, k 3 and k 4 received SK in a 200 μg/kg bolus iv, followed by continuous infusion of 100 μg/kg-h-1; 200 μg/kg-1-h; 300 μg/kg-1-h and 400 μg/kg-1-h, respectively. In all patients in groups k1, k2, k3 and k4, 200 μg/kg-1 bolus SK was used. Eleven moments were evaluated in each group: M0 - before anesthetic induction; M1 - 10 minutes after anesthesia stabilization with BIS between 45 and 55 (with a target of 50); M2 - 3 minutes after SK; M3 -6 minutes after SK; M4 - 9 minutes after SK; M5 - 12 minutes after SK; M6 - 15 minutes after SK; M7 - 18 minutes after SK; M8 - 21 minutes after SK; M9 - 24 minutes after SK and M10 - 27 minutes after D. At all times the values of: BIS and EMG were noted. The electroencephalographic data obtained were analyzed using ANOVA for repeated measures and adjusted p-value for multiple comparisons by Tukey test, considering as significant, p <0.05.

**Results and Discussion:** Comparing the mean values of BIS and EMG between data obtained were analyzed using ANOVA for repeated measures and adjusted p-value for multiple comparisons by Tukey test, considering as significant, p <0.05. No significant changes were observed (p< 0.05). All groups, in each moment, no significant changes were observed (p< 0.05). No significant differences were observed in the three groups.

**Conclusion:** Electroencephalographic parameters (BIS and EMG) can be used to assess anesthetic adequacy when this model of SK infusion and TIVA is observed.

## 4431

**Postoperative pain and steroid pulse therapy affect oral intake after tonsillectomy for IgA nephropathy**

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**Background and Goal of Study:** Early oral intake after surgery is associated with a decrease in postoperative complications and shortened hospital stay. The aim of this study was to retrospectively examine the predictors of adequate oral intake after tonsillectomy for IgA nephropathy.

**Materials and Methods:** This study was a retrospective observational study conducted at a single institution, which was reviewed and approved by the Ethics Committee of Oshikubo Hospital, Public Health Corporation. We reviewed patients with IgA nephropathy who underwent tonsillectomy between January 1, 2014, and March 31, 2019. The patients were divided into two groups: the possible group (amount of oral intake after surgery was 60% or more) and the impossible group (less than 60%). The primary outcome was odds ratio (OR) with a 95% confidence interval (CI) between various patient factors and oral intake, assessed using logistic regression analysis (p<0.05 as the level of significance, calculated with the R software - R-Hochberg method). Pain was evaluated with and without analgesics before initial intake after tonsillectomy.

**Results and Discussion:** A total of 293 patients (212 patients in the possible group and 81 in the impossible group) were reviewed. The insufficient initial intake after tonsillectomy was associated with the need for analgesic administration before initial intake [OR=2.28, 95% CI(1.24, 4.19), p<0.02] and steroid pulse therapy before surgery [OR=0.33, 95% CI(0.15, 0.74), p<0.02]. There was no correlation between initial oral intake and the incidence of postoperative nausea and vomiting (PONV) [OR=1.53, 95% CI(0.78, 3.01), p<0.22]. Pain was the most common cause for lack of intake (n=41, 50.6%), followed by unknown reasons (n=21, 25.9%), unsatisfactory meal served (n=8, 9.9%).

**Conclusion:** In patients with IgA nephropathy, weak postoperative pain and steroid pulse therapy before surgery had a positive effect on the initial oral intake. No significant difference between groups was observed in terms of the incidence of PONV, whereas some patients complained that PONV was the cause of poor dietary intake. Taken together, appropriate postoperative analgesic management and the prevention of PONV are necessary for early oral intake after tonsillectomy.

## 4677

**An investigation of the association between perioperative blood transfusion and recurrence of pancreatic cancer after surgical resection**

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**Background and Goal of Study:** The controversial effects of perioperative blood transfusion on pancreatic cancer recurrence following surgery stem from shortfalls in analytic approaches of previous studies that failed to separate blood transfusion effects from other potential confounders. We utilized a retrospective cohort to investigate the effect of perioperative blood transfusion on cancer prognosis for patients with pancreatic cancer resection.

**Materials and Methods:** We identified patients with stage I through III pancreatic cancer undergoing tumor resection at a tertiary medical center in Taiwan between January 2010 and December 2018 and then divided into transfusion and non-transfusion groups based on whether they received perioperative packed red blood cell (PRBC) transfusion or not. and evaluated through October 2019. Recurrence and patient death were collected from 286 patients with the median follow-up time of 14.5 months and 160 (55.9%) of them received red cell transfusion within 7 days of surgery. Postoperative disease-free survival and overall survival were measured using proportional hazards regression models with inverse probability of treatment weighting (IPTW) to balance observed covariates between the transfusion and non-transfusion groups. Restricted cubic spline functions were used to characterize dose-response effects of the amount of transfusion on cancer recurrence and mortality.

**Results and Discussion:** Perioperative PRBC transfusions were associated with increased risk of cancer recurrence (IPTW adjusted HR: 1.62, 95% CI: 1.18 – 2.23, p = 0.003) and all-cause mortality (IPTW adjusted HR: 1.63, 95% CI: 1.19 – 2.24, p = 0.002) after pancreatic cancer resections. Restricted cubic spline regression analysis disclosed a linear dose-response association between the amount of PRBC transfused and cancer recurrence but no specific dose-response relationship was identified between transfusions and death after cancer resection.

**Conclusion:** Perioperative blood transfusion was associated with worse prognosis after curative pancreatic cancer resection. Strategies aim to minimize transfusion requirements should be further developed.
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The Cancer and Anaesthesia study (CAN), an RCT of survival after propofol- or sevoflurane-based anaesthesia for cancer surgery. First results for breast cancer

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Background and Goal of Study: Animal studies and a few retrospective human studies indicate that the choice of anaesthetic may affect long-term-survival (1,2). This is however questioned for breast cancer (3). The aim is to investigate any difference in 1- and 5-year-survival between propofol and sevoflurane.

Materials and Methods: In the CAN study, adult patients scheduled for curative surgery of breast- or colorectal cancers are included. After informed consent, patients were randomised to either propofol- or sevoflurane-group in a 1:1-ratio. For pragmatic reasons, there are no protocol-specific restrictions regarding concomitant therapy, thus, anaesthesia are maintained according to randomisation and otherwise according to standard institutional procedures at each site. Demographic data, oncological-, surgical- and anaesthesia related details are recorded in an electronic CRF. With 1,650 patients, a survival difference of 5 %-units may be detected with 80 % power and a P-value of <0.05. Another 115 more patients will give a reasonable safety margin for loss of patients or technical errors. Overall survival and time to progress are presented as Kaplan-Meier curves together with median survival time. The impact of factors related to anaesthesia, the surgical procedure, oncological characteristics of the tumor, and adjuvant treatment are evaluated in regression analyses.

Results and Discussion: Of 1,765 patients included between December 2013 and September 2017, 1,757 remained for analysis, 887 in the propofol group and 870 in the sevoflurane group. Randomisation equalised all surgical- and oncological related variables, perioperative characteristics, demographics, and anaesthesia related variables. Only the hypnotic used for anaesthesia maintenance separated the groups. One-year-survival will be presented in the abstract.

Conclusion: This is the first results from the first RCT comparing the impact of propofol and sevoflurane on survival after cancer surgery.

References:


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Involuntary muscle contraction after C-spine surgery

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Background: Myoclonus is a common medical sign of various diseases. To differentiate the cause of myoclonus at the spot is difficult. Here, we present a case of propriospinal myoclonus after cervical laminoplasty in the post-anesthesia care unit (PACU).

Case Report: A 70-year-old man with a diagnosis of ossification of posterior longitudinal ligament with myelopathy received cervical laminoplasty. He did not have a history of seizure but he experienced involuntary upper limb muscle contraction when he bent his head down. He took antihypertensive medication and pain killers before the surgery. All of his preoperative tests were within normal limits. General anesthesia was induced with propofol 200mg, fentanyl 100mg, cisatracurium 10mg, and was maintained with sevoflurane. His hemodynamics was stable throughout the surgery. Neck collar was placed before emergence. He was extubated uneventfully and was transferred to PACU. In PACU, he developed jerky movement with alert consciousness. The jerky movements arise from upper limb initially and spread over the trunk and lower limb. It is a rhythmic flexion motion. Midazolam was given intravenously and jerky movements subsided as he was sedated. The jerky movements relapsed when he was alert or stimulated by pain or touch. Following brain CT showed neither intracranial hemorrhage nor other intracranial abnormalities. The clinical features of his jerky movements were likely to propriospinal myoclonus, which was originated from the spinal cord. Clonazepam was prescribed and no known of myoclonus relapsed before he was discharged. We proposed that the cause of propriospinal myoclonus might be induced by the mechanical rub of the ossified posterior longitudinal ligament on the cervical spinal cord.

Discussion: Generalized involuntary muscle contraction after the emergence of anesthesia is often treated as a seizure. Here, we emphasize the importance of past medical history and characteristics of muscle contraction for differential diagnosis before EEG and polymyography take place.

References:

Learning points: Initial signs of seizure were subtle and attributed to common causes: shivering, movement from decreased anaesthetic depth. Suspicions were only raised when seizures became more apparent. Careful monitoring of brain function waveforms may aid in more prompt diagnosis. Early diagnosis and management of intra-operative seizures is needed to prevent life-threatening neurological injury. Increased use of negative pressure drainage devices makes knowledge of potential harms crucial peroperatively[3].

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A Case Report of Seizures During General Anaesthesia for Cervical Spine Surgery: Undetected Cerebrospinal Fluid Leak Leading to Intracranial Haemorrhage and Status Epilepticus

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Background: Cerebrospinal fluid (CSF) leak is a known complication of spine surgery, with an incidence of 0.3-1.3% in cervical spine surgery[1]. Symptoms range from mild (headache, vertigo) to potentially life-threatening (meningitis, intracranial haemorrhage)[1,2]. Most publications[3] report intracranial events after emergence of general anesthesia(GA), hours-days post-procedure. We report a case of seizure during GA with status epilepticus secondary to ICH due to CSF leak, contributed by active drain suction.

Case Report: 78-year-old underwent C1-T2 posterior decompression for cervical myelopathy. After resuming supine position, he developed tonic-clonic seizures. Blood gas sampling ruled out metabolic causes. Surgical drain was found to be active with 400ml haemoserous fluid drained. Observation of patient was obscured by drapes and body straps which restricted movement. High index of suspicion is required for intracranial events during spine surgery which can cause life threatening complications.

References:
Predictors of severity of Perioperative hypersensitive drug reaction (HDR): Retrospective Cohort study

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Background: Hypersensitive drug reactions (HDR) can lead to life threatening events, depending on their severity. However, predictors based study of the severity of HDR were rare. Hence, we examined the predictors of the severity of HDR for patients undergoing general anesthesia.

Methods and materials: Retrospective cohort study was conducted in patients of all age, who underwent anesthesia at a Tertiary care hospital, in Southern Thailand, between February 2015 to December 2018. Data were collected from the Hospital Information System. HDR were graded from 1 to 4. The suspected agents of HDR were evaluated by anesthesiologists and allergists. Patient, surgery and anesthetic factors were included as a potential predictor, Univariate and multivariate multinomial logistic regression was performed and presented as relative risk ratio (RRR) with a 95 % confidence interval (CI).

Results: The incidence of HDR was 3.4 per 1,000 (325 of 74,031 patients). The severity of HDR were grade 1 (72.9%), grade 2 (24%), grade 3 (3.1%) and grade 4 (0.5%). The most common symptoms were cutaneous symptoms (30.5%), hypotension (7.8%) and flushing (4.8%). According to the allergist, morphine, ceftriaxone and cefazolin were the most commonly suspected agents for grade 1, while cisatracramur, proplofol and cefazolin were the most commonly suspected agents for grade 3. For the multivariable analysis, when compared to grade 1, the predictor of grade 3 were having rhinitis (RRR 12.37, 95%CI 8.94, 17.11), longer duration of anesthesia (RRR 1.002, 95% CI 0.999, 1.004) and ASA 3 vs 1 (RRR 3.29, 95% CI 1.77, 6.11). The predictor for grade 2 HDR were older age (RRR 1.02, 95% CI 1.00, 1.04), history of a drug allergy (RRR 2.08, 95% CI 1.05, 4.11) and higher blood loss (RRR 1.0002, 95% CI 1.00, 1.0003) intraoperatively. The common predictor of grade 2 and 3 HDR were cardio-vascular-thoracic/ neurosurgery/ eye/ ear-nose-throat surgery, when compared with orthopedic and abdominal surgery (p<0.01). The combination of general and regional anesthesia reduced the risk of grade 3 HDR, compared to sole use of general anesthesia (RRR 0.69, 95% CI 0.62, 0.77).

Conclusion: Most patient risks (older age, history of allergic rhinitis, drug allergy) and anesthetic risk (higher ASA classification and longer anesthetic time) for severe HDR may be unpreventable. Avoiding cisatracramur, proplofol and cefazolin are required in these high risk patients, so as to minimize the severity of HDR perioperatively.


Learning points: Patent blue dye anaphylaxis is a rare condition, the diagnosis is a challenge to anesthesiologists. The variable clinical presentation and late onset of symptoms/signs are factors that can difficult the diagnosis. Patent blue dye anaphylaxis should be considered in the differential diagnosis of perioperative allergic reactions whenever it is used.
Unexpected coma in a patient with Parkinson’s Disease following general anaesthesia

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Background: Parkinson’s disease (PD) is a disorder of the central nervous system and these patients represent a particular anaesthetic challenge (1,2).

Case Report: A 65 years old male with PD under carbidopa/levodopa (25mg/100mg) five times daily was scheduled for an inguinal hernia repair surgery. He had light bradykinesia of the limbs, slow walking, dystonia of the toes and unpredictable off periods. The patient received his usual medication orally in the morning of the surgery. The surgery took 3 hours and when anaesthesia was discontinued the patient quickly started spontaneous ventilation, opened his eyes but failed to demonstrate any facial movements or any response to direct commands and presented a severe hypotonia of the limbs. He had no response to pain or any verbal or motor response. Possible diagnoses were a delayed emergence of anaesthesia, a stroke leading to a locked-in syndrome or an off-syndrome. CT scan was negative for acute cerebrovascular events and 300 mg of levodopa was given through a nasogastric tube. Over the next minutes, he showed progressive improvement in responsiveness to questions and in muscular tone. Levodopa administration was continued every 2 hours and at the end of the day he was already able to speak by gestures and move with a light bradykinesia.

Discussion: Levodopa is an effective drug to treat motor symptoms of PD and to prevent an acute exacerbation it should be used until the day of surgery (1-3). This patient received his usual medication in the morning of the surgery, but an unforeseen delay lead to a prolonged time without administration of additional doses. The patient emerged from the anaesthesia with a GCS of 3 which was reversed with the administration of Levodopa via nasogastric tube. There are no prior reports of a comatose state with hypotonic muscle tone, expressionless facies and unresponsiveness to verbal command in these patients.

Learning points: Off-syndrome in patients with PD is expectable if the timing of levodopa dose is not adjusted properly and symptoms usually improve with administration of Parkinson’s medication. Minimize drug interruptions and place a nasogastric tube for additional doses may be helpful to prevent exacerbation of PD symptoms.

References:
2. Perioperative management of patients with Parkinson’s disease; An J Med; 2014.

Learning points:
2. Perioperative management of patients with Parkinson’s disease; An J Med; 2014.

A strange cause of intraoperative desaturation

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Background: Platypnea-Orthodeoxia Syndrome (POS) is a rare clinical entity characterized by dyspnea and arterial desaturation from supine to an upright position. The pathophysiology of POS remains unclear. We present a case of POS during the intraoperative period.

Case Report: A 54-year-old man with previous history of hypertension, obesity and alcoholic liver disease was diagnosed of esophageal carcinoma with a GCS of 3 which was reversed with the administration of Levodopa via nasogastric tube. There are no prior reports of a comatose state with hypotonic muscle tone, expressionless facies and unresponsiveness to verbal command in these patients.

Discussion: Levodopa is an effective drug to treat motor symptoms of PD and to prevent an acute exacerbation it should be used until the day of surgery (1-3). This patient received his usual medication in the morning of the surgery, but an unforeseen delay lead to a prolonged time without administration of additional doses. The patient emerged from the anaesthesia with a GCS of 3 which was reversed with the administration of Levodopa via nasogastric tube. There are no prior reports of a comatose state with hypotonic muscle tone, expressionless facies and unresponsiveness to verbal command in these patients.

Learning points: Off-syndrome in patients with PD is expectable if the timing of levodopa dose is not adjusted properly and symptoms usually improve with administration of Parkinson’s medication. Minimize drug interruptions and place a nasogastric tube for additional doses may be helpful to prevent exacerbation of PD symptoms.

References:
2. Perioperative management of patients with Parkinson’s disease; An J Med; 2014.
A prospective, randomized, clinical study

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Background and Goal of Study: It’s known that low-flow anesthesia (LFA) technique has many advantages. In this prospective study, we aimed to determine whether LFA has an effect on emergence agitation (EA) in the post-anesthesia care unit (PACU) in women underwent laparotomic gynecologic surgeries.

Materials and Methods: After receiving approval, 64 female patients who scheduled for elective laparotomic gynecologic surgery requiring general anesthesia were enrolled in this prospective, randomised study. Patients were randomly divided into two groups as Group 2 (n = 32) and Group 0.5 (n = 32). General anesthesia was administered using a standardised protocol for all patients in both groups. At the beginning of anesthesia fresh gas flow (FGF) rate was set at 4 L/min in both groups. When all patients reached 1 MAC of sevoflurane (AbbVie Inc.), then FGF was reduced to 2 L/min Group 2 and 0.5 L/min in Group 0.5. Sevoflurane concentration adjusted to 1-1.1 MAC during throughout surgery. Vapor was closed in Group 0.5, 15 min before and in Group 2 end of the operation. At the end of the surgery FGF was increased to 4 L/min. All patients were extubated when the TOF ratio was > 90%. Emergence agitation was assessed by using Riker Sedation-Agitation Scale (SAS) in the PACU at 5th, 10th, 20th and 30th minutes (4: calm and cooperative, 4+: presence of agitation, 4<: presence of sedation).

Results and Discussion: Emergence agitation was observed in 5 patients in the PACU. There was no significant difference between two groups. At the all evaluation times, the number of patients with SAS<4 was significantly higher in Group 0.5 than group 2 and the number of patients with SAS>4 was significantly higher in Group 2 than Group 0.5 (p>0.05). In the literature, there is no study that is demonstrating the effects of low flow anesthesia on emergence agitation in adult patients. It is known that awakening agitation in pediatric patients is associated with rapid redistribution of inhalation anesthetics from the brain (1).

Conclusion: In our study, we didn’t find any statistically significant difference between the groups about emergence agitation. However the presence of higher number of patients who are calm and cooperative in the PACU in LFA may be related with slower redistribution of volatile anesthetics from brain.

References:

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Kounis syndrome after sugammadex administration

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Background: We present a case of Kounis syndrome (KS, “allergic angina syndrome”) after sugammadex administration. Informed consent of the patient for the publication of this case was obtained.

Case Report: A 70-year-old woman with no remarkable medical history or preoperative examinations findings was admitted for surgical intervention (acute apericitis). General anesthesia was induced and intraoperative course was uneventful. When the surgical procedure finished sugammadex was given and the patient was exubated. Few minutes later we found a sudden ST depression in lead V5, low blood pressure, signs of hypoperfusion and tachycardia. Patient was reintubated and perfusion of norepinephrine was initiated. We performed a transthoracic echocardiogram in which good cardiac contractility was observed; by this time the ECG had return to normal. Skin redness was observed when normal hemodynamic returned. The patient was moved to PACU with norepinephrine perfusion at 0.4 ug/kg/min. About one hour later she was normally exubated. Intradermal allergy tests obtained a positive result to sugammadex.

Discussion: KS has been related with a wide range of drugs. Sugammadex is commonly used in general anesthesia with an estimated incidence of allergic reactions of 0.04%. Diagnosis of KS can be challenging in the surgical context because there are many drugs administered in short time, patients are unable to refer their symptoms and clinical signs may be hidden. Actually there are no clinical guidelines to treat KS. It is necessary to treat the acute myocardial infarction and also the anaphylactic reaction. After the acute clinical presentation all patients must be evaluated by an allergist doctor.
References:

Learning points:
Sugammadex can cause acute coronary symptoms by allergic mechanisms. It is important to keep patients monitored and evaluate development of reactions when neuromuscular blockade has been reversed. A high suspicion index for KS can lead to a faster treatment.

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Iatrogenic scrotal pneumatocele with severe bradycardia and hypotension as a complication of TAPP hernioplasty: a case report

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Background: Transabdominal preperitoneal (TAPP) hernioplasty is one of the possible approaches to laparoscopic hernia surgical repair. This case report presents a unique iatrogenic surgical complication of this technique: scrotal pneumatocele (air in the scrotum) with severe hemodynamic effects.

Case Report: A 42-year-old male, ASA II, previous smoker otherwise healthy, with no known allergies, underwent a programmed hernioplasty with transabdominal preperitoneal approach under balanced general anesthesia. During surgery, sudden severe bradycardia and hypotension occurred, being successfully treated with 0.5 + 0.5 mg of Atropine. While searching for possible causes, the anesthesia team found beneath the surgical drapes that an exuberant scrotal pneumatocele had been formed. Other causes for the bradycardia were excluded, such as sudden hypovolemic shock, hypoxemia, and electrolyte abnormality. After the patient was hemodynamically stabilized, the surgery continued without other difficulties. In the end, with discontinuation of pneumoperitoneum, scrotal pneumatocele disappeared without any scrotal complaints during the postoperative period.

Discussion: This case shows scrotal pneumatocele as an iatrogenic complication of TAPP Hernioplasty not described before in the scientific literature. Excluding other possible causes, bradycardia and hypotension were attributed to hypervagotonia due to a secondary parasympathetic reflex caused by air in the scrotum. Although not having any postoperative consequences, the iatrogenic scrotal pneumatocele caused severe intraoperative hemodynamic adverse effects that could have put the patient’s life at risk.

References:

Learning points:
The anesthesiology team should be always aware of possible complications under the surgical drapes. Scrotal pneumatocele can be an iatrogenic complication of hemioplasty by TAPP technique, which can have severe intraoperative adverse effects.

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Challenges in the intraoperative diagnosis of Malignant Hyperthermia versus other hypermetabolic states: Case report

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Background: Malignant hyperthermia syndrome is a rare family myopathy, which appears as a skeletal muscle hypermetabolic syndrome linked to anesthesia and may prove fatal if effective treatment is delayed. However there are other medical conditions such as acute sepsis that may mimic this hypermetabolic state and hinder a prompt diagnosis.

Case Report: We report a case of a 51-year-old male without history of previous general anesthesia or relevant medical history that underwent an arthroscopic knee washout due to septic arthritis. Insertion of a laryngeal mask airway after induction with propofol and fentanyl resulted in adequate ventilation. Anesthesia was maintained by sevoflurane and oxygen. After 45 minutes of induction when articular debridement was mostly finished and before tourniquet cuff was released a drastic elevation in end-tidal carbon dioxide was noted (first arterial gasometry showed PaCO2 > 115 mmHg), and several possible causes for this elevation were subsequently ruled out. A presumptive diagnosis of malignant hyperthermia was made when the patient exhibited tachycardia and temperature increase (38,8°C). Immediately malignant hyperthermia protocol was initiated, sevoflurane was suspended and early administration of dantrolene helped in hemodynamically stabilizing the patient. The patient later recovered in the intensive care unite, where he was treated for the bacteria that grew in joint fluid.

Discussion: Malignant Hyperthermia is an uncommon condition without specific clinical features. Sepsis shares clinical symptoms that resemble malignant hyperthermia. However, in an acute situation, with the knowledge that untreated malignant hyperthermia is life threatening, patients with clinical suspicion of malignant hyperthermia, even with signs of sepsis or uncertain diagnosis, should be treated as such. Early administration of dantrolene is the cornerstone in malignant hyperthermia treatment, which can also be useful in other non-specific hyper metabolic medical condition.

References:

Learning points: Highlight the need of an early intervention considering the difficulty to clinically differentiate MH and sepsis during surgery.

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Complication of laparoscopic surgery: a case of carbon dioxide embolism

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Background: Laparoscopic surgery has many known benefits, however it also has associated risks due to physiologic changes in response to pneumoperitoneum, extreme positioning, systemic carbon dioxide (CO2) absorption and gas embolism.1 Case report: A 70-year-old woman, ASA physical status class 2, was admitted for an arthroscopic knee washout due to septic arthritis. She was submitted to radiotherapy and chemotherapy with significant tumor regression. Pre-operative physical examination and analytical study showed no pathological findings. An intravenous general anesthesia under ASA standard, invasive blood pressure, BISTM, StarlingSV and neuromuscular blockade monitoring was conducted. Consecutive arterial blood gases were performed without significant changes. Two hours after pneumoperitoneum insufflation, we observed a sudden increase in end-tidal CO2 from 32 to 56mmHg and a drop of medium blood pressure from 112 to 48 mmHg. Fraction of inspired oxygen (FiO2) was increased to 100% and the findings rapidly reverted. Arterial blood gas analysis with a FiO2 68% revealed a pH 7,296; paO2 237 mmHg; paCO2 45.4 mmHg and HCO3- 26.2 mmol/L. The procedure and post operative period were uneventful.

Discussion: The clinical findings were read as CO2 embolism. This complication is rare (incidence 0.0014-0.6%) but potentially fatal.1 CO2 is highly soluble on blood and rapidly eliminated in the pulmonary vasculature. Clinical manifestation of CO2 embolism depends on the amount and celerity of gas entering the venous system. Air embolism causes increased dead space, ventilation/perfusion mismatch, hypoxemia and hypercapnia. As it increases pulmonary artery pressure and right ventricular afterload, it leads to decreased venous return, left ventricular preload and cardiac output, which may culminate in to cardiovascular collapse. Treatment includes immediate release of the pneumoperitoneum, FiO2 100%, fluid therapy, and cardiac output, which may culminate in to cardiovascular collapse. Treatment includes immediate release of the pneumoperitoneum, FiO2 100%, fluid therapy, and
Anaphylactic reaction in a patient undergoing laparoscopic oophorectomy

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Background: The incidence of anaphylaxis in the perioperative period is 1:4000 to 1:25000. Various mechanisms cause activation of mast cells and basophils which in turn release inflammatory mediators leading to the onset of clinical features potentially life-threatening. This case illustrates the anesthetic management of a anaphylactic reaction during anaesthetic induction.

Case Report: A 22-year-old female of ASA physical status class 1 was scheduled for laparoscopic oophorectomy. Before anaesthesia induction 2 g of cefazolin and 500 mg of metronidazole were administered. Anaesthesia was induced with midazolam, droperidol and fentanyl at which time the patient complained about mild respiratory distress and induction continued with propofol and rocuronium. At this time, the patient developed labial and periorbital swelling with cardiovascular collapse (BP 35/17 mmHg and HR 150 beats/min). Endotracheal intubation was performed and she was treated with i.v. volume, ephedrine and amiodarone. This restored cardiovascular stability within 20 min. Surgery was performed and at the end the patient was successfully extubated, although some labial and periorbital edema were still present, for which clemastine was administered. Blood was withdrawn for histamine and tryptase measurements and an immunological appointment was scheduled. She had no complaints after anaesthesia emergency and after three days went home.

Discussion: Perioperative anaphylaxis tends to be severe and has a higher mortality rate than anaphylaxis occurring in other settings, partly because of factors that impair early recognition. Diagnosis is presumptive based on clinical signs and the timing of the reaction in relation to the drugs administered. Antibiotics and neuromuscular blocking agents are the most common triggers. Although different from the case described the cornerstones of treatment are adrenaline and i.v. fluids. Histamine and tryptase levels should be measured and referral to an allergy specialist for definitive diagnosis is recommended.

References:
1. doi: 10.4103/0259-1162.108286.

Learning points: Anaphylactic reactions are important causes for perioperative morbidity and mortality. Prompt diagnosis and treatment are crucial for the successful management of anaphylaxis. All patients should measure histamine and tryptase levels and be followed up, so the culprit drug and safe alternatives are identified, thus ensuring patient safety during future anaesthetics.

Myoclonic Jerks Post General Anaesthesia — A Case Report

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Case Report: A 29-year-old Male with no medical history and a previous uneventful general anaesthesia (GA), presented for a knee meniscus repair. GA was induced with intravenous (IV) propofol 200mg and fentanyl 50mcg. IV cefazolin 2g was given for antibiotic prophylaxis. A laryngeal mask airway was inserted, and GA was maintained with sevoflurane and oxygen/air mixture. Surgery proceeded uneventfully. IV morphine 6mg and paracetamol 1g was given for analgesia. Anti-emetics included IV ondansetron 4mg and dexamethasone 8mg. Upon awakening, he had involuntary jerking movements of his head, torso and upper limbs, occurring 2 to 3 times every few minutes. Each episode lasted a few seconds. These movements were not distractible, choreiform, nor dystonic in nature. There was accompanying myalgia, but no slurred speech, aura, photophobia, neck stiffness or diplopia. He was conscious and aware of the jerks. Neurological examination was otherwise normal. He was afebrile and haemodynamically stable. Blood investigations revealed normal calcium, magnesium and serum electrolyte levels. He was transferred to the high dependency and prescribed IV MidaZolam and oral Clonazepam by the neurologist. An EEG performed to exclude seizures was normal. The jerks reduced in frequency following the administration of benzodiazepines, and he was discharged after complete resolution of his symptoms on the 2nd post-operative day.

Discussion: Myoclonic jerks post anaesthesia are a rare occurrence, the mechanisms of which are relatively unknown. Drugs reported to be associated include propofol, fentanyl, ramelson and ondansetron. This phenomenon is idiosyncratic and impossible to predict. It is important to rule out differential diagnoses such as adverse drug reactions, local anaesthetic reactions, emergence delirium, hysterical response and shivering. Investigations such as electrolyte levels, EEG, CT/MRI Brain should be performed. Treatment may involve aborting myoclonic jerks with benzodiazepines, barbiturates or anti-epileptics. All cases of unexplained seizure-like activity after anaesthesia should be reported. The symptoms are usually self-limiting without any long-term sequelae. It is important to reassure the patient as these symptoms may be distressing, and they should be reviewed regularly till resolution of symptoms. It may be prudent to provide a memo to avoid administering similar drugs for future anaesthesia to prevent reoccurrence of such symptoms.
Intra-operative anaphylaxis after ketorolac administration unveils sensitization to multiple neuromuscular blocking agents and midazolam

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Background: Anaphylaxis during anaesthesia is a serious complication with considerable morbidity and mortality (3%-6%). Therefore, it demands adequate recognition, management and investigation. During the episode, removal of suspected drugs is mandatory, but their identification is often difficult such that 40% of the time wrong drugs are discarded.1 Case Report: A 43-year-old female, ASA II patient with smoking habits, controlled asthma and allergy to egg yolk was scheduled for abdominal liposuction. After midazolam, remifentanil, thiopental and rocuronium, she was intubated and volatile anesthetics were administered without any incident. Ketorolac was administered 45 minutes after the anesthetic induction. Immediately, a severe bronchospasm started, followed by arterial hypotension (minimum: 55/29 mmHg) and a widespread rash. Anaphylaxis due to ketorolac was suspected and treated with fluidotherapy, a sympathomimetic, hydrocortisone, clemastine, aminophylline and inhaled salbutamol. The clinical evolution was good and the patient was extubated and transferred to the PACU without incidents. Skin tests were performed 13 weeks later and were positive for midazolam as well as for tested neuromuscular blocking agents (NMBA): rocuronium, atracurium and cisatracurium. The only reliable test to confirm sensitization to ketorolac was a provocation test, which was not performed due to high risk of anaphylaxis.1 Therefore, the anaesthesiologist was believed to be caused by ketorolac, rocuronium and/or midazolam.

Discussion: Type I hypersensitivity reactions during anaesthesia typically occur within the first minutes after IV exposure, however delayed onset may occur.1 In this case, the investigation was crucial because it detected sensitization to unsuspected agents that putatively contributed to the anaphylaxis (even though their action did not occur immediately).1 It identified a sensitization to midazolam, for which a small number of cases of anaphylaxis have been reported.2 Furthermore, it identified a cross-sensitivity between NMBA, which implies that all NMBA must be avoided hereafter.1 However, if future NMBA use is imperative, a NMBA with a negative skin test should be chosen, even though it does not guarantee its safety.1,2.

References:

Learning points: The temporal relationship between drug administration and anaphylaxis symptoms may not be a reliable predictor of the causative agent.

Does regional scalp block reduce pain after craniotomy?

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Background and Goal of Study: There is no consensus regarding the best anesthetic regimen for use in neurosurgery. Performing a regional scalp block as an adjunct to various anaesthesia techniques has the potential for reducing analgesic and vasoactive requirements during cranioanatomy surgery and in the post-operative period. We evaluated our 2.5 year experience in a new Neurosurgical department.

Materials and Methods: A retrospective qualitative analysis of electronic charts from Sheare Zedeck Medical Center for patients undergoing cranioanatomy surgery for tumor removal during the period of December 2016 through July 2019. A total of 195 patient files were examined, of which 67 received a scalp block (intervention group) and 128 received conventional IV treatment. Highest postoperative pain was recorded during the first 8 hours (VAS1), 8-16 hours (VAS2) and 16-24 hours (VAS3) after surgery. Total amount and time of analgesic and anxiolytic drugs during surgery and in the first day post-op were evaluated.

Results and Discussion: The 2 groups were equivalent for age, gender, weight, operation time and hospital stay. Statistically significant differences were found between the conventional and intervention groups respectively in VAS1 (3.37±3.01 vs 2.55±2.91, p=0.0014) and in VAS3 (1.8±2.37 vs 0.0±0.02, p=0.005) (Wilcoxon-2 sided). The intervention group contained a higher percentage of hypertensive patients (37.1% compared to 25.78%). The intraoperative requirements of Labelolol were similar between groups (0.71±0.48 vs 0.74±0.44, p=0.31). The intraoperative requirements of Hydralazine were lower in the intervention group (30.47% vs 19.4%, p=0.033). The intraoperative requirements of Fentanyl were lower in the intervention group as compared to the control group (4.2±2.42 mcg/kg and 5.63±2.44 mcg/kg respectively, p=0.037). After surgery pain control was superior in the intervention group, and use of anxiolytic drugs was lower in this group despite containing more hypertensive patients. Although the study was retrospective with no uniform protocol for pain management less narcotics were given. Better post-op pain scores were probably attributed to lower sympathetic surge and patient anxiety.

Conclusion: It seems that performing a regional scalp block for cranioanatomy surgeries carries the high benefit of lower opiate and anti-hypertensive treatment-intraoperatively and lower pain scores postoperatively.

Intravenous lidocaine perfusion for postoperative analgesia in CRS + HIPEC: a retrospective analysis

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Background and Goal of Study: Surgical approach of peritoneal carcinomatosis following Sugarbaker’s technique (medial laparotomy and coliseum technique), is performed in our hospital under combined anaesthesia: thoracic peridural catheter (TPC) + balanced anaesthesia. The use of the TPC during 5 days after the surgery provides the patient good quality analgesia. Our challenge is to find the best strategy for the postoperative pain management in patients who are not candidates for TPC.

Materials and Methods: Based on the successful use of intravenous lidocaine, not only in multimodal pain management, but also in reducing postoperative ileus, reducing PONV and reducing length of hospital stay, reported in the last years, we applied this approach to the patients who were not candidates for TPC for postoperative pain management. These patients received a lidocaine bolus of 15 mg/kg at anaesthetic induction (balanced anaesthesia, with sevofurane, rocuronium in continuous perfusion and fentanyl on demand), followed by a continuous intravenous lidocaine perfusion at 1.5 mg/kg/h, started before surgical incision, and maintained during 48 hours. Between September 2016 and November 2019, 20 patients received intravenous lidocaine, becomes a good alternative, reducing PONV and NSAIDs during 48 hours for postoperative analgesia. When lidocaine perfusion was finished they received NSAIDs and opioids in case of pain (VAS >3).

Results and Discussion: 19 of the patients had a good analgesia quality, with VAS (0-10 cm) between 0 and 3 during the 5 days following the surgery. No one of them presented adverse effects due to the lidocaine administration. Only one patient needed opioid administration during this period (intravenous morphine perfusion at 1 mg/h, during 24 hours, between the second and the third postoperative day).

Conclusion: Although it is a small sample, these results suggest that lidocaine intravenous perfusion provide a good postoperative analgesia, and we think that a study comparing lidocaine intravenous perfusion to TPC should be considered. Other possible benefits of lidocaine administration (reduction of postoperative ileus, reduction of length of hospital stay, less postoperative nausea and vomiting) should also be compared.

Multimodal analgesia and rectus abdominis sheath block in exploratory laparotomy

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Background: Multimodal analgesia has been stimulated by the excessive use of opioids and their unwanted postoperative (PO) effects. The gold analgesic blueprint for major abdominal surgeries is neuraxial block, however, it is a risk-free technique and has contraindications. In this context, regional block in association with multimodal analgesia becomes a good alternative.

Case Report: A 60 years old, no comorbidities, in the fifth postoperative day of abdominal liposuction. After multimodal analgesia in the anterior abdominal wall region. This case reports a patient with...
Contraindications to epidural block. RSA was chosen at the end of surgery for analgesia associated with multimodal anesthesia that contributes visceral as well as somatic analgesia intra and PO, reducing opioid use and its unwanted effects.

References:

Background and Goal of Study: Optimal pain management after major abdominal surgery presents unique challenges. The goal of this study is to compare the effectiveness of the On-Q surgical incision site pain-relief system to intravenous patient controlled analgesia.

Materials and Methods: Thirty-six patients, ASA I-II, who underwent major surgery (peripheral pancreatectomy, Whipple's, cancer colon surgery) were randomized to either the On-Q catheter / pump or the i.v. PCA group. Exclusion criteria were: history of chronic pain, allergic reactions to local anesthetics, inability to use a PCA device. Intraoperatively, all patients received fentanyl, paracetamol 1mg, lornoxicam 8mg and morphine 8-10mg i.v. Post-op instructions for 3mg paracetamol and 8mg lornoxicam /day were given. On-Q group: 24 patients, aged 38-67 (mean 69.4y) received a continuous infusion of ropivacaine 0.375%, at a rate of 2ml/ml through each catheter before skin suturing. PCA i.v. (100 ml morphine 0.3mg/ml, bolus 0.6mg, lockout 15/min) was used as a "rescue" regimen. At PACU (POD0), 24h (POD1) 48h (POD2), total morphine consumption was also recorded in both groups.

Results and Discussion: Pain scores were: a) POD0: On-Q group 0-8, (mean value 2.92), 8/24 patients had 0 pain, PCA group 0-6 (mean value 3.33) (only 1 patient with 0 pain) b) POD1: On-Q group 0-9 (mean value 3.29), and PCA group 2-4 (mean value 2.92). c) POD2: On-Q group 0-7 (11/24 patients had 0 pain) (mean value 2) PCA group 1-4 (mean value 2.67) In the On-Q group, 10/24 patients (41.7%) used the PCA, receiving 0.3-30 mg morphine (mean 3.2mg) during 48h. In the PCA group, 11/12 patients (91.7%) received 2.45 mg morphine (mean 10.2mg). Although patients in the On-Q group showed a rise in pain scores on POD1, the overall pain scores were significantly lower and "the drop" in pain scores is higher in the On-Q group at all time-points. Total morphine consumption was also significantly lower in the On-Q group.

Conclusion: Continuous wound perfusion with a ropivacaine solution using the On-Q system seems to provide effective postoperative analgesia with less opioid consumption in major abdominal surgery.

Impact of opioid free anesthesia on perioperative outcomes in pancreatoduodenectomy surgery: epidural versus patient controlled analgesia

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Background and Goal of Study: Pancreateoduodenectomy (PDC) remains one of the most anaesthetic and surgical demanding open abdominal surgery. Although epidural analgesia (EA) remains the Gold-Standard for most open abdominal surgical procedures, the optimal analgesic technique remains under debate. The choice of the analgesic technique usually takes under consideration the analgesic efficacy, but the implications in the progression of the disease and in morbi-mortality are also primordial aspects. Should we take under consideration other parameters beside the analgesic outcome? This study aimed to compare the epidural analgesia (EA) and intravenous patient controlled analgesia (PCA) based on postoperative clinical outcomes.

Materials and Methods: Retrospective observational study with adult inpatients (>18yr) submitted to PDC between 1ST January 2018 and 30th september 2019 in tertiary medical center. According to analgesic technique the patients were divided into two groups (EA vs morphine PCA). Demographic parameters were analyzed. Outcomes studied were: 30 days mortality, acute pain unit stay (days), surgical intermediate care unit (SICU) stay (days), hospital stay (days), urgency readmission. For the statistically analysis we used SPSS version 23.

Results and Discussion: The study included 42 patients. Mean of age was 66 ±10 years, with 54.3% male, 59.5% ASA I-II and 40.5% ASA III. Group distribution was: EA 26.2%, and PCA 73.8%. Data distribution for normality was tested. No statistically significant differences were found in terms of 30 days mortality (p=0.210) between the two groups. Neither in relation to other outcomes: acute pain unit stay (mean of
Intrathecal anesthesia was provided for a 27 years old female when placing an intravenous continuous fluid. This was a observational study including 20 patients. In all patients the IJV-subclavian junction and the right nerve stimulator (Stimuplex®; B Braun, Melsungen, Germany). First, we identified (January 3, 2018) and participants' informed consent, we used a linear portable ultrasound and a cutaneous nerve stimulator, in volunteer participants. Between the superficial branches of the radial nerve and the cephalic vein using anatomical information. In this study, we investigated the intersection points related anatomical research was performed using cadavers (2), which sometimes progresses to complex regional pain syndrome (1). However, the radial styloid process should be avoided because of the risk of radial nerve damage, which sometimes can be deleterious to the nerve regeneration. (2), However there was an animal study (1) There is a debate about the benefit of the use of steroids in cases of nerve injury in shortening the duration of the effects caused by nerve injury. Case Report: Intrathecal anesthesia was provided for a 27 years old female scheduled for C.S. In sitting position with a 25G bevelled cutting needle at the L4-5 intervertebral space level, the patient experienced paresthesia during introductions of the needle where the needle introduction was stopped and the paresthesia had completely disappeared before the injection of fentanyl and hyperbaric bupivacaine. Two hours after the uneventful operation the patient complained of severe pain on the medial aspect of the foot with marked tactile allodynia. The patient was given a single dose of 100mg hydrocortisone intravenously. 45 minutes later the pain dramatically improved with disappearance of allodynia and after 2 hours the patient was able to walk with minimal pain and within 6 hours the pain completely disappeared and did not appear again within the next 48 hours. Discussion: The most accepted explanation for paresthesia is the contact of the spinal needle with a nerve root that may have caused an inflammatory response. (1) There is a debate about the benefit of the use of steroids in cases of nerve injury as they are believed to decrease the levels of autoantibodies that are suspected to be deleterious to the nerve regeneration. (2) However there was an animal study on mice that showed that Corticosteroid treatment slowed nerve recovery after crush injury to the facial nerve in adult mice. (3) A case report of a patient who had foot drop after spinal anesthesia stated that the use of corticosteroids showed no observed side effects with complete recovery to the patient within few days. (4) Learning points: In case of neurological symptoms following parasthesia with spinal an. steroids should be considered.

Case Report: Effect of steroids on a case of allodynia following Spinal anesthesia in Cesarean section

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Background: Most neurological complications with spinal anesthesia are associated with paresthesia on introduction of the spinal needle. There is a debate about the benefit of the use of steroids in cases of nerve injury in shortening the duration of the effects caused by nerve injury. Case Report: Intrathecal anesthesia was provided for a 27 years old female scheduled for C.S. In sitting position with a 25G bevelled cutting needle at the L4-5 intervertebral space level, the patient experienced paresthesia during introductions of the needle where the needle introduction was stopped and the paresthesia had completely disappeared before the injection of fentanyl and hyperbaric bupivacaine. Two hours after the uneventful operation the patient complained of severe pain on the medial aspect of the foot with marked tactile allodynia. The patient was given a single dose of 100mg hydrocortisone intravenously. 45 minutes later the pain dramatically improved with disappearance of allodynia and after 2 hours the patient was able to walk with minimal pain and within 6 hours the pain completely disappeared and did not appear again within the next 48 hours. Discussion: The most accepted explanation for paresthesia is the contact of the spinal needle with a nerve root that may have caused an inflammatory response. (1) There is a debate about the benefit of the use of steroids in cases of nerve injury as they are believed to decrease the levels of autoantibodies that are suspected to be deleterious to the nerve regeneration. (2) However there was an animal study on mice that showed that Corticosteroid treatment slowed nerve recovery after crush injury to the facial nerve in adult mice. (3) A case report of a patient who had foot drop after spinal anesthesia stated that the use of corticosteroids showed no observed side effects with complete recovery to the patient within few days. (4) Learning points: In case of neurological symptoms following parasthesia with spinal an. steroids should be considered.

Evaluating the risk of radial nerve injury during radial cutaneous venous puncture in volunteer participants

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Background and Goal of Study: When placing an intravenous continuous fluid, studies reported that radial venous punctures within 12-cm proximal to the radial styloid process should be avoided because of the risk of radial nerve damage, which sometimes progresses to complex regional pain syndrome 1). However, the relationship of radial nerve injury was confirmed by thigh amputation(2), which usually causes sustained damage to the superficial nerves during dissection, resulting in incorrect anatomical information. In this study, we investigated the intersection points between the superficial branches of the radial nerve and the cephalic vein using portable ultrasound and a cutaneous nerve stimulator, in volunteer participants.

Materials and Methods: After obtaining Institutional Review Board approval (#4679, January 3, 2018 ) and participants’ informed consent, we used a linear ultrasound probe (LOGIQ e; GE Healthcare, Madison, WI, USA) and a pen-type nerve stimulator (Stimuplex®; B Braun, Melsungen, Germany). First, we identified the superficial branches of the radial nerve by minimum amplitude to notice stimulation (approx. 1.2–1.4 mA) using Stimuplex® at participants’ wrists. Next, we moved the ultrasound probe proximally to find the intersections between the nerve branches and the cephalic vein. We measured the number of proximate distances to the intersections from the radial styloid process, for each participant. Results and Discussion: Thirty-two volunteers participated. The intersection points were 9.3 ± 3.5 cm proximally on the left arm and 9.1 ± 3.9 cm on the right arm (mean ± standard deviation). Furthermore, the rate of crossing points beyond the 12-cm range1) was 25% on the left arms and 19% on the right arms (Figure). Conclusion: Using living volunteers, our results showed that there was no safe venipuncture point in the forearm on the radial side to prevent damage to the superficial radial nerve, using ultrasound and a nerve stimulator.

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Novel supraclavicular ultrasonographic real-time guidance during insertion of peripherally inserted central catheter lines

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Background and Goal of Study: Mispositioning is common during insertion of PICC lines. Available techniques to evaluate tip position include fluoroscopy and chest x-ray. Fluoroscopy is resource demanding and exposes both patients and personnel to radiation. Chest x-ray is performed after compromise of field sterility and catheter repositioning entails a completely new procedure. None of the techniques provide precise information on catheter position throughout insertion. A novel supraclavicular ultrasonographic technique facilitates visualisation of the right subclavian, internal jugular (IJV) and brachiocephalic vein and provides guidance of catheter insertion in real-time. The aim of this study was to assess the feasibility of ultrasonographic real-time guidance of PICC line insertion using the supraclavicular view.

Materials and Methods: This was a observational study including 20 patients. The junction of the right IJV and subclavian vein (IJV-subclavian junction), forming the right brachiocephalic vein, was visualised using a microconvex probe in the right supraclavicular fossa. The wire guide tip was identified at the IJV-subclavian junction allowing for estimation of optimal catheter length. During catheter insertion the stiffening wire was identified in real-time, and in case of mispositioning, the catheter was redirected into the right brachiocephalic vein. Final catheter tip placement was validated with fluoroscopy or chest x-ray. Results and Discussion: In all patients the IJV-subclavian junction and the right brachiocephalic vein were identified. Insufficient upper arm vein patency precluded successful insertion in one patient. Thrombi were identified in two patients in the right brachiocephalic vein and the left subclavian vein. In 16 out of 17 right-sided insertions, both wire guide and catheter stiffening wire were identified at the IJV-subclavian junction and 15 out of 16 visual catheters could successfully be followed into the right brachiocephalic vein. Real-time mispositioning during insertion was detected in 8 cases and redirection was successful in 7 of these. All Ultrasonographic guided catheter length estimations were correct.

Conclusion: Supraclavicular ultrasonography for PICC line insertion was feasible and enabled real-time catheter visualisation during insertion. Mispositioned catheters were redirected without delay and ultrasonographic estimations of catheter lengths were correct.
Neuromuscular block management in Kugelberg-Welander Syndrome

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Background: Kugelberg Welander syndrome is a milder type of Spinal muscular atrophy (SMA type III) with symptoms typically presenting after 12 months and survival into adulthood. We report our neuromuscular block (NMB) management in a patient with SMA type III.

Case Report: A 46-year-old wheelchair woman (157cm, 100kg), ASA III, underwent laparoscopic cholecystectomy under general anesthesia with standard ASA, BIS and train-of-four monitoring. Anesthesia was induced with intravenous propofol (180 mg), fentanyl (0.15 mg) and rocuronium (60 mg); laryngoscopy and tracheal intubation proceeded uneventfully and anesthesia was maintained by pressure-controlled ventilation with sevoflurane in O2 titrated to BIS 40-60. At the time of pharmacologic reversal, the last and only rocuronium bolus (10 mg) had 27 minutes. Sugammadex (400mg) was administered (PTC 6/10) and after 50s the patient presented a TOFratio<0.90. She was extubated uneventfully. At discharge time to the ward, she was hemodynamically stable without signs of residual NMB or recurarization.

Discussion: The management of anesthesia in patients with SMA is often challenging due to muscle weakness, anesthesia-related respiratory complications, hypersensitivities to nondepolarizing muscle relaxants, and succinylcholine-induced hyperkalemia. Only few cases reported the use of muscle relaxants in these patients, and the majority used neostigmine as NMB reversal agent. Anticholinesterase agents often do not guarantee an adequate recovery of neuromuscular function. As far as we know, there are only 3 cases reporting the use of Sugammadex in SMA type III. 1, 2, 3 All of them presented an efficient NMB reversal with no adverse effects. Sugammadex has been demonstrated to be safe and effective in patients with cardiovascular disease and other neuromuscular disorders.1 Apparently our patient didn’t reveal an increased sensitivity to rocuronium, and the sugammadex reversal was very efficient with no adverse effects.

Learning points: Our case reinforces that the combination of rocuronium and sugammadex should be considered in the NMB management of patients with SMA.

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Fingers Hook Technique to Improve Trachway Assisted Nasotracheal Intubation

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Background and Goal of Study: To load a nasotracheal tube on Trachway (a video stylet) has been demonstrated an effective technique in patients undergoing oromaxillofacial surgery.1,2 The goal is to investigate an alternate technique to instead of the conventional technique of jaw thrust to improve the nasotracheal intubation.

Materials and Methods: Eighty patients undergoing oromaxillofacial surgery with Trachway assisted nasotracheal intubation were included in this prospective, randomized, single blind, clinical trial study. The induction agents of fentanyl 2 mcg/kg, thiamylal 5mg/kg, rocuronium 0.1mg/kg, propofol 1mg/kg were administered and intubation initiated 2 minutes later. In group C (conventional jaw thrust), an attempt was made to reach the target sedation in order to start the endoscopy (Entropia of 65-75). The airway characteristics between groups are comparable. There are 6 out of 40 patients in group C and 9 out of 40 patients in group F need no assisted technique to advance the Trachway assembly into trachea. Therefore, 34 patients in group C and 31 patients in group F were analyzed in final. The intubation attempts and intubation time spent were comparable between groups. However, the average score of MNIDS was 3.7±0.5 in group C and 2.8±0.5 in group F (P<0.001). Patients categorized into score of MNIDS 2, 3 and 4.

Conclusion: Propofol allows adequate sedation in a shorter time, without being associated with more complications than midazolam during DISE.

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Sedation during drug induced sleep endoscopy: comparison of continuous infusion of propofol vs continuous infusion of midazolam

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Background and Goal of Study: Drug induced sleep endoscopy (DISE) is a diagnostic procedure for planning surgery in obstructive sleep apnoea (OSA) patients. The impact of the sedative agents on achieving the desired sedation as well as the influence on the airways and on the cardiovascular system are critical. This observational study compares two different sedative drug regimens for DISE.

Materials and Methods: After ERB approval and informed consent, 34 OSA patients were enrolled. Midazolam 0.05-0.07 mg/kg e.v., atropine 0.01 mg/kg e.v. and lidocaine 2% aerosol were given before allocation to propofol (group P n=19); loading 1.5 mg/kg, increased of 0.1 mg/kg (maximum dose 3.5 mg/kg); or midazolam (group M n=15); loading 0.05 mg/kg, increased after 5 minutes of 0.02 mg/kg (maximum dose 0.25 mg/kg). Both groups received supplemental oxygen. Primary endpoint was to compare the groups in terms of time needed to reach the target sedation in order to start the endoscopy (Entropia of 65-75). Secondary endpoint was to find out differences in term of complications and the endoscopist’s satisfaction (blinded to the group).

Results and Discussion: Group M took a significantly higher time to reach the target sedation. However, the time of the whole procedure (from the start of the continuous infusion till the end) did not differ. There was no difference in term of complications and the endoscopist’s satisfaction (Table 1).

Conclusion: Propofol allows adequate sedation in a shorter time, without being associated with more complications than midazolam during DISE.
Intraoperative intravascular effect of Ringers lactate and hyperoncotic albumin during haemorrhage in cystectomy patients

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Background and Goal of Study: Crystalloids quickly equilibrate between the intravascular and interstitial volumes, consequently they are mainly used to treat temporary volume deficits. In contrast, isoncotic colloids induce a long-lasting plasma volume expansion. As doubts have been raised about synthetic colloids, albumin solutions have been used more extensively. The effect of 20% albumin on blood volume expansion and crystalloid kinetic in a clinical setting involving relevant intraoperative blood loss during major abdominal surgery is still unknown. We expect that fluid replacement with crystalloid will be better sustained intravascularly with the administration of 20% albumin during haemorrhage.

Materials and Methods: In this single-arm, single centre feasibility study, an i.v. infusion of 3 mL/kgBW of 20% albumin was administered over 30 min to 13 cystectomy patients during the bleeding phase (mean blood loss 973 mL) in addition to Ringers lactate solution. Blood samples were collected at regular intervals over a period of 300 min to estimate clinical efficacy (i.e. plasma volume expansion / infused volume) which was analysed with a regression modelling equation.

Results and Discussion: Mean haemorrhage was 973 mL (SD ±395). The regression method showed a strong linearity ($r = 0.82$) between the blood loss minus the blood volume expansion and the independent effects of the infused volume of Ringers lactate and 20% albumin solutions (all $P < 0.001$). The mean clinical efficacy was for the Ringer solution 0.37 (95% CI 0.30 to 0.44) mL/mL and for the 20% albumin 1.77 (95% CI 1.17 to 2.37) mL/mL, on an average of 5 hours. This resulted that the 20% albumin expanded plasma volume around 5 times stronger / more potent than the Ringers lactate solution.

Conclusion: The infusion of 20% albumin during haemorrhage of around 1000 mL expands blood volume by 1.8 times and its effect was long standing whereas Ringer solution expanded by 0.4 time. These results suggest that 20% albumin can be used as a potent blood volume expander in this setting, but also sustaining a pronounced longer intravascular effect of Ringers lactate solution.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group P</th>
<th>Group M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>49.8±8.9</td>
<td>43.6±5</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>26.7±3.1</td>
<td>25.7±2.6</td>
</tr>
<tr>
<td>Time to reach target sedation (min)*</td>
<td>6.4±2.7</td>
<td>10.0±3.8</td>
</tr>
<tr>
<td>Duration of the whole procedure (min)</td>
<td>16.3±6.5</td>
<td>18.7±5.5</td>
</tr>
<tr>
<td>Hypo/Hypertension</td>
<td>0(0%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Bradycardia (&lt;50 beats/min)</td>
<td>0(0%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Desaturation (&lt;92%)</td>
<td>4(21%)</td>
<td>3(20%)</td>
</tr>
<tr>
<td>Endoscopist’s satisfaction:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>18(95%)</td>
<td>14(93%)</td>
</tr>
<tr>
<td>Neutral</td>
<td>1(5%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Bad</td>
<td>0</td>
<td>1(7%)</td>
</tr>
</tbody>
</table>

Table 1-Data are means±SD or patient’s number (%); *Mann-Whitney test $p=0.0061$
The effect of preoperative anxiety on pain after third molar tooth surgery

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Background and Goal of Study: This study aims to investigate the effects of preoperative anxiety upon postoperative pain in patients who will undergo third molar dental surgery.

Materials and Methods: 50 patients, aged 18-70, the anxiety levels were measured with Spielberger State-Trait Anxiety Inventory (STAI FORM TX-1) and (STAI FORM TX-2). Patients with scores of STAI-1 ≥ 35 and STAI-2 ≥ 35 were considered as low anxiety patients and the group was named as LA (n: 20). Patients with a score of STAI-1 >35 and STAI-2 >35 were considered as high anxiety level patients and the group was named as HA (n: 20). After their levels of anxiety were established, all the patients were administered desloratadinen IV and they went into third molar dental surgery after local anesthesia. The pain scores of patients in the postoperative period (15 th minute, 30 th minute, 1 st, 2 nd, 4 th, 6 th, 8 th, 12 th and 24 th hours) were assessed using Visual Analog Scale (VAS). In the postoperative period, the patients were administered 275 mg naproxen sodium PO when VAS was ≥ 4. The first analgesic requirement time, total analgesic consumption, patient and doctor satisfaction were recorded.

Results and Discussion: Insignificant difference between Group LA and Group HA in terms of postoperative pain and analgesic consumption shows that preoperative anxiety is not too intensive to have an effect upon the postoperative pain related to the third molar dental surgery. Fear of dental extraction does not constitute a high level of anxiety. Preoperative anxiety is not significantly correlated with the postoperative pain in third molar dental surgery.

Conclusion: Our study shows that anxiety level has no effect on third molar dental surgery pain when an effective analgesia administered before pain mechanism triggered and patients’ pain levels are controlled in frequent intervals.

Driving skills of patients at the time of discharge after sedation for colonoscopy are impaired by comparison with those of their escorts: a prospective study

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Background and Goal of Study: Driving performance is altered for several hours after anaesthesia. Most experts and guidelines for day-case surgery recommend a 12-24 hour non-driving period after general anaesthesia.2,3. However, driving skills after procedural sedation have not been assessed so far. We therefore designed this study to compare driving skills of patients who underwent procedural sedation with those of their escorts.

Materials and Methods: Driving skills of 30 patients who underwent colonoscopy under sedation were compared to the ones of their escorts. Sedation was provided with propofol. During the driving test, all patients had reached a PADS score > 9. The duration of the sedation, the dose of propofol and the delay between PADS > 9 and the driving test were recorded. For all participants, gender, age, number of collisions, speeding, crossing of traffic separating or shoulder lines as well as the distances travelled while speeding or weaving out of traffic lanes were recorded. Data were presented as mean(SD).For statistical analysis, Student-t test, Mann-Whitney test or chi-2 were used when appropriate. P<0.05 was considered significant.

Results and Discussion: Participants' characteristics were similar. The mean duration of colonoscopy was 35 (16) min, the dose of propofol was 298 (133) mg and the delay between PADS>9 and driving test was 51 (57) min. Results of the driving test are shown in table 1.

<table>
<thead>
<tr>
<th>Patients</th>
<th>Escorts</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=30</td>
<td>n=30</td>
</tr>
<tr>
<td>Collisions</td>
<td>0.40 (0.77)</td>
</tr>
<tr>
<td>Speeding</td>
<td>25 (9)</td>
</tr>
<tr>
<td>% of distance driven while speeding</td>
<td>37 (20)</td>
</tr>
<tr>
<td>Traffic separation line crossing</td>
<td>3.27 (2.65)</td>
</tr>
<tr>
<td>Shoulder line crossing</td>
<td>22 (12)</td>
</tr>
<tr>
<td>% of distance driven while weaving out of lane</td>
<td>3.79 (4.78)</td>
</tr>
</tbody>
</table>

Conclusion: Driving ability of patients at the time of discharge following sedation for colonoscopy is impaired. Hence, patients who underwent sedation require an adult escort for post sedation discharge.

References:
Physical status of pediatric patients in outpatient anaesthesiology

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Background and Goal of Study: Children who demonstrate fear and anxiety of dental treatment require deep sedation or general anesthesia. Nowadays, dentists treat multiple caries of primary teeth even in small patients, in whom such treatment is possible only under conditions of general anesthesia. Analysis of physical status, age, and comorbidities in children who underwent general anesthesia in outpatient dental clinics.

Materials and Methods: The database of outpatient anaesthesiology care in dental clinics for 2015-2018 was analyzed. The following data were recorded: indications for dental surgery under general anesthesia, age, gender, ASA, planned surgery, complications of anesthesia.

Results and Discussion: The number of patients 1687, boys 1147 (68%) girls 540 (32%), mean age 4.5 ± 2.3 y.o. All patients were examined by a dentist, anesthetist and found to be in need of treatment for multiple dental caries under general anesthesia. 1248 (76%) children were treated as scheduled, 439 children (26%) were anesthetized urgently during the treatment of purulent processes in oral cavity. 604 children (40%) underwent multiple extractions of teeth with complicated caries, with boys predominating 398 (66%) girls 206 (34%). ASA I-1265 (75%), ASA II-422 (25%) patients. 439 (26%) children have allergy to various factors. In 388 (23%) children, there were concomitant CNS diseases (cerebral palsy, autism, others) that caused treatment under general anesthesia. Anatomical and physiological barriers to dental treatment (gag reflex, increased salivation, limited mouth opening) were most commonly observed in children with congenital malformations of CNS - in 101 cases (6%). 978 (58%) children had an overwhelming fear of treatment as a result of unsuccessful previous dental treatment, including 649 boys (60%) 329 girls (34%). All patients underwent treatment - sevoflurane, propofol, fentanyl. Intubation - 81% of cases. The hemodynamics were stable, the recovery of consciousness occurred within 35 min after the treatment. There were no serious complications. The children were discharged home 90 min after surgery.

Conclusion: The vast majority of children who require treatment of multiple dental caries in an outpatient setting under anesthesia have concomitant CNS pathology, allergic reactions, ASA I-II, previous experience of unsuccessful dental treatment without anesthesia. General anesthesia - sevoflurane, propofol, fentanyl with intubation is optimal in such treatment.

5089

Are patients entering the operating room on foot less anxious than patients in a bed during an outpatient superficial venous laser surgery? A prospective randomized study

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Background and Goal of Study: The operating room (OR) environment can be a source of anxiety for the patient, including the ambulatory patient who anxiolytic premedication is rarely used. Anxiety has been associated with a high incidence of complications in the recovery room (RR) after ambulatory superficial venous surgery. A previous study demonstrates a reduction of anxiety for patients entering the operating room on foot in various surgeries. We therefore designed this study to compare anxiety between patients entering the operating room on foot and in bed during an outpatient superficial venous laser surgery.

Materials and Methods: 100 patients undergoing outpatient venous surgery were randomized to either the on-foot group (n = 50) or the in-bed group (n = 50). An assessment of anxiety using the APAIS-score (20) and an NRS-anxiety (0-10) was performed in the room before departure to the OR. The NRS-anxiety was repeated upon arrival at the OR. Other data collected were sex, age, ASA status and type of anesthesia. The data are expressed in median (IQR 25-75). For statistical analysis, Student-t, Mann-Whitney or chi-2 tests were used when appropriate. P<0.05 was considered significant.

Results and Discussion: Demographic data was similar between the 2 groups. Salient results for anxiety are shown in Table 1.

| Table 1: |
|-----------------|-----------------|-----------------|-----------------|
|                | In-bed N=50     | On-foot N=50    | p-value         |
| N-in-room APAIS score for anxiety (20) | 6.5 (5-12)      | 6 (4.75-9)      | 0.22            |
| N-in-room prep NRS-anxiety | 4 (2.6)         | 2 (1-3)         | 0.01            |
| Prep NRS-anxiety in OR | 3 (1-6.5)       | 2 (1-5.25)      | 0.64            |
| Reduction of NRS-anxiety between n-in-room and OR | 0 (2-0)         | 0 (0 - 1.5)     | 0.021           |

Conclusion: The perspective of entering the operating room on foot significantly reduces the anxiety perceived by the patient via the NRS-anxiety score performed in the room before departure but not the anxiety APAIS-score. The ambulation itself seems less efficient than in-bed transport to reduce the perceived anxiety upon arrival at the OR.


5829

Predicting factors of unplanned admission in ambulatory laparoscopic surgery

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Background and Goal of Study: The objective of this study was to determine the factors associated with a higher probability of unplanned income after an ambulatory laparoscopic surgery.

Materials and Methods: This is a prospective study of 297 adult patients operated by laparoscopic surgery on an outpatient care at La Fe Hospital in Valencia during one year period. The inclusion criteria were age over 18 years old and indication of outpatient laparoscopic surgery. The diagnoses were coded according to the International Classification of Diseases (ICD-9). The variables of the study included preoperative, intraoperative and postoperative factors. The unplanned hospital admission on the same day were considered as a dependent variable. Admission criteria were preestablished. A comparative analysis was performed between patients with or without a hospital admission, using Student’s t, Mann-Whitney U and Ji-Square in independent groups. Through logistic regression, the association of the variables regarding the necessity for hospital admission was verified.

Results and Discussion: The 8.1% of patients required hospitalization (CI:4.8–11.3). It was significantly higher in gynecological surgery (12.1% vs5.5%; p=0.04), higher ASA (12.1% vs4.5%; p=0.017), smokers (13.9% vs8.2%; p=0.03), pneumoperitoneum time >45 minutes (11.7% vs4.7%; p=0.02), anesthetic complications (4.4% vs7.0%; p=0.003), surgical complications (36.4% vs4.8%; p=0.001), presence of NVPO (13.5% vs3.7%; p=0.003) or vomits (42.9% vs3.5%; p=0.006). The unplanned admissions rate is one of the most used factors in the outpatient units to analyze the results. The overall rate of unplanned admission in outpatients units is between 0.09-16. The appearance of complications increases the risk of unplanned admission. The NVPO has been the most common reason for unplanned admission after an ambulatory surgery (up to 50%). The presence of interventions in the abdominal cavity benefits the development of adhesions and fibrosis, difficulting surgical technique and reducing abdominal compliance.

Conclusion: The proportion of unplanned admissions in this type of surgery is about 8.1%, being higher in gynecological surgery. The probability of postoperative admission is 8.7 times higher when surgical complications appear, 6.5 times higher if pneumoperitoneum> 100 minutes and 4.1 times higher if NVPO.
Outpatient Surgery Cancellations: Reasons and Suggestions for Improvement

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Background and Goal of Study: Unexpected delay or cancellation of elective surgeries has significant impact on hospital performance and patients outcomes. Efficiency is at risk, waiting time increases, patient care may be compromised, resources are wasted, and cost increases. ¹This study aims to identify the frequency and reasons of surgery cancellation in an outpatient surgical center during 2018 and to prioritize areas of improvement.

Materials and Methods: A retrospective evaluation of the rate of surgery cancellation in one outpatient center was performed. The data of scheduled surgeries from 5 different surgical specialties was collected from January to December 2018. The number of patients operated, canceled, and the reason for cancellation, whenever available, were recorded. We included all cases appearing on the definitive operative room (OR) list that were not performed on that day. We excluded the days when personnel absence led to complete cancellations. Statistical treatment was made with Microsoft Excel 2007 and proposed improvements were discussed. Results and Discussion: A total of 2802 surgeries were listed of which 288 (10.28%) were canceled. Contribution to total cancellation was highest in vascular surgery 17.58%, followed by general surgery 10.05%, gynecology 9.8%, orthopedics 7.46% and plastic 4.43%. According to category, 30.7% of cancellations was related to patient absence, 29% unavailable OR time, 18.3% associated with anesthesia, 13% due to not recorded reasons, 4.8% related to surgeons and 4.5% due to other reasons. There was no mean of establishing the reason of cancellation for any particular patient, which constitutes a primary field of improvement.

Conclusion: Apart from patient absence, most cases of surgical cancellation were related to unavailable OR time, which is consistent with literature. ²Since the majority of cancellations was due to planning errors, the next step is to implement reduction strategies, starting by adequate documentation. Regarding anesthesia-associated causes, is important to understand the reasons for which a specific patient is cancelled, so we can further improve their preoperative assessment, risk stratification and clinical optimization.

References:

Surgical outcome with topical anaesthesia for intracorneal rings – our reality

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Background and Goal of Study: Intracorneal ring implantation is used in the treatment of keratoconus in young patients, aiming to improve visual acuity. This surgery should take place in an outpatient regime with topical anaesthetic and local anesthesia. Despite the recommendations, most centres in our country often choose general anaesthesia as the first approach. This paper aims to describe our experience with this type of ambulatory surgery, evaluate surgeon satisfaction and surgical timing.

Materials and Methods: We have analysed physical and digital documentation about each patient submitted to ophthalmologic ambulatory surgery under the diagnosis of keratoconus between 2016 and the first semester of 2019. From a total of 88 cases we have excluded 31 due to bad codification or lack of information. Results and Discussion: From our final 57 patients, 47.3% were male and all 57 were classified as ASA I or II. All patients were submitted to pre anaesthetic evaluation to select candidates and to clarify about the anaesthetic procedure. Our protocol included premedication with 1000mg acetaminophen IV and 1 mg midazolam IV. Topcon anaesthesia was performed with oxybuprocaine. During surgical intervention, 22.8% of patients needed extra sedation or analgesia due to anxiety or difficult collaboration. Only one case was converted to general anaesthesia probably due to bad patient selection. The median surgical duration was 24.6 minutes and median post anaesthetic care unit duration was around 45 minutes. All patients returned home within the same day. All data was collected and analysed after ethical approval from our Hospital Ethics Committee.

Conclusion: Our centre protocol was successful in more than 75% of our patients. Although topical anaesthesia is a safe approach we have to consider patient limitations such as fear, anxiety or claustrophobia. Sedation/analgesia helps tolerate the surgical procedure and improves patient collaboration. With this approach we improve recovery without compromising surgical time. Surgeon satisfaction also improves with topical anaesthesia since they have immediate feedback from the patient, quicker turnover between patients and no overnight stay.

References:

Ambulatory surgery taken to the limit

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Background: The number and complexity of procedures and patients managed in ambulatory surgery have increased steadily. ¹Dilated cardiomyopathy (DCMP) is associated with high perioperative morbidity and mortality. ²3 Since the majority of DCMP patients are elderly and with multiple comorbidities, the next step is to implement reduction strategies, starting by adequate documentation. Regarding anesthesia-associated causes, is important to understand the reasons for which a specific patient is cancelled, so we can further improve their preoperative assessment, risk stratification and clinical optimization.

Materials and Methods: We’ve conducted a prospective study on patients requiring sedation for cataract surgery with intraocular lens implantation and vitrectomy. Sedative and anxiolytic action. It also seems to lower the intraocular pressure. The surgical conditions. Dexmedetomidine(Dex) is a selective alpha 2 agonist with sedative and anxiolytic action. It also seems to lower the intraocular pressure. The surgical conditions.

Discussion: Major advantages of ambulatory surgery depend on adequate patient evaluation and optimization for each type of surgery. ¹Anaesthetic management of patients with DCMP is challenging and can be complicated by congestive heart failure and malignant arrhythmias. ²3 Although ASA status alone is not a rejection criterion for ambulatory surgery ¹Being able to perform the surgery with a peripheral nerve/plexus block (alone or in combination with sedoanalgesia) would avoid many of the complications associated with DCMP, ²Communication with the surgeon, the short-expected length and good patient collaboration were vital for the success of our anaesthetic approach.

References:

Dexmedetomidine sedoanalgesia in ophthalmology: can you see it?

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Background and Goal of Study: A significant proportion of patients that anesthetists deal in ophthalmology are elderly and with multiple comorbidities, making it sometimes challenging to achieve an optimal level of sedation and good surgical conditions. Dexmedetomidine(Dex) is a selective alpha 2 agonist with sedative and anxiolytic action. It also seems to lower the intracocular pressure. The aim of this study is to evaluate the effect of dex sedation on patient and surgeon satisfaction in cataract surgery with intraocular lens implantation and vitrectomy.

Materials and Methods: We’ve conducted a prospective study on patients requiring sedation for cataract surgery with intraocular lens implantation and vitrectomy. Dex was initiated 30 minutes prior to surgery with an initial infusion dose of 0.6–1.2 mcg/Kg/h. Blinded interviews were conducted postoperatively in order to access patient and surgeon satisfaction using a 5-point satisfaction scale (very unsatisfied, unsatisfied, neither satisfied nor dissatisfied, satisfied, very satisfied). Data collection included RASS scale, perioperative pain, respiratory rate and hemodynamic parameters. Visual Analogue Scale(VAS) was used to quantify pain intensity.
A randomized controlled trial evaluating high flow nasal oxygen during ERCP in the prone position

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Background and Goal of Study: Sedation for endoscopic retrograde cholangiopancreatography (ERCP) can be challenging in that deep sedation is required in elderly patients in the prone position. The aim of the present study was to investigate and compare the effects of a high flow nasal oxygen (HFNO) delivery system and conventional nasal cannula oxygen delivery on oxygenation.

Materials and Methods: A prospective randomized trial with patients undergoing endoscopic retrograde cholangiopancreatography in the prone position. For each patient, the lowest oxygen saturation (SpO2) level, incidence of hypoxemia (SpO2 < 90%), and procedure interruptions due to airway interventions, as well as end-tidal CO2 (mMvHg) at the end of the procedure, were recorded.

Results and Discussion: The lowest SpO2 recorded during the procedure was higher in the high flow nasal oxygen group than in the conventional control group (99.8 ± 0.6 % vs. 95.1 ± 7.3 %; p = 0.001). Hypoxemia occurred only in the control group [seven cases (19.4%); p = 0.011]. Procedural interruptions including discontinuing sedation, patient stimulation, and jaw thrusting occurred only in the control group (10 (27.8%), and 10 (27.8%) cases, respectively; p = 0.001 for each). End-tidal CO2 was lower in the high flow nasal oxygen group than in the control group (30.4 ± 6.6 mMvHg vs. 33.9 ± 7.4 mMvHg; p = 0.045).

Conclusion: High flow nasal oxygen provided adequate oxygenation without causing procedural interruptions during endoscopic retrograde cholangiopancreatography compared with conventional nasal cannula. We thus suggest that high flow nasal oxygen may be used as a standard oxygen delivery method in endoscopic retrograde cholangiopancreatography.

Vascular surgery for varicose veins in ambulatory: is there a better analgesic protocol to prevent post operative pain?

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Background and Goal of Study: Ambulatory surgery is growing from minor procedures performed on healthy patients to complex surgeries on elderly patients with multiple comorbidities. Thus, appropriate discharge assessment is important to secure safety and quality of care.(1) One of the major points for discharge is postoperative pain control. In this study we looked for differences between the use of an intraoperative analgesic protocol and the need for rescue medication after surgery. We aim to establish a standard analgesic protocol to improve pain control and discharge time.

Materials and Methods: In a retrospective observational study we included 58 patients (P) submitted to Stripping between 01/2019 and 09/2019. The P was recruited according to the inclusion criteria: >18 years, outpatient, general anesthesia with fentanyl opioid used, and distributed into four groups, according to the intraoperative analgesia strategy: Paracetamol (PA) vs PA+Parecoxib (PX) vs PA+Cetorolac (C) and PA+Metamizol (M). The primary endpoint was the use of rescue analgesia in postoperative period. Demographic parameters are evaluated and Chi2 test were used to analyze and compare the main endpoit.

Results and Discussion: Mean age of the P was 49.5 ± 12.5 years, with 60% female; 21% were classified as ASA I, 76% ASA II and 3% ASA III. The group distribution was: PA 21%, PX 28%; C 29% and M 22%. 26% of the patients had no pain in postoperative period, 24% mild pain, 34% moderate pain, 4% severe pain and 12% miss data. There were no significant statistical differences between the four groups (p>0.05). 64% of P required rescue analgesia in the postoperative period (29% non-opioid vs. 34% opioid use). Metamizol seems the most effective medication, and Chi2 test were used to analyze and compare the main endpoit.

Conclusion: With the absence of statistically significant differences, we reinforce
the importance of multimodal analgesia in the control of postoperative pain. We emphasize that a study with a larger number of patients may lead to different results. With the progressive requirement of outpatient surgery, it will be pertinent to conduct such studies in order to optimize analgesia, patient satisfaction and safety.

References:

4952

The outpatient anesthesiology problems with adult dentistry patients
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Background and Goal of Study: A significant part of dental care is provided in outpatient dental clinics. For the quality treatment of adult patients with concomitant diseases, allergies, the presence of a vomiting reflex, fear and more, the special treatment approach and mental comfort of the patient are highly required. One of the best ways is anesthesiologic support, which consists of the combined use of analgesosensation and local anesthesia. To analyze the problems that arise during analgesosensation in outpatient dental patients.

Methods and materials: The evaluation term of 1454 analgesosations, which were conducted in 2013-2018 in adult patients at private dental clinics, was analyzed. Age, gender, ASA physical status, duration, and complications during the intraoperative period were recorded.

Results and Discussion: The average age of patients was 52 ± 13 years (25 to 93 years), 45% of patients were older than 60 years. There were 804 males (55%) and 650 females (45%). ASA I - 61% (42%), ASA II - 98% (49%), ASA III - 45 patients (10%). All patients were operated under local anesthesia and analgesosensation: analgesia was administered by fentanyl and dexametropfen, sedation by propofol, dexametomidine, sometimes by tiopental and midazolam. All patients were closely monitored. The average time of treatment was 100 min, analgesosensation 115 min. The duration of the analgesosensation was smooth, which made it possible to carry out the dental treatment as planned. The following problems were reported during the analgesosensation: 14 cases of paroxysmal tachycardia; 37 bleeding from the operating wound; increase in BP, which required the introduction of antihypertensive drugs in 31% of patients, hemostatics were administered in 70% of patients. At discharge from the clinic, patients met the criteria of the PADS scale on average 2 hours after the end of the procedure. The emotional state of the patients after the intervention under the analgesosensation is much more positive. The postoperative period was more smoothly because the toothache is favorably influenced by the residual background of central action analgesics.

Conclusions: The most common problems during analgesosensation for outpatient dental interventions are arterial hypertension, cardiac arrhythmias, and bleeding. An analgesosensation allows for outpatient dental manipulations of any complexity.

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Anesthesia for gynecological major ambulatory surgery: our experience
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Background and Goal of Study: Major Ambulatory Surgery (MAS) is considered a big advance in health sector. It can be applied to many surgeries and the anesthesiologist has an important role on it. We present data from MAS gynecologic interventions performed in our centre.

Materials and Methods: We've made a study of women undergoing gynecological laparoscopic surgery in MAS. Patients were followed during the first postoperative week. Informed consent was obtained. Registered variables were age, ASA score, visual analog scale (VAS) score for pain, need for analgesic rescues, oral tolerance, presence of complications and general condition.

Results and Discussion: Our 56 patients were aged 20 to 70 and presented ASA scores I, II and III (68%, 28% and 4% respectively). Interventions included were diagnostic laparoscopy, tubal ligation, salpingectomy, cystectomy, and laparoscopic adhesiolysis.

Results showed: In PACU (Post Anesthesia Care Unit), incidence of early PONV (Postoperative nausea and vomiting) was 5.35%. 80% of patients were discharged to MAS unit in less than 90 minutes. One patient required hospital admission for post-surgical complication (hemoperitoneum). Overall readmission rate was 1.78%. After 24h, only 62.71% took analgesics. 7.8% had nauseous sensation. All them had drunk normally and 90.2% had eaten normally. 27.45% had returned to normal activities. 45.09% had a good general condition. After 48h, incidence of nausea remained at 7.8%, and 50.98% reported having a good general condition. A week after surgery, no patient presented nausea or vomiting. 84.31% had returned to their activities. 45.09% had a good general condition. After 48h, incidence of nausea remained at 7.8%, and 50.98% reported having a good general condition. A week after surgery, no patient presented nausea or vomiting. 84.31% had returned to their activities. 45.09% had a good general condition. After 48h, incidence of nausea remained at 7.8%, and 50.98% reported having a good general condition. A week after surgery, no patient presented nausea or vomiting. 84.31% had returned to their activities. 45.09% had a good general condition. After 48h, incidence of nausea remained at 7.8%, and 50.98% reported having a good general condition. A week after surgery, no patient presented nausea or vomiting. 84.31% had returned to their activities.

Conclusion: These data show the current state of MAS in our center, a tertiary hospital with 1086 beds. They are good general results showing MAS as a good alternative to perform gynecologic surgical procedures.

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Impact of anaesthesia on delay and failure-to-launch rate for same-day discharge total hip replacement patients
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Background and Goal of Study: Same-day discharge (SDD) for total hip arthroplasty (THA) has been made possible by minimally invasive surgery and advances in ambulatory anesthesia. We endeavoured to analyse the most recent data available over a year and determine which factors are associated with failure to discharge (“failure to launch”) patients on the same day. We were especially interested in comparing intrathecal bupivacaine vs. ropivacaine to ascertain whether ropivacaine, which is shorter acting1, would lead to an earlier discharge from post-anaesthesia care unit (PACU).

Materials and Methods: Following IRB approval, data of patients undergoing THA and scheduled for SDD from May 2018 until April 2019 were retrospectively collected. Demographics including smoking status, anaesthesia type and medications, surgical time, time in Phase I PACU and opioid analgesics administered in the PACU expressed as morphine equivalent were recorded.

Results and Discussion: Two hundred eighty-one patients’ records were analysed. Only three patients received general anaesthesia. No patient receiving spinal anaesthesia had to be administered unanticipated general anaesthesia. Fourteen patients could not be discharged on the day of surgery (aspiration: 1; syncope/ light-headedness: 7; severe nausea: 2; uncontrolled pain: 2; excessive blood loss/ drainage: 2). A further four patients, while being discharged on the day of surgery, were readmitted and/or revised within two weeks. A Pearson correlation coefficient table was built to explore the relationship between the various data collected. None of the variables was significantly associated with a failure to discharge the patient on the day of surgery. The use of intrathecal ropivacaine significantly shortened the time to discharge from Phase I PACU (79 ± 38.9 vs. 112 ± 54.1 minutes; p < 0.001).

Conclusion: The fact that we could not find any predictor of the failure to discharge is probably a reflection of careful pre-operative patient selection. Intrathecal ropivacaine is clearly shorter acting than bupivacaine and should be used preferentially. Using even shorter acting medications such as mepivacaine2 or chloroprocaine might lead to even shorter discharge times but an unanticipated longer duration of surgery might then necessitate conversion to general anaesthesia.

References:
Postoperative nausea and vomiting in children – our experience in the ambulatory setting

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) incidence in childhood ranges between 13 and 42% (1), can be even higher in outpatients (2) and is twice as high compared with adults. PONV can result in increased risk of bleeding, wound dehiscence, prolonged postanaesthetic care unit stay and unanticipated hospital admission (2). This high incidence warrants the use of antiemetic prophylaxis instead of therapy. Our main goal was to audit PONV rate in paediatric population, comparing it to the literature findings, and if measures to avoid PONV were adequately taken.

Materials and Methods: This study occurred in our hospital for a period of two years. All patients, type of surgery and intraoperative period was recorded. In the PACU, nausea, vomit and PONV therapeutic administration were registered. In the first day after surgery, our staff called the parents to ask about nausea, vomit and the need to take the PONV prophylaxis prescribed. Descriptive analysis was performed with SPSS software, version 24.

Results and Discussion: Our population had 234 patients: 57% male, 11% under 3 years. ASA functional status was 1 in 71,8% of patients, 2 in 26,5% and 3 in 1,7%. 45.3% of surgeries performed had risk for PONV. The most common surgery performed was adenotonsillectomy, which increases PONV risk. Only 4.7% patients didn’t have risk factor for PONV, almost half (47.4%) had 3 risk factors. Intraoperative PONV prophylaxis was performed in 88.9% patients: double therapy in 49.6%, cases and triple in 27.8%. Any studies regarding prevalence and number of antiemetics used in paediatric setting were found to compare to these values. Nitrous oxide was used in 1.7% of patients and neostigmine in 10.7% of cases. PONV occurred in 1.7% of patients and no patient was unexpectedly admitted. Despite PONV incidence described is higher in child, in our ambulatory setting we had an expressively low incidence. The reduced number of PONV cases limited the statistical analysis.

Conclusion: In our population, we had a high prevalence of antiemetic prophylaxis administration and a low prevalence of PONV. Although a casual link can’t be established, our data suggests that administration of prophylactic antiemetics and also evasion of emetic factors may play an important role in reducing PONV in children on day surgery.

References:

Learning points: day care surgery, improving locoregional breast cancer treatment, team working, selecting patients.

6369

Comparison of pain between unilateral and bilateral inguinal hernia repair in a tertiary hospital surgical day care center

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Background and Goal of Study: we aim to measure pain at Post Anesthetic Unit entry, 24 hours (h) and 30days, postoperative complications, daily activity constraints and time to professional reintegration between unilateral and bilateral inguinal hernia repair to assess any potential benefit of bilateral surgery.

Materials and Methods: Observational study, retrospective cohort from a Portuguese tertiary hospital surgical day care center. Inclusion criteria: inguinal hernia repair performed in ambulatory setting. Exclusion criteria: age <18y, absent medical data from Electronic Health Record.

Results and Discussion: 176 unilateral and 39 bilateral hernia repairs, median age (interquartile range, IQR) 55(19) years vs 51(24) years (p=0.12). 85.8% vs 100% males (p=0.03) with similar ASA-PS (p=0.36) and no differences in the analgesic scheme between groups (table 1). Pain at PACU entry was similar in both groups (median VAS[IQR]: 0[0], p=0.91). Although bilateral surgery was associated with greater pain (median VAS[IQR]) at 24h and 30 days (0[2] vs 0[3], p=0.03 and 0[2] vs 0[3], p=0.03) there were no statistically significant differences in restriction to daily life activity (p=0.28) or time to return to work (p=0.40). There were also no differences in incidence of postoperative complications (table 2).

Conclusion: In terms of pain control at PACU, 24h and 30 days our study did not show differences between unilateral and bilateral hernia repair. And also there is no difference on resume normal daily activities and work. The main limitation of this work is the study design.

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Breast cancer with intraoperative radiotherapy in hybrid operating room under general anesthesia. First experience in Argentina

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Background: The possibility of reducing aggression and duration of breast cancer treatment is an option in select patients or with difficulties accessing the radiotherapy treatment. The IORT technique (intramammary quadrantectomy plus sentinel node plus radiotherapy) is a novel technique that provides complete treatment to selected patients, saving several weeks of treatment and avoid radiating other organs. This hybrid operating room is placed in a day care center, where must be combined surgery, radiotherapy and anesthesia patients, generating cost efficient outcomes, less time consuming treatment and satisfaction of patients. The benefits of this kind of rooms are safety, diagnosis and treatment in the same place, faster outcome.

Case Report: We present our experience of more than 12 months, with 31 patients treated in a hybrid operating room in a Radiotherapy Clinic in day case surgery. The average of age was 68 years old. We had one unexpected difficult airway that has been waked up, one case of postoperative hypertension that received labetalol ev and one case of postoperative delirium 24hs postoperative no need to be treated.

Discussion: The IORT technique is a reality in the city of Rosario Argentina, improving the treatment of locoregional breast cancer. The key of succes is a correct team working, selecting patients, nursery care and communication.

References:
2. Cardoso G.1, Campos C.1, Silva A. P.1 6014

Spinal versus general anesthesia for hemmorhoidectomy in a tertiary hospital surgical day care center

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Background and Goal of Study: We aim to measure pain at Post Anesthetic Care Unit (PACU) entry, 24 hours (h) and 30 days, nausea/vomiting, daily activity constraints and time to professional reintegration between general (GA) and spinal anesthesia (SA) in hemmorhoidectomies performed in ambulatory setting.

Materials and Methods: Observational study, retrospective cohort from a Portuguese tertiary hospital surgical day care center. Inclusion criteria: hemmorhoidectomy performed under general or spinal anesthesia in ambulatory setting. Exclusion criteria: age <18 years, absent medical data from Electronic Health Record.

Results and Discussion: 49 GA and 13 SA, median ages (interquartile range) 49(14) years and 46(6) years (p=0.24), 51% vs 53% males (p=0.86) and all ASA-
Incidence of hypotension and hypoxemia during procedural sedation in relation to the duration of supraventricular cardiac ablations, a retrospective cohort study

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Background and Goal of Study: Arrhythmias are treated by cardiac ablation (CA) performed under moderate-to-deep sedation (MDS). CA can take up to several hours. A previous study found an association between the risk of a sedation related adverse event and procedure duration.1 We investigated the incidence of sedation related events (SRE) during MDS using Target Controlled Infusions (TCI) of propofol and remifentanil in relation to the duration of the procedure.

Materials and Methods: In this retrospective cohort study we reviewed the anesthetic records of 229 patients undergoing CA for supraventricular arrhythmias under MDS, between January – November 2019 in the University Medical Center Groningen. An IRB waiver was obtained. Sedation related events were described as hypotension: mean arterial pressure below 65 mmHg, longer than 10 minutes requiring treatment. Hypoxemia: any oxygen saturation below 75% or oxygen saturation below 90% for more than 60 seconds. Procedures were divided into 2 groups: group A ≤120 minutes, group B >120 minutes. MDS was administered by effect-site targeted TCI using the Schnider model for propofol and remifentanil. Patients were classified according to either receiving 0.5mg/kg recall-dose of propofol (GroupP) or not (GroupC) after ECT, from their medical records. Patients were assessed on their posttetanic count values. All patients were ventilated by using a bag-mask until full recovery of neuromuscular block. The information on demographic characteristics and duration of seizures were noted. The presence and severity of PIA according to PIA classification system (no, mild, moderate, severe) was also recorded at 5th, 10th and 15thminutes after ECT. Patients were classified according to either receiving 0.5mg/kg recall-dose propofol (GroupP) or not (GroupC) after ECT, from their medical records.

Results and Discussion: There were no statistically significant differences in the incidence of postoperative nausea and vomiting in PACU (0 cases by group) or at 24h (p=0.38) and restriction in daily life activities (p=1.00) or time to return to work (p=1.00).

Conclusion: In this study procedure duration is not a risk factor for hypoxemia and hypotension. However, a larger prospective study is needed to obtain more data.

References:

Table 1. Patient and procedure characteristics

<table>
<thead>
<tr>
<th>Group</th>
<th>A</th>
<th>B</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>93 (41%)</td>
<td>136 (55%)</td>
<td>0.41</td>
</tr>
<tr>
<td>Mean age (SD, RANGE)</td>
<td>56 (15.6, 18-78)</td>
<td>57 (14.3, 18-77)</td>
<td>0.87</td>
</tr>
<tr>
<td>Male</td>
<td>89 (95%)</td>
<td>128 (94%)</td>
<td>0.99</td>
</tr>
<tr>
<td>Female</td>
<td>4 (4%)</td>
<td>8 (4%)</td>
<td>0.99</td>
</tr>
<tr>
<td>ASA I</td>
<td>1 (1%)</td>
<td>2 (1%)</td>
<td>0.79</td>
</tr>
<tr>
<td>ASA II</td>
<td>71 (76%)</td>
<td>103 (76%)</td>
<td>0.96</td>
</tr>
<tr>
<td>ASA III</td>
<td>21 (23%)</td>
<td>31 (23%)</td>
<td>0.97</td>
</tr>
<tr>
<td>Mean duration minutes</td>
<td>44 (±120)</td>
<td>121 (±327)</td>
<td>0.06</td>
</tr>
<tr>
<td>Mean duration minutes (SD)</td>
<td>100 (±15)</td>
<td>166 (±42)</td>
<td>0.06</td>
</tr>
</tbody>
</table>

PONV in ambulatory surgery: the role of Apfel Score in early discharge!

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Background and Goal of Study: The interest in outpatient surgery is increasing and the importance of enhanced recovery after surgery is nowadays a common practice. Thus, the therapeutic plan should be more demanding with high priority on patient safety and quality of care.1 PONV are the most frequent complaints and a major cause for late discharge. The Apfel Score (APF) predicts risk for postoperative nausea and vomiting and advises on the drug strategy based on the presented risk. It includes four risk factors (RF). The aim of this study is to determine the compliance of anti-emetic medication for PONV according to APF and the need for rescue antiemetic medication during recovery time.

Materials and Methods: In a retrospective observational study, we included 80 patients (P) submitted to Stripping between 01/2019 and 09/2019. P was assessed for the APF, the intra-operative antiemetic medication and the occurrence of PONV with the need for antiemetic medication during the recovery time, our main point. Demographic parameters are evaluated and Chi2 test were used to analyze and compare the main endpoint.

Results and Discussion: Mean age of the P was 51 years, with 64% female; 17.5% were classified as ASA I, 33.8% ASA II and 33.8% ASA III. The group distribution was: 1: RF: 35%: 2: RF: 45% and 3: RF:20%. In 81% of P was given antiemetic medication according to APF. Of the non compliance group, 84% were over-medicated. 12.5% P presented symptoms and required rescue medication but there was no statistically significant relationships between symptom occurrence in postoperative period and therapy according or not to the APF. Other variables such as gender, age and ASA status were also unrelated to recovery therapeutic need. We focus on antiemetic overmedication given to patients that do not meet the Apfel Score criteria and also on the low incidence of PONV.

Conclusion: Most patients were medicated according APF, however we highlight that there is no relationship between rescue antiemetic medication and accomplishment of APF. It is important to recognize the existence of other risk factors for PONV. We emphasize that a study with more P may lead to different results. With the requirements of outpatient surgery, it is pertinent to conduct such studies in order to optimize P satisfaction and safety.

References:
developing PIA graded as severe in Group C, whereas none in Group P. 

Conclusion: The present study demonstrates that an additional dose of bolus propofol (0.5mg/kg) after ECT sessions seems to be ideal for reducing the incidence of PIA, especially at 5th minutes after ECT. Due to its short half life, recall-propofol does not affect the incidence of PIA emerging at the late period after ECT. In conclusion, recall-dose propofol should be considered in patients undergoing ECT who may develop severe PIA.

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4954

Laparoscopic nisen fundoplication on a patient with patent foramen ovale in ambulatory surgery


Background: Patent foramen ovale (PFO) is estimated to have a prevalence of 25%. PFO has the potential for right-to-left shunt, hypoxemia, paradoxical embolization and ischemic stroke. Despite its advantages compared to open surgical techniques, the safety of laparoscopic surgery in patients with congenital heart disease has been controversial, being contraindicated in some reports (1). During pneumoperitoneum, the possibility of paradoxical air embolism (PAE) in patients already at risk makes the anesthesiologist special. Furthermore, there are no case reports in ambulatory surgery and no consensus of the minimal standard care.

Case Report: A 60 year old female patient with gastroesophageal reflux disease was evaluated for laparoscopic Nissen Fundoplication as day surgery. The patient had been recently diagnosed with a PFO with a left-to-right shunt without surgical indication. After discussion, the team decided to perform laparoscopic surgery with increased surveillance for embolic events, limited intraabdominal pressure and slow rate of pneumoperitoneum insufflation. Additionally, if necessary, a hyperbaric chamber is available at the hospital. Surgery was conducted without complications, and the patient was then taken to the postoperative recovery unit. It was decided to keep the patient under surveillance during an overnight stay, in order to quickly detect and respond to any complications. The patient was discharged the day after.

Discussion: Noting both the benefits of laparoscopic surgery and the substantial incidence of PFO in the general population (2), the attending and consulting surgeons reasoned that the benefits of laparoscopy greatly exceeded an immeasurably small risk of paradoxical emboli. Although transesophageal echocardiography is the most sensitive monitor for PAE diagnosis, its implementation is not always possible (3). We report a successful case of ambulatory surgery in the presence of a heart condition in which laparoscopic surgery was safely applied with a previously outlined multidisciplinary plan, careful clinical observation and haemodynamic monitoring.

References:

4792

Low flow anesthesia: Comparison of the Effects of BASKA Mask and Endotracheal Tube on Hemodynamics and Postoperative Recovery in Outpatient Surgery


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Background: Goal of Study: Low flow anesthesia can lead to reduction of anesthetic gas and vaporconsumption. Baska Mask® has proved to be an effective and safe supraglottic airway device. The aim of this study is to assess the feasibility of new generation laryngeal mask Baska Mask® airway during controlled ventilation using low fresh gas flow (1.0 L/min) as compared to endotracheal tube (ETT) in outpatient surgery.

Materials and Methods: The study was approved by The Ethics Committee of the University of Health Sciences with a decision number of 1193, March 19th, 2019. A total of 60 patients, ASA I-II, being scheduled for a surgical or interventional procedures, were randomly allocated into two groups - Group I (Baska Mask®, n=30) and Group II (ETT, n=30). Both groups were compared with respect to the outcome measures: HR, SpO2, MAP, ETCO2, PLAT (cmH2O). The effectiveness of the airway device on intraoperative hemodynamic, postoperative recovery and postoperative airway-related complications (cough, sore throat, difficulty in swallowing) were evaluated.

Results and Discussion: Patient demographics are shown in Table 1. No significant difference was found between the two groups when intraoperative hemodynamic data were compared. Although the mean value was within normal limits, ETCO2 levels were found to be significantly higher in patients who were treated with Baska Mask® (32.61±2.14 vs 31.68±2.11, p=0.040, Table 2). The median (min.-max.) duration of insertion in the Baska Mask® and ETT groups was 9 (6-13) and 15 (9-22) seconds, respectively (z=7.392, p<0.001, Table 3). Postoperative recovery time for Baska Mask® were significantly shorter than the ETT (16.46±1.47min vs 18.10±2.06 min., p=0.001). In the early postoperative period, no significant difference was observed in complications such as cough, dysphagia and sore throat (Table 4).

Conclusion: Low-flow sevoflurane anesthesia with Baska Mask® might be considered in patients with short operations who need rapid recovery from anesthesia.

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4986

Jaw Elevation Device (JED™) use during In-Vitro Fertilization (IVF) procedures under deep sedation


1 Dokuz Eylul University Faculty of Medicine - Izmir (Turkey)

Background and Goal of Study: IVF is a painful and disturbing interventional procedure and often requires analgesia or anesthesia. Upper airway obstruction may occur in varying degrees in patients undergoing this procedure under sedation. The aim of this study consists of collecting upper airway obstruction occurrence, haemodynamic and ventilatory data and validating the effectiveness of the device, on patients undergoing IVF procedure under procedural sedation and analgesia, with or without the use of Jaw Elevation Device (JED™).

Materials and Methods: This study is a retrospective data analysis from outpatient, ASA (American Society of Anesthesiologists) I-II and over 18 years of age patient files who underwent IVF procedure in our hospital’s IVF center between the dates May 2016 and May 2018 after approval from Non-Interventional Research Ethics Committee, Dokuz Eylul University Faculty of Medicine. Patients were separated into two groups, according to JED utilization. Demographics and ASA standard monitoring data are collected. Upper airway obstruction time and duration data are collected. Lower airway obstruction and alternative airway management are collected.

Results and Discussion: In our study, data from a total of 130 patients, who underwent ovocyte collection procedure under deep sedation is evaluated. In 65 of these patients there were JED utilization. Mean age of patients were 32.9, 33.2 and 33.09; mean body mass index values were 25.79, 25.14 and 25.97; in control group, JED group and total, respectively. ASA risk score distribution was 44 and 39 ASA I patients; 21 and 28 ASA II patients in the control and JED groups, respectively.

Upper airway obstruction occurrence noted in 32 of the patients in control group and in 30 of the patients in JED group. Alternative airway management were employed in 3 and 7 patients in control and JED groups, respectively. The study has the largest population according to similar studies which are associated with JED, providing better opinion about the use of the device.

Conclusion: Jaw Elevation Device’s utilization is useful for maintaining an open upper airway during interventional procedures which require a deep sedation plane. However it is necessary to make proper patient selection without head/neck abnormalities and usage under close vigilance/supervision due to the device’s “slight” inadequacy/imperfection at maintaining an open upper airway.
Ephedrine Prevents Orthostatic Hypotension Immediately After Dental Treatment under Dexmedetomidine Sedation

1Nagoya University Hospital - Nagoya (Japan), 2Nagoya Medical Center - Nagoya (Japan), 3Nagoya University Graduate School of Medicine - Nagoya (Japan), 4Aichi Gakuen University School of Dentistry - Nagoya (Japan), 5Aichi Gakuen University School of Dentistry - Nagoya (Japan)

Background and Goal of Study: Office based dental treatment is undergone in patients with semi-supine position using a reclining chair. We administer dexmedetomidine (Dex) as a sedative during surgical procedure for maintaining patients’ comfortability. Dex has a sympatholytic effect, and heart rate and blood pressure are decreased. After the treatment, the patient is returned to sitting position. Some patients demonstrate mild orthostatic hypotension without reflective increase of heart rate. Thus, we preliminary evaluated the prophylactic effect of ephedrine (Ephe) administration at the end of surgery to prevent from hypotension.

Materials and Methods: After the approval of Ethical Committee of the Institute, prospective, single-blinded randomized study was conducted. 20 adult patients participated in the study after giving written informed consent. The patients were allocated into 2 groups: no intervention otherwise Dex infusion (Control group) and 10-mg Ephe was administered 5 min before the position change to sitting from semi-supine (Ephe group). ASA standard monitor was applied. 6-µg/kg/h Dex was infused 10 min as a loading and subsequently 0.7-µg/kg/h Dex was continuously infused. The infusion was terminated 10 min before the end of the procedure. The changes in the vital signs were observed until returning to the patient to a bed in the ward.

Results and Discussion: There was no difference in patients’ background between the groups (Table). Immediately after the position change, there was no significant difference in heart rate (Figure). However, blood pressure was significantly higher in Ephe group.

Ephedrine (Ephe) is a sympathomimetic amine with vasoconstrictive properties that increase blood pressure. The results of our study suggest that ephedrine can prevent orthostatic hypotension in patients following dental treatment using dexmedetomidine sedation. Further studies with a larger sample size are needed to confirm these findings.

References:

5843
Performance of Spinal Block With Prilocaine 2% Hyperbaric Solution in Ambulatory Surgery Clinical Setting

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1ULSM Hospital Pedro Hispano - Porto (Portugal), 2ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)

Background and Goal of Study: Prilocaine is a local anesthetic characterized by intermediate potency and duration and fast onset of action. A recent formulation of 2% hyperbaric solution is currently available in Europe. With an advocated better safety profile, prilocaine is suggested as substitute to lidocaine, mepivacaine, and to low doses of long-acting local anesthetics in spinal anesthesia for ambulatory surgery. The relatively sparse and low quality amount of evidence available does not allow a rigorous evidence-based evaluation of its characteristics in the clinical setting.

Materials and Methods: We evaluated the patients who went through ambulatory surgery under spinal block with prilocaine 2% hyperbaric solution over a period of six months at our institution and analysed the data using standard statistical methods.

Results and Discussion: We assessed data from 41 patients: 21 cases of lower limb surgery, 14 cases of inguinal hernia repair and 6 cases of other pelvic region procedures. The time to achieve desired level block was 6 ± 2.2 min. Time to regression of the motor block was 118.4 ± 38.1 min. Time to regression of the sensorial block was 247.8 ± 81.9 min. Time to first voiding was 298.2 ± 118.6 min. Time to home discharge was 267.4 ± 92.7 min. There were no severe adverse events recorded. Three patients had hypotension easily treated.

Conclusion: Spinal Block With Prilocaine 2% Hyperbaric Solution proved to be an efficient and reliable anesthetic strategy for short to intermediate length ambulatory procedures.

5299
Comparison of dexmedetomidine-propofol and ketamine-propofol administration during sedation-guided endoscopy

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1Van Yuzuncu Yıl University - Van (Turkey)

Background and Goal of Study: Dexmedetomidine and ketamine are popular sedative agents that result in minimal respiratory depression and the presence of analgesic activity. Dexmedetomidine-propofol combination and ketamine-propofol combination were compared during upper gastrointestinal endoscopy sedation for sedation depth, hemodynamic stability, patient and endoscopist satisfaction, recovery time, desaturation, apnoea, cough and frequency of nausea and vomiting.

Materials and Methods: The study commenced after receiving approval local ethics committee. Patients between 18 and 60 years, American Society of Anesthesiologists (ASA) I and II groups were included. Patients that had severe organ disease, allergies to study drugs, refused or were participated were excluded. Cases were divided into the dexmedetomidine-propofol group (Group D, n=30) and ketamine-propofol group (Group K, n=30). Cardiac monitoring, peripheral oxygen saturation, bispectral index (BIS) monitoring were performed. Group D received 1mg/kg dexmedetomidine + 0.5mg/kg propofol intravenous (i/v) bolus, 0.5 µg/kg/h dexmedetomidine + 0.5 mg/kg/h ketamine + propofol/ketofol infusion. Group K received 0.125 mL/kg bolus, 0.125 mL/kg/h ketamine + propofol/ketofol infusion (ketofol was prepared with 4 mg propofol + 2 mg ketamine). Patients were followed up with Ramsay Sedation Scale (RSS) of 4, SPSS 22.0 program was used for the analyses.

Results and Discussion: In Group K, recovery time and mean arterial pressure (MAP) values were significantly shorter, coughing rate, pulse and BIS values were higher than Group D (p<0.05). Our study produced different findings about ketofol and deeper anaesthesia than El Mourad et al.’s study but similar findings to Yagol et al.’s study on patient and endoscopist satisfaction evaluations. Although there were no significant differences, we believe dexmedetomidine group experienced more comfortable levels of sedation.

Conclusion: Dexmedetomidine-propofol and ketamine-propofol combinations may be suitable for endoscopy sedation due to their different properties.
Anaesthetic management in a patient with glucose-6-phosphate dehydrogenase deficiency undergoing an out-patient surgery

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Background: Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is an X-linked recessive enzymopathy responsible for acute haemolysis following exposure to oxidative stress. Drugs which induce haemolysis in these patients are often used in anaesthesia and perioperative pain management. Here, we present a patient with a G-6-PD deficiency who underwent uneventful ambulatory surgery.

Case Report: A 20-year-old female patient, ASA II, presented for multiple dental extraction under general anaesthesia in our Ambulatory Unit. Past history revealed well-controlled asthma and G-6-PD deficiency with no history of haemolysis, jaundice or blood transfusion. All the routine investigations were within normal limits (haemoglobin 13.4 g/dL). In the operating room, fentanyl 0.1 mg and propofol 200mg were administered and nasotracheal intubation was facilitated with rocuronium 40mg. Standard ASA monitoring as well as bispectral index and neuromuscular monitoring were applied. Anaesthesia was maintained with iv propofol and intermittent boluses of rocuronium and fentanyl. Cefazolin 2g was given iv as prophylactic antibiotics. The uneventful surgery lasted for 55 minutes. At the end of procedure, anaesthetic agents were discontinued, residual neuromuscular blockade was reversed with neostigmine and atropine and patient was extubated. Paracetamol 1g and metamizole 2g were given for postoperative analgesia. After 3 hours without incidents in the Post Anaesthesia Care Unit, the patient was informed of signs of acute haemolysis and was discharged. Post-surgery calls at 24 hours, 72 hours and at the 7th day revealed the remaining postoperative course was uneventful.

Learning points: The inadequate management of G6PD-deficient patients increases the risk of them developing acute hemolytic anemia. We found that, with careful selection, G6PD-deficient patients can be eligible for out-patient surgery.

References:

Compartment psaos block efficacy and safety for elderly patients with proximal femur fractures

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1Bogomolets National Medical University - Kyiv (Ukraine), 2Bogomolets National Medical University - Kyiv (Ukraine), 3Medical Center Into-Sana - Odesa (Ukraine)

Background and Goal of Study: Proximal femur fractures are most common fractures in the elderly and associated with significant mortality and morbidity, with high economic and social impact. Perioperative pain management influence outcomes and mortality after femur surgery with early mobilization being possible. The goal of the study was to compare the efficacy and safety of the compartment psaos block for perioperative analgesia in elderly patients with proximal femur fractures.

Materials and Methods: The randomized controlled study was held in medical center Into-Sana (Odesa, Ukraine). Patients with proximal femur fractures and 60 years were included in the study. They were randomly allocated to groups – compartment psaos block group (bupivacaine analgesia was started as soon as possible before surgery and prolonged during and after surgery with additional ischiadicus block for surgical anesthesia); spinal anesthesia (SA) group and general (inhalational) anesthesia (GA) group, both with comparable demographic data, types of operation, and SPB technique among the three groups. Three patients were excluded due to conversion to general anesthesia, leaving 25, 26 and 26 patients in the LPB, FIB and FNB groups, respectively. Postoperative morphine consumption [median(IQR); 2(0-3) vs 3(0-4) vs 3(0-4) mg; P=0.905] and 4-point verbal rating scale [median(IQR); 0(0-1) vs 0(0-0) vs 0(0-0) vs 0(0-1); P=0.216] at 24 hours were not different among the groups. The median(IQR) times for performing the LPB, FIB and FNB were 5.4(2.67), 3.5(3.0-6.4) and 2.9(2.5-4.1) minutes. When compared between groups, the procedural time of the LPB was more than the FIB [P=0.019] and the FNB [P<0.001], and that of the FIB was longer than the FNB [P=0.019]. There were no vascular puncture, paresthesia or LA toxicity from all PNBs. Patients started walking with aid on postoperative day 1-3 in all groups [P=0.863].

Conclusions: From the preliminary results, the LPB, FIB and FNB provided effective pain control after hip fracture surgery. The ultrasound-guided FNB had the shortest procedural time as implying the simplest technique.
ACLR is associated with moderate to severe pain control (number of patients with severe pain 10% vs 47% and 60% in SA and GA groups, p<0.05), decreased opioid consumption in first 24 hours after surgery (0 [0-6] mg vs 15 [10-20] and 20 [15-25] mg respectively, p<0.001), better sleep quality, earlier mobilization after surgery, decreased incidence of opioid-associated vomiting/nausea (OR 7 95 CI 1.3-35, p=0.02) and myocardial injury (OR 9 95 CI 1.01-77, p=0.048 for SA group and OR 11 95 CI 1.2-91, p=0.03 for GA group). There were no differences in the incidence of hospital acquired pneumonia and delirium.

Conclusion: Perioperative compartment psoas block is effective and safe for perioperative analgesia in elderly patients with proximal femur fractures, and is associated with better pain control and decreased complications incidence.

References:

**Comparison of the analgesic effects of adding infiltration between popliteal vessel and capsule of the knee (IPACK) to femoral triangle block for anterior cruciate ligament reconstruction (ACLR): retrospective cohort**

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Background and Goal of Study: ACLR is associated with moderate to severe pain, performed generally on an ambulatory basis. Hamstring graft technique, as well as tibial or femoral tunnels, gives a potential source of pain at the posterior aspect of the thigh and knee, exceeding the territory covered by femoral (FB) or femoral triangle (FT) blockades. IPACK blocks sensory nerves coming from the posterior aspect of the knee. The aim of this study was to evaluate the analgesic effects of adding IPACK to FT in ACLR since there are no studies comparing these strategies.

Materials and Methods: This study was conducted at Hospital Italiano de Buenos Aires. Data was extracted of clinical records. We included patients undergoing ACLR (hamstring graft) under general anesthesia and receiving ultrasound guided FT (at the apex of FT) with or without IPACK (20 ml 0.375% ropivacaine) between June 2016 and June 2019. Patient demographics, anesthetic strategy, post-operative verbal numerical pain scale (VNS), AINEs and opioids (as oral morphine equivalents) administration and total time in post anesthesia care unit (PACU) were examined. Qualitative data were compared by using chi-square or Fisher’s exact tests, and quantitative data using Wilcoxon rank-sum test. We used multiple logistic regression to evaluate association between anesthetic strategy and rescue analgesic needs.

Results and Discussion: 180 patients were included, 84 in the FT group and 96 in the IPACK+FT group. VNS pain scores within the first 60 minutes were lower in the IPACK group (table 1). IPACK group required less rescue opioids (29%) than the FT group (50%). There were no significant differences in total opioid administration. The lack of addition of IPACK to FT was associated to a greater need of rescue analgesia (OR 2.45 CI 1.29-4.65 p=0.006) and rescue opioid requirements (OR 2.07 CI 1.2-3.35 p=0.006) after adjustment for age, BMI and total intraoperative morphine.

**Table 1. Comparison of demographic and perioperative data between groups.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>FT (n= 84)</th>
<th>FT + IPACK (n= 96)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>72 (85.71%)</td>
<td>76 (79.16%)</td>
<td>0.26</td>
</tr>
<tr>
<td>Age</td>
<td>31.5 (26.7-39.0)</td>
<td>28 (23.7-36.0)</td>
<td>0.038</td>
</tr>
<tr>
<td>BMI category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy weight</td>
<td>38 (45.0)</td>
<td>38 (45)</td>
<td>0.08</td>
</tr>
<tr>
<td>Overweight</td>
<td>40 (47.6)</td>
<td>41 (43.2)</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>6 (7.1)</td>
<td>16 (16.6)</td>
<td></td>
</tr>
<tr>
<td>VNS at PACU arrival</td>
<td>1.98 (3.09)</td>
<td>1.08 (2.18)</td>
<td>0.025</td>
</tr>
<tr>
<td>Intrathecal</td>
<td>3.40 (2.57)</td>
<td>2.81 (2.02)</td>
<td>0.085</td>
</tr>
<tr>
<td>Morphine IV mg</td>
<td>6.97 (1.25)</td>
<td>12.91 (1.25)</td>
<td></td>
</tr>
<tr>
<td>Time in PACU</td>
<td>132.50 (60.00, 167.00)</td>
<td>127.50 (89.75, 171.25)</td>
<td>0.730</td>
</tr>
<tr>
<td>Rescue analgesia (AINEs+Opioids)</td>
<td>56 (66.7%)</td>
<td>40 (41.7)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Conclusion: Adding IPACK to FT reduce VNS scores during the first postoperative hour in the PACU and significantly reduce rescue analgesic requirements during total stay in PACU.

4726

**Ultrasound-guided Anterior Approach to Sciatic Nerve Block: Influence of Lower Limb Positioning on the Visibility and Depth of the Sciatic Nerve**

Kim H.1
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**Background and Goal of Study:** We aimed to identify the optimal lower limb position for the ultrasound-guided anterior approach to sciatic nerve block.

**Materials and Methods:** We included 45 patients who met the following criteria: 1) ASA physical status of 1-3; 2) age between 18 years and 80 years; and 3) scheduled to undergo knee surgery that required a sciatic nerve block. The lower limbs of each subject were placed in the following four positions: N, neutral position; ER, external rotation of hip (angle, 45°); ER/F15, external rotation (angle, 45°) and flexion (angle, 15°) of hip; ER/F45, external rotation of (angle, 45°) and flexion (angle, 45°) of hip (Figure 1). An investigator acquired ultrasound scans of the sciatic nerve in each position. From the scans, the visibility score and depth from the skin of the sciatic nerve were analyzed.

**Results and Discussion:** Figure 2 is an example showing the change in the sciatic nerve at each position. Visibility score was significantly higher in positions ER/ F15 and ER/F45 than in positions ER and N (p<0.0001). However, there was no difference between the visibility scores in positions ER/F15 and ER/F45 (p=0.0959). Depth from the skin decreased with external rotation and an increase in the angle of hip flexion (p<0.0001).

**Conclusion:** Based on the visibility score and depth from skin, external rotation of the hip to 45° with a greater angle of flexion (45° vs. 15°) of the hip appears to be the optimal position for the ultrasound-guided anterior approach to sciatic nerve block.

![Figure 1. The 4 leg positions included in the analysis](image1)

![Figure 2. The ultrasound images of the sciatic nerve in 4 leg positions](image2)

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**Popliteal sciatic nerve block occurrence according to the injection distance to the nerve: a multimodal study**

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**Background and Goal of Study:** Inject anesthetic dye (AD) too close to the nerve is related to the risk of persistent and disabling peripheral nervous lesion. In this context, using a multimodal (M) setting (clinical, sonographical and electrophysiological), during an ultrasound-guided & nerve-stimulated Popliteal...
Sciatic Nerve Block (PSNB) we have compared a close injection to the nerve (1mm) to a remote one (3mm).

Materials and Methods: For this prospective single-blinded study we included 10 patients (foot surgery). They received PSNB (lateral approach). Patients were randomly divided into 2 groups: AD (Ropivacain 0.5% 13ml + Lidocain 2% 7ml) was injected in 1mm (Grp1m n=10) vs 3mm (Grp3m n=10) to the nerve. Each PSNB was finally assessed using clinical, sonographical and electrophysiological (sensory evoked potentials SEP, and electromyographical responses as M response and H reflex) assessments from before the block performance until 30min after. Results are presented as means±SD. Statistics consisted in bilateral Student, Levenne, Fischer and ANOVA tests.

Results and Discussion: PSNB succeeded in 100% of patients allowing clinical and sonographical assessment. Twenty-eight patients were randomized into 2 groups: AD (Ropi0.5% 13ml + Lido2% 7ml) was injected in 1mm (Grp1m) vs 3mm (Grp3m) to the nerve. After infiltration to the targeted muscular fascia, the needle was inserted at each point. The local anesthetic was injected in a volume not larger than 20 ml. During the first 6 postoperative hours unrestricted operated leg movements were significantly more frequent in FT + AC blocks group (95 %) compared to the group with PAI only (9 %). This M study advocates for the lack of difference between 1 and 3mm injection of 20 ml of 0.125% bupivacaine by a single injection. Patients in both groups postoperatively received standard doses of analgesic medications such as paracetamol and dexketoprofen. At 3, 6, 24 and 48 hours after the surgery pain was assessed using clinical, sonographical and electrophysiological (sensory evoked potentials SEP, and electromyographical responses as M response and H reflex) assessments from before the block performance until 30min after. Results are presented as means±SD. Statistics consisted in bilateral Student, Levenne, Fischer and ANOVA tests.

Conclusion: This M study advocates for the lack of difference between 1 and 3mm injection of 20 ml of 0.125% bupivacaine by a single injection. Patients in both groups postoperatively received standard doses of analgesic medications such as paracetamol and dexketoprofen. At 3, 6, 24 and 48 hours after the surgery pain was assessed using clinical, sonographical and electrophysiological (sensory evoked potentials SEP, and electromyographical responses as M response and H reflex) assessments from before the block performance until 30min after. Results are presented as means±SD. Statistics consisted in bilateral Student, Levenne, Fischer and ANOVA tests.

Background and Goal of Study: Total knee arthroplasty (TKA) has become one of the most common surgical procedures worldwide. Optimal post-operative pain management with multimodal analgesia approach based on regional techniques and systemic analgesics is the cornerstone of enhanced recovery after surgery. The aim of our study was to determine whether the infiltration between the popliteal artery and capsule of the posterior knee joint (IPACK), in combination with adductor canal block (ACB), improved analgesia compared to periauricular injection (PAI) of ropivacain after unilateral TKA.

Materials and Methods: This randomized controlled trial included patients undergoing unilateral TKA. Patients either received a PAI with ACB (Group1) or an IPACK with an ACB (Group2). The primary outcome was opioid consumption during the first 48 hours post-operatively. The secondary outcomes included visual analogue scale (VAS) at rest and on ambulation on post-operative day one and two (POD 1 and POD2), time up and go (TUG) test, the range of movement (ROM) and patient satisfaction. Results and Discussion: Nineteen patients were included in each group. Patients of the Group1 had less opioid consumption (p=0.05) with significantly longer VAS scores on ambulation (POD1: p=0.033/ POD2: p=0.033) and at rest from the 18-post-operative hour and were more satisfied. However, there was no significantly differences in the mean ROM of knee or in median TUG test between the two groups.

Conclusion: ACB+PAI offers improved pain management in the immediate postoperative period resulting in better patient satisfaction compared to ACB+IPACK. Further studies with larger sample size, evaluating the dose and mode of administration (single shot vs. continuous infusion) of the anesthetic used will probably help in designing optimized pain management protocols after TKA.

Acknowledgements: We gratefully acknowledge Mme Sonia, the kinesiologist for her outstanding contribution to achieve the study.
postoperative knee pain in different leg positions less than 5 points according to VAS. However, there was no difference in pain scores at all time points after the surgery (p > 0.05). Furthermore, there was no difference in requirement of additional opioid analgesics and their adverse effects at all time points (p > 0.05).

Conclusion: FT + AC blocks result in lower extent of motor blockade at first 6 postoperative hours. FT + AC blocks and FN block effectively reduce postoperative pain after the elective knee arthroplasty.

The second group consists of 25 patients with spinal block, accomplished with Marcaine and intrathecal Morphine, providing postoperative analgesia for about 20-24 hours. Postoperative analgesia is provided by Metamizole and Tramadol in recommended doses for patients with GA. Venous blood samples are tested among all patients in order to follow the cortisol's levels before operation, 30 minutes after surgical incision and one hour after the end of the surgical intervention.

Results and Discussion: There were significant differences between the two groups of patients (with spinal block or general anaesthesia) in intraoperative (p=0.003) and postoperative (p=0.0001) cortisol levels.

Conclusion: Neuroaxial anaesthesia is a powerful reducer of stress response in “fast-track” hip prosthesis - attenuates the perioperative stress, postoperative pain and discomfort.

5796

Continuous PENG block: is it possible?

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Background: Peripheral nerve blocks are becoming popular in hip surgery analgesia. Ultrasound guided techniques for blockade of articular hip branches include the PENG block, described by Girón-Arango, Peng and col., with proven good results.1 The possibility in placement and permanence of catheters on this anatomic site has not yet been tested. We studied the placement of a catheter at the level of the injection target site of the PENG Block, analysing the challenges and advantages of this technique.

Case Report: A 78-year-old female patient, (155cm, 50kg), ASA III, hospitalized with hip fracture was submitted to hip replacement technique. A combined general anesthesia with an ultrasound guided PENG block with catheter was proposed to the patient and fully accepted. The PENG block technique, before general anesthesia, was used: needle tip psoas tendon anteriorly / pubic branch posteriorly. Hydrodissection was performed with Ropivacaine 0.5%, 20ml and the catheter was introduced. The catheter placement was between the psoas tendon and the iliopubic branch and fixation site at 10cm at the skin. In the postoperative period the analgesia was assured by continuous pumping infusion of Ropivacaine 0.2% 6ml/h for 48h. Analgesia was supplemented with paracetamol and tramadol. Patient reported no resting pain during the next 48h and Visual Analog Scale for Pain was 3/10.

Discussion: Analgesia and early rehabilitation in hip surgery is a challenge for the anaesthesiologist. PENG Block is a recent approach that covers the blockage of 3 nerves that give innervation to the anterior hip capsule.2 We placed this catheter with the aim of prolonging analgesia, reducing opioid consumption and accelerating rehabilitation process.

References:

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Single injection ultrasound-guided thoracic paravertebral block versus transversus abdominis plane block in peritoneal dialysis catheter implantation: a randomized controlled trial

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Background and Goal of Study: Ultrasound-guided thoracic paravertebral block (US-TPVB) is generally used for postoperative analgesia. We hypothesized that single-injection US-TPVB could be used as the principal anesthetic technique for peritoneal dialysis catheter (PDC) implantations. The anesthetic effect of a single-injection TPVB would be compared with that of a transversus abdominis plane (TAP) block and local anesthetic infiltration (LAI).

Materials and Methods: Patients undergoing PDC implantations were randomized into Groups TPVB, or TAP or LAI. In Group TPVB, single-injection US-TPVB at T10-T11 level was performed with 20ml of 0.25% ropivacaine. In Group TAP, ultrasound-guided oblique subcostal TAP block was performed with 20ml of 0.25% ropivacaine. In Group LAI, 40ml of 0.25% ropivacaine were used. The quality of analgesia was compared among the three groups.

Results and Discussion: Eighty-eight eligible patients were enrolled. The majority of patients in Groups TPVB (24 of 28), TAP (30/30) and LAI (24 of 30) underwent PDC implantations successfully. Lower general anesthesia conversion rate and higher satisfaction rates by nephrologists and patients were observed in Group TAP, compared with Groups TPVB and LAI.VAS at the majority of time points were lower in Group TAP, except for at the catheter exit sites. Less rescuing sufentanil was consumed in Group TAP. The boundaries of area with surgical anesthesia after a single-injection TPVB was much wider and more variable than that after a TAP block. Theoretically, that TPVB might block ipsilateral, segmental, somatic and sympathetic nerve, including the lateral and anterior cutaneous branches of the related somatic nerve (TAP block covers the anterior cutaneous branches only). Therefore, TPVB could possibly provide a better anesthetic effect than that of a TAP block for PDC implantation. However, poor predictability of spread of local anesthetics in TPVB consequently affected the reliability of its block. In the contrast, a TAP block provided a more reliable and better anesthetic effect, though such an area with surgical analgesia was smaller.

Conclusion: Although a single-injection US-TPVB could be the principal anesthetic technique for PDC implantations and provided a comparable anesthetic effect to that of LAI, oblique subcostal TAP block provided a better and more reliable analgesia than US-TPVB or LAI did for PDC implantations.

4890

The anaesthesia effect on the perioperative stress in patients with "fast- track" surgery in hip replacement

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Background and Goal of Study: Hip replacement is considered to be a large surgical intervention, related to a high level of stress-response, manifestation of stress pain and patient’s discomfort. The systemic stress response triggered by surgical trauma is characterized with neuroendocrine dysregulation. The activation of Hypotalamicus-Pituitary-Adrenal axis is critical for the coordination of stress response by human’s body against surgical intervention. The cortisol reduces the response by human’s body against surgical intervention. The cortisol reduces
The study was conducted on 70 patients scheduled for the Intraoperative MAP, HR and fentanyl requirement during Lumbar Spine Surgeries aiming to decrease postoperatively.

**Conclusion:** Analogue score and total morphine consumption were statistically lower in Group (A) (n= 35) include the patients who will undergo ultrasound guided ESP block and transversus abdominis plane block have been previously described for analgesia in inguinal hernia repair. In this case report we describe a combination of these two blocks in order to achieve intraoperative anesthesia.

**Materials and Methods:** A 44 year old patient with incarcerated left sided inguinal hernia was presented to us on our night shift. He had also a dilatative myocardiopathy, mainly right sided due to severe tricuspid valve insufficiency and pulmonary hypertension. Also the left side of the heart was affected with EF 35%. For anesthesia we decided to use a left sided ESP block at level Th9-Th10 and left sided TAP block. For the ESP block we used L-Bupivacain 0,25% 20 ml + Dexason 2 mg and for the TAP block 0,25% L-Bupivacain 20 ml. After 20 min, the operation started with good operating conditions and anesthesia. We also gave the patient ketamin 50 mg, midazolam 1 mg and fentanyl 0,05 mg i.v. A desincarceration of the sigmoid colon and hernioplastica was done. The bowel was vital and needed no resection.

**Discussion:** We searched the literature, but we could not find a combination of these two blocks in one patient for this indication. These techniques had been described separately for inguinal hernia repair, mainly for postoperative analgesia, but there are some reports for intraoperative anesthesia as well. We decided to use both blocks in order to increase our success rate. Side effects of this technique may be local anesthetic toxicity because of larger volumes used and also technical difficulties and patient refusal due to two point puncture.

**References:**

**Learning points:** A combination of peripheral nerve blocks, targeted to similar conditions in high risk patients.

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**4584**

**Effectiveness of Bilateral Ultrasound-Guided Erector Spinae Plane Block in Intraoperative and Postoperative Pain control in Lumbar Spine Surgeries. A Randomized Controlled Trial**

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**Background and Goal of Study:** Control of Postoperative pain after spinal surgery is a prerequisite to enable early mobilization, which leads to improved functional recovery and enhance patient satisfaction. The aim of this study is to estimate the efficacy of the ultrasound guided ESP block in intraoperative pain control and postoperative pain management in lumbar spine surgeries.

**Materials and Methods:** The study was conducted on 70 patients scheduled for elective lumbar spine surgeries in any 2 levels (L1-L5) under general anesthesia in Kae Aralain School of medicine. Patients were randomly allocated into two groups: Group (A) (n=35) include the patients who will undergo ultrasound guided ESP block after induction of GA. Group (B): (n = 35) include the patients who will undergo GA with conventional analgesia. During the surgery, the MAP and HR were traced every 15 minutes. Total Intraoperative fentanyl requirement, and postoperative VAS and time to 1st request of rescue analgesia as well as Incidence of complications were recorded.

**Results and Discussion:** The Intraoperative MAP, HR and fentanyl requirement were statistically lower in Group (A) compared with Group (B). The Postoperative Visual Analogue score and total morphine consumption were statistically lower in Group (A) compared with Group (B). There were no statistically significant differences among the two groups as regards incidence of complications when assessed postoperatively.

**Conclusion:** The study offered a new technique using Bilateral Ultrasound-Guided Erector Spinae Plane Block during Lumbar Spine Surgeries aiming to decrease intra and postoperative pain together with reducing analgesic needs to minimum during and after the operation with the consequent beneficial reduction of narcotic side effects.

**References:**
Ultrasound-guided rectus sheath block as a part of a multimodal analgesia plan in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity

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Background and Goal of Study: Various method of abdominal field block have been used in anesthetic practice over recent decades. But the last recommendations in multimodal analgesia have lack of information about these techniques in obese patients 1.1: The aim of this study is to compare the efficiency of analgetic action of ultrasound guided rectus sheath block (USGRSB) and the local infiltration anesthesia (LIA) of trocara entry points in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity.

Materials and Methods: The retrospective study included 110 patients with BMI ≥35 who underwent laparoscopic surgery on upper and middle section of abdominal cavity. Retrospectively patients were divided on tow equal groups according to the tipe of analgesia; group I had bilateral USGRSB, group II received LIA in trocara entry points. Patients in both groups had inhaled low-flow anesthesia with sevofluran combined with pre-entry analgesia (i.v. paracetamol and dextropropofen) and systemic analgesia by fentanyl. The primary efficacy endpoints-reduction of intraoperative dose of opioids, the need of rescue analgesia in the first 6 postoperative hours. The statistical processing of the study results was carried out using the statistical analysis package MedCalc v. 18.11 (MedCalc Software Inc, Broekstraat, Belgium).

Results and Discussion: The intraoperative fentanyl i.v. dose in group I is considerably decreased 0.94±0.11 µg/kg vs 1.7±0.16 µg/kg in group II (p =0.027). The pain level by VAS in patients in both groups in average did not exceed 3 points in the first post-operative day, and there was no need in life-saving analgesia with opioids.

Conclusion: The USGRSB has analgetic and opioid-sparing advantages in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity and may be a part of efficient multimodal analgesia plan in that patient’s group.


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4845

Efficacy of programmed intermittent bolus infusion erector spinae plane block on postoperative analgesia after video-assisted thoracoscopic surgery: A preliminary randomized controlled trial

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Background: Although thoracic epidural anesthesia and paravertebral block are effective analgesic techniques after thoracic surgery, they cannot be performed because of the risk of hematoma in patients with anticoagulant therapy or coagulopathy. Erector spinae plane block (ESPb), which first reported in 2016, is a relatively superficial interfascial plane block between thoracolumbar transverse process and erector spinae muscle and has a little evidence for analgesic effects after thoracic surgery. We intended to assess the efficacy of ESPb on postoperative analgesia after video-assisted thoracoscopic surgery (VATS).

Materials and Methods: After approval of Institutional Ethics committee, we conducted a prospective, randomized controlled trial. Among patients undergoing VATS at the age of 20–80, with an American Society of Anesthesiologists physical status 1 and 2, we recruited patients with contraindications for epidural anesthesia due to coagulopathy, anticoagulant or antiplatelet therapy. The patients were randomly assigned to ESPb (group E) or control (group C). In group E, after general anesthesia induction, we performed ultrasound-guided ESPb at the level of T5 or T6 with 30ml of 0.25% levobupivacaine, inserted catheter and started intermittent bolus infusion of 0.25% levobupivacaine (20ml every 4hours). In group C, prior to skin closure, the surgeon infiltrated all surgical strata with 20ml of levobupivacaine. In both groups, an intravenous patient-controlled analgesia containing fentanyl and a regular intravenous administration of acetaminophen were initiated as postoperative analgesia. The primary outcome was the fentanyl consumption within 24 hours after the surgery. The secondary outcomes were visual analog scale pain scores under the status of rest and movement, pruritus, nausea and vomiting, drowsiness, and dermatomes anaesthetized to pinprick and cold testing until the second postoperative day and opioid consumption during the surgery.

Results: Twelve patients were included. There was no significant difference between two groups in the consumption of fentanyl within postoperative 24 hours (120 vs 175µg, P=0.94). Intrathecal opioid usage was significantly lower in group E. There were no intergroup differences in terms of other outcomes.

Conclusion: Our results show that postoperative opioid usage and pain were not significantly reduced with ESPb after VATS. During the surgery, ESPb may provide hemodynamics stability and reduce opioid consumption.

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4813

The Analgesic Efficacy of Transversus Abdominis Plane Block after Laparoscopic Bariatric Surgery: A Systematic Review and Meta-analysis

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Background: After bariatric surgery, patients suffer from moderate to severe postoperative pain. The transversus abdominis plane (TAP) block might be a useful analgesic technique, but literature reports conflicting results. This meta-analysis investigated whether TAP block reduces postoperative pain in patients undergoing bariatric surgery.

Methods: The electronic databases PUBMED and Embase were queried until October 2019. We included trials that reported pain outcomes and compared TAP block to a control or placebo group, in adult patients undergoing any bariatric surgical procedure. Meta-analyses were mostly performed by employing a random-effects model. We rated the quality of evidence for each outcome. The primary outcome was rest pain score at rest (analogue scale, 0-10) at 2 postoperative hours. We performed subgroup analyses for our primary outcome according to the type of surgery, timing (pre- vs postoperative) and technique (ultrasound- vs laparoscopy-guided) of TAP block. Secondary outcomes included rest and dynamic pain scores at 12, 24 and 48 postoperative hours, postoperative opioid consumption, rate of PONV at 24 hours and postoperative complications.

Results: Twelve controlled trials including a total of 857 patients were identified. The risk of bias was moderate in most studies. Pain score at rest at 2 postoperative hours was significantly reduced in the TAP block group (mean difference 95%CI -1.8 [-2.5;-1.1], I2=85%, P=0.00001). Our subgroup analyses showed that TAP block was more effective in sleeve gasterctomy than in other types of surgery and when performed at the end rather than at the beginning of an intervention. All other pain-related outcomes were significantly reduced by TAP block (table 1). There were no differences between groups regarding PONV or postoperative complications.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Mean difference 95%CI</th>
<th>I2</th>
<th>P value</th>
<th>Quality of evidence (GRADE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest pain score (VAS, 0-10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 12 postoperative hours</td>
<td>-0.6 [-1.54; -0.18]</td>
<td>93</td>
<td>0.01</td>
<td>moderate</td>
</tr>
<tr>
<td>At 24 postoperative hours</td>
<td>-0.6 [1.163; -0.28]</td>
<td>96</td>
<td>0.005</td>
<td>high</td>
</tr>
<tr>
<td>Dynamic pain score (VAS, 0-10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At 12 postoperative hours</td>
<td>-2.1 [3.35; -0.81]</td>
<td>95</td>
<td>0.002</td>
<td>moderate</td>
</tr>
<tr>
<td>At 24 postoperative hours</td>
<td>-1.3 [2.21; -0.46]</td>
<td>90</td>
<td>0.005</td>
<td>moderate</td>
</tr>
<tr>
<td>Cumulative i.v. morphine consumption equivalent (mg)</td>
<td>-13.7 [26.67; -0.62]</td>
<td>100</td>
<td>0.04</td>
<td>moderate</td>
</tr>
<tr>
<td>PONV</td>
<td>0.62 [0.30; 1.27]</td>
<td>79</td>
<td>0.19</td>
<td>high</td>
</tr>
</tbody>
</table>

Table 1. Acute pain-related outcomes and PONV.

Conclusion: There is moderate evidence that TAP block provides effective analgesia after bariatric surgery.

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Epidural versus transversus abdominis plane block for abdominal wall analgesia – a systematic review, meta-analysis and trial sequential analysis

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Background and Goal of Study: In the past, pain relief for abdominal surgery has centered on epidural analgesia but transversus abdominis plane (TAP) block is now increasingly used. Our aim in the present meta-analysis was to compare analgesic efficacy, side effects and functional outcomes of TAP block versus epidural analgesia.

Materials and Methods: After a systematic search of electronic databases from inception to April 2019, we screened the retrieved citations for eligibility. Only randomised controlled trials that included adult patients having abdominal surgery with TAP block as the intervention and epidural analgesia as the comparator were considered for inclusion. The risk of bias in each trial was assessed with Cochrane Collaboration’s tool. Following data extraction, we conducted meta-analysis if appropriate and performed trial sequential analysis.

Results and Discussion: Sixteen studies with 1110 patients were included. Our first co-primary outcome, postoperative pain score at rest at 12 h, was decreased by a mean difference of 0.74 (95% CI 0.10 to 1.38; p = 0.02) with epidural analgesia compared to TAP block. No difference was found for the second co-primary outcome, postoperative pain score at rest at 24 h. In comparison to epidural analgesia, intravenous morphine equivalent consumption was increased by a mean difference of 9.7 mg (95% CI 5.3 to 14.2 mg; p < 0.0001) at 0–24 h interval, risk ratio of hypotension at 72 h was 0.17 (95% CI 0.06 to 0.48; p = 0.0008), and length of time needed to fulfill discharge criteria was shorter by 0.51 day (95% CI -0.91 to -0.10; p = 0.01) with TAP block. Our systematic review was limited by high risk of detection and performance bias in included trials, significant statistical heterogeneity and publication bias.

Conclusion: Epidural analgesia and TAP block are clinically equivalent in decreasing the postoperative pain score at rest at 12 h and 24 h. The reduced intravenous morphine equivalent consumption at 0–24 h interval with epidural analgesia should be balanced against its increased risk of hypotension. In view of this, TAP block is a favourable alternative to epidural analgesia in abdominal surgery.

4921

Efficacy of ultrasound-guided erector spinae plane block for postoperative analgesia in robotic-assisted mitral valve repair and lung resection surgery: a retrospective observational study

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Background: Robotic-assisted minimally invasive techniques are increasingly used as part of enhanced recovery after surgery (ERAS) programs for mitral valve repair (MVR) and lung resection surgery (LRS). Yet, surgical incision in the thoracic region remains associated with significant postoperative pain1 which delays early mobilization. Erector spinae plane block (ESPb) is a simpler and safer analgesic technique compared to thoracic epidural analgesia or paravertebral block, and has been suggested as an alternative in thoracic surgery2. This study aims to assess the efficacy of ESPb in robotic-assisted minimally invasive cardiothoracic surgery.

Methods: This retrospective observational study over 2 years included 84 patients undergoing robotic-assisted MVR and LRS. 19 out of 57 MVR patients received ESPb postoperatively and 14 out of 27 LRS patients received ESPb preoperatively.

Ultrasound-guided ESPb was performed at T5 level with an initial bolus of 30mL lidocaine 0.25%, followed by placement of a perineural catheter allowing delivery of programmed intermittent bolus of chloroaine 0.125% 10mL, per hour. All patients (ESPb and controls) were given patient-controlled intravenous analgesia using morphine. Morphine consumption and pain score using Visual Analogic Scale (VAS) were both recorded at end of postoperative day 1 and day 2. Statistical analysis was carried out with the Mann-Whitney U test.

Results and Discussion: There was a significantly lower morphine consumption in ESPb patients compared to controls after MVR and LRS (Fig 1). In both surgeries, there was no significant difference between ESPb patients and controls regarding VAS.

4728

Optimization of anesthetic management during operations on the mammary gland

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Background and Goal of Study: Despite the considerable achievements of world anaesthesiology in recent years, the effectiveness of perioperative analgesia for reconstructive and aesthetic surgical interventions on the mammary glands has a reserve for optimization. The important issues are determining the path of safe analgesia, taking into account the possibility of developing side effects from various organ systems, possible cognitive consequences and impaired quality of life, changes in central and cerebral hemodynamics.

Materials and Methods: The results of 70 surgical interventions, reduction / augmentation mammoplasty with areolar or T-inverted access, with the installation of implants under the pectoralis major muscle performed in the period from 2018 to 2019. The amount of anesthetic spent, the incidence of postoperative nausea and vomiting, changes in heart rate and blood pressure were determined. Postoperative analgesia was determined using an analog visual scale. Patients are divided into three centers according to the types of anesthesia: the 1st group (No. 28) inhalation anesthesia with sevoflurane, analgesia with nalbuphine; the 2nd (No. 16) inhalation anesthesia with sevoflurane, analgesia with paracetamol + desketoprofen; the 3d (No. 26) inhalation anesthesia with sevoflurane + PECs block (in specific, own modifications).

Results and Discussion: The depth of anesthesia in all groups according to the BIS monitor was comparable. The frequency of POVN in the first group was the highest (21.42%), in the second and third 12.5% and 3.84%, respectively (p <0.001). In the third group, the lowest intraoperative anesthetic consumption was observed (6 ± 1.22 ml / h). Postoperative analgesia is comparable in groups 1 and 3, but significantly lower in the second one (on average, 43.75% of AVS in the first 3 hours was ≥ 5, which required additional analgesia).

Conclusion: The use of regional methods, in particular such as PECs blocks, allows you to get a good analgesic effect, and reduce the number of complications of anesthesia during mammary gland surgery.
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Regional anesthesia provides greater patient safety by avoiding the risk of MH and the approach of the potential DA and by interfering less with ventilatory dynamics, desirable in a patient with pulmonary sarcoidosis. Surgical time greater than 2 hours, lower hemodynamic impact and possibility of administering prolonged analgesia led to the preference for an EA over a subarachnoid block.

References:

Learning points: The rarity of this pathology and the scarcity of literature mean that there is no recommended anaesthetic technique. It should be determined by the patient’s condition and characteristics of the procedure. EA allowed evading the susceptibility to MH and the potential DA, as well as maintaining cardiorespiratory homeostasis, ensuring adequate perioperative analgesia and adapting the anaesthesia time to the duration of surgery.

5697

Uterine leiomyomectomy in a 41 year old patient with myotonic dystrophy: a case report of opioid-free anaesthesia

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Background: Myotonic dystrophy (DM), an autosomal dominant disorder, affects skeletal, smooth and cardiac muscle. Heart conductions defects and central nervous system alterations are also found. Sleep study may be necessary for central or obstructive sleep apnoea. There is no specific treatment, apart from managing complications. Anaesthetic management of these patients is challenging. Hypothermia, shivering and mechanical/electrical stimulation may precipitate myotonia. Moreover, patients are more sensitive to sedative, anaesthetic and neuromuscular blockade, resulting in intraoperative or early postoperative cardiovascular and respiratory problems, along with prolonged recovery from anaesthesia.

Case Report: A 41y old woman admitted for scheduled uterine leiomyomectomy, suffering from DM since the age of 16. Unable to walk unassisted, she had mild mitral regurgitation and lung restriction (FEV1=58%). According to the neurologist’s consultation and since her respiratory function was severely impaired, she should avoid sedatives and opioids, rendering regional anaesthesia the preferable technique. On examination she had a HR of 73/min, BP 128/84 mmHg, respiratory rate 14/min and slight pallor. Airway evaluation showed normal mouth opening, adequate neck mobility, Mallampatti grade II and thyromental distance over 6.5 cm. Epidural anaesthesia was performed. The catheter was inserted at L3-4 level in the sitting position, through an 18G Tuohy needle. Epidural space was detected at 4cm from skin and the catheter was fixed at 10 cm, followed by a lidocaine 2% at 4cm from skin and the catheter was fixed at 10 cm, followed by a lidocaine 2% solution and then a ropivacaine 100mg in a total volume of 150ml. Epidural catheter was placed at T6 level was achieved; operation was uneventful with SpO2 99% throughout and had an excellent outcome.

Discussion: Opioid free anaesthesia although a novel approach, is already the gold standard for certain patients, as in this case with DM. Awareness of specific illnesses and anaesthetic possibilities may provide excellent anaesthetic conditions especially when respiratory function is at risk.

References:

Learning points: Opioid free epidural anaesthesia, when feasible, is a safe choice for patients with myotonic dystrophy, providing excellent anaesthetic conditions and outcome.
5167

**Erector spinae plane block for postoperative analgesia after hemilaminecmy in a 7 year old patient with ataxia telangiectasia syndrome**

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**Background:** The erector spinae plane block (ESP Block) was described1 by Forero et al. in 2016 and since then it has been an emerging technique for thoracic analgesia, alternative to neuraxial assessment. The injection of local anesthetics can spread to paravertebral, intercostal and dorsal rami of the spinal nerves and promote consistent analgesia2,3.

**Case Report:** A 7 year old boy diagnosed with ataxia telangiectasia syndrome and non hodgkin’s lymphoma with bones lesion from T7-T9 and to the spinal canal, scheduled for open surgical jejunostomy under regional analgesia, helping him to be mobilized the same day of surgery and discharge him the next day. The surgery was performed as a form of rescue analgesia considering its relative simplicity and safety when USG guided.

**References:**

5438

**Bilateral rectus sheath block as the sole perioperative anesthetic technique for open surgical jejunostomy placement to a high-risk patient**

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**Background:** Rectus sheath block (RSB) is a trunk block usually performed under general anesthesia (GA) which provides postoperative analgesia to patients undergoing minor surgical interventions. This case report describes the performance of bilateral RSB as the sole perioperative anesthetic technique to a high-risk patient undergoing open surgical jejunostomy.

**Case Report:** We present the case of an elderly patient with multiple comorbidities (ASA V) undergoing open surgical jejunostomy. The patient suffered from final stage pancreatic cancer expanding to the superior esophagus and causing superior esophageal stenosis. Open surgical jejunostomy was scheduled so that enteral nutrition could be accomplished. Bilateral RSB was performed as the sole perioperative anesthetic technique, with ultrasound guidance at T8 level, administering at each side 20ml of local anesthetic and 25y of dexmedetomidine. Shortly after the performance of the block, anesthetic of the surgical field was observed. The patient remained hemodynamically stable throughout surgery. No complications were observed. A month after this surgery, the patient was rescheduled for open surgical jejunostomy, after its accidental removal. The surgery was performed with the same anesthetic technique.

**Discussion:** When confronting a surgical patient with multiple comorbidities, trunk blocks can serve as a safe, alternative technique of analgesia and can also be used alone to provide sufficient analgesia for minor surgeries. In our case, the performance of RSB to a high-risk patient, helped to completely avoid GA, administration of opioids and contributed to the patient’s post-operative analgesia, helping him to be mobilized the same day of surgery and discharge him shortly after surgery. Only one case of open surgical jejunostomy under regional anesthesia (Transversus Abdominis Plane block) has been reported combined with perioperative infusion of dexmedetomidine.

**References:**

5603

**Neuraxial anesthesia in a patient with Factor VII deficiency – a case report**

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**Background:** Epidural haematoma is a rare but potentially disastrous complication associated with neuraxial anesthesia. Risk is higher during times of insertion and removal of epidural catheters, especially in the presence of coagulation disorders. Factor VII (FVII) deficiency is an autosomal recessive coagulation disorder with an estimated prevalence of 1:300,000 and highly variable clinical expression. For surgery, clotting factor levels of 20-25% are thought to provide adequate hemostasis but data for neuraxial anesthesia is missing.

**Case report:** A 21y male patient with history of asthma and smoking habits, was admitted in the emergency operating room with a femoral neck fracture after a high fall. Pre-operative blood tests, including coagulation routine tests, were normal and a combined sequential spinal-epidural technique was performed. Nearly the end of an uneventful reduction and cephalomedullary nailing, information about an important coagulation anomaly in rotational thrombelastometry (ROTEM) was received. The patient was then found to have a FVII deficiency. After multidisciplinary discussion, 3g of fibrinogen and 2 units of fresh frozen plasma were administered and epidural catheter removed. The patient remained under close monitoring for 24hours. His postoperative period was unremarkable without focal neurologic signs or abnormal bleeding.

**Discussion:** This case report describes a young patient with an indwelling epidural catheter in whom a FVII deficiency was incidentally discovered. Guidelines for epidural catheter removal in patients receiving anticoagulant therapy are well established. However, little data is available addressing specific times and precautions on removal an epidural catheter in patients with other coagulation disorders. His clotting factor level was 47%, which is above the limits defined for adequate surgical hemostasis.

**Learning points:** The successful management of this case indicates that it may be safe to perform neuraxial anesthesia in patients with FVII deficiency and an abnormal ROTEM. An appropriate discussion with immunohemotherapy team is crucial. The risk-benefit ratio should always be considered when deciding whether to use neuraxial techniques.

**References:**
Bezold-Jarisch reflex: a cause of cardiac arrest in spinal anaesthesia

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Background: Cardiac arrest after spinal anaesthesia (SA) has an incidence of 7.1/10000 cases.1 This case consists of a successful intraoperative resuscitation during SA.

Case Report: Male patient, 78 years old, ASA II, hypertension, was admitted for transurethral resection of the bladder. SA was performed with 5% hyperbaric bupivacaine 5mg, following the incision, a T10 sensitive block level was documented. The patient was hemodynamic stable until 50min after SA, when bradycardia (36-48bp) with hemodynamic repercussion (MAP 40-45mmHg) occurred. Head-down position and rapid infusion of intravenous fluids were performed, as well as ephedrine 10mg and atropine 0.5mg were administered simultaneously. Shortly the ECG showed asystole. Adrenaline 1mg was immediately administered. Sinus rhythm and spontaneous circulation resumed after 1 cycle of CPR. Next to the critical event, hypotension was managed successfully with additional ephedrine bolus. Blood loss was minimal and until the time of cardiac arrest the patient had received 500mL of crystalloid fluid. After surgery he was transferred to the PACU and heart disease was excluded.

Discussion: Cardiac arrest has been reported within 12–72min after intrathecal administration.2 In elderly patients, it was shown a biphasic change in cardiac output after SA with an initial increase (a fall in afterload), followed by a progressive fall from baseline (a fall in preload).3 Probably inadequate volume loading potentiated relative hypovolemia established by sympathetic block from SA. Vigorous ventricular contractions of an underfilled heart were the mechanical stimulus to initiate Bezold-Jarisch reflex which causes inhibition of sympathetic outflow coupled with bradycardia, peripheral vasodilation and cardiovascular collapse. Although anticholinergic drugs are often the initial agent for bradycardia during anaesthesia, it wasn’t a good choice in this case since it prevented ventricular filling by inducing tachycardia. However, α-adrenergic agonists counteract the vasodilatation in both the arterial and venous circulations, allowing increased venous return and cardiac output improvement.

References:

Learning points: This is a rare complication that can be seen during SA. α-adrenergic agonists are the most logical choice as 1st line agent to treat bradycardia during SA.

5645

Safe neuraxial anesthesia in a patient with Charcot-Marie-Tooth disease: a case report

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Background: Charcot-Marie-Tooth disease (CMT) is the most common inherited neurologic disorder, affecting 1 in 2600 people. It compiles a spectrum of disorders caused by demyelination, with patients experiencing progressive distal muscle weakness and wasting with hyporeflexia, sensory loss and neuropathic pain.1 Despite being common, considerations regarding the anaesthetic management of these patients remain limited. Nevertheless, major concerns include the risk of adverse reactions to neuromuscular blocking agents, susceptibility to malignant hyperthermia, post-operative respiratory weakness and exacerbated neurological symptoms.2,3 Case Report: A 62-year old female, ASA III, with CMT type I disease, with diminished lower limb motility, and a history of idiopathic chronic cough and hypothyroidism, presented with fractures of the tibia and fibula and underwent open reduction with internal fixation under subacromial block with bupivacaine and sufentanil. A focused neurological assessment was performed preoperatively and complete recovery of previews neurological state was evidenced during postoperative follow-up.

Discussion: Reporting uneventful neuraxial anaesthesia in a patient with a neuromuscular disease comes in light of the lack of evidence regarding the safety of this technique in such patients. Neuraxial anaesthesia in adult patients has been reported in the literature though remaining controversial with concern for worsening neurological symptoms.2,3 This case contributes to corroborate the benefits and safety of this anaesthetic approach as compared with other options available for CMT patients.

References:

5963

Anesthetic approach of Madelung Disease in performing axillary vein-prosthesis bypass at the deltopectoral sulcus level: a case report

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Background: Madelung's disease (MD) is a rare disorder of unknown etiology, defined as the presence of multiple and symmetric fatty accumulations, usually involving the upper trunk, neck and head (1). These fat masses cause significant deformity and cervical immobility. Airway management of these patients is challenging and postoperative respiratory failure is a frequent complication (2). We present a clinical case of a patient with MD who underwent peripheral nerve block (PNB) for axillary vein-prosthesis bypass.

Case Report: A 84-year old male, classified as ASA IV, was scheduled for axillary vein-prosthesis bypass due to fistula dysfunction for hemodialysis. Past medical history included MD, COPD, chronic kidney disease in stage 5, stroke with aphasia and hemiparesis, severe osteoarthritis and excessive alcohol intake. Airway examination revealed inability to mandibular protrusion and limitation of cervical mobility by a giant anterior and posterior cervical lipoma that made it impossible to evaluate thyromental distance and tracheal orientation. We decided to perform the procedure under ultrasound-guided clavpectoral fascial plane block (CFFPB) in association with supraclavicular brachial plexus block and intercostal block (T2) using 375 mg lidocaine 1.5% (150 mg + 75 mg + 150 mg, respectively), without respiratory, vascular or neurological complications. 24-hour post-procedure, the patient had no pain, sensory or motor block and no adverse effects.

Discussion: The predictors of difficult airway in association with MD patient comorbidities become a challenge for any anaesthesiologist. In this case, the recourse to regional anaesthesia, with CFFPB and intercostal block (T2), was fundamental for the construction of the fistula at the deltopectoral sulcus level, allowed anesthesia and postoperative analgesia at the surgical intervention sites, prevents the risks associated with general anesthesia in a patient with multiple comorbidities and difficult airway; reduction in opioid-related adverse effects and patient satisfaction.

References:

Learning points: Peripheral nerve block becomes an added advantage when we have a predictable difficult airway, reducing anaesthetic risks and even promoting postoperative analgesia.
Shoulder adduction weakness and paraesthesia post PECs block: a rarely described and rarely discussed complication

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Background: Pectoral plane blocks (PECs) were first described in 2011 and are growing in popularity. They are most commonly used as an analgesic adjunct for patients undergoing breast surgery but also other procedures such as cardiac defibrillator insertion.

Case Report: We present a case report of a 51 year old lady undergoing wide local excision of the breast and sentinel node biopsy. She received a PECs I and PECs II block, 10mls of 0.25% levobupivacaine was infiltrated below pectoralis major and 20 of mils 0.25% levobupivacaine below pectoralis minor. This block was performed under ultrasound guidance, which demonstrated a good spread of local anaesthetic in these planes. The patient received an uneventful general anaesthetic. Post-operatively, reduced power of shoulder abduction and arm numbness was reported and she was kept overnight for observation. The patient was reviewed the next day and her symptoms had resolved with conservative management and she was safely discharged home.

Discussion: Literature search demonstrates only two previous case reports of reduced power in shoulder abduction and arm paraesthesia in the post-operative period. We submit this case report to increase awareness of this complication and suggest it should routinely be part of the consent process for PECs I and PECs II blocks.

Learning points: Complications of PECs blocks and informed patient consent.

Continuous Spinal Anesthesia in the frail orthopedic elderly patient: a case report

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Background: High-risk elderly patients scheduled for urgent orthopaedic procedures are becoming more common. They often present with severe comorbidities, poor physiologic reserve and overall frailty (1). We present an example of patient management using an uncommon anaesthetic technique: continuous spinal anaesthesia (CSA).

Case Report: A 95-year-old man was scheduled for total hip arthroplasty due to a hip-fracture. After hospital admission he developed a nosocomial pneumonia and was not accepted for surgery for 30 days. He had congestive heart failure and COPD, so we decided to perform the procedure under peripheral nerve blocks. CSA was performed using an ultrasound-guided femoral and lateral cutaneous femoral nerve blocks. The patient underwent surgery uneventfully and was discharged home with no adverse events, and there were no cases of skin or finger necrosis. One of the reported reasons for success of WALANT technique worldwide is the lack of need for sedation, and it is even performed out of the operating room in clinics and offices, with no anesthesiologist3. Nevertheless at our institution hand-surgeons and anaesthesiologists believe these procedures performed with an anaesthesiologist gain safety and patient comfort. Besides, preoperative routine tests are unnecessary for these surgeries at our institution, one of the advantages stated for performing WALANT without an anaesthesiologist.

Conclusion: WALANT for carpal tunnel and trigger finger release is rapidly growing. Although one of the stated reasons for success has been no need for an anaesthesiologist, at our institution the hand-surgeon and anaesthesiologist team believe patients gain comfort and safety with monitored anaesthesia care.

References:
Results and Discussion: The results of the quality of the block are presented in table 1. Forearm Bier’s block was significantly more associated with an incomplete block as compared to the peripheral nerve block (17 vs 7; p=0.034). The surgeon(Chi-square test p=0.027) as well as the patients (p=0.021) were more satisfied with the peripheral nerve block compared to the forearm Bier’s block.

<table>
<thead>
<tr>
<th>Complete (grade 1 and 2)</th>
<th>Incomplete (grade 3 and 4)</th>
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<tbody>
<tr>
<td>Forearm Bier’s block</td>
<td>33 (86%)</td>
</tr>
<tr>
<td>Peripheral nerve block</td>
<td>43 (86%)</td>
</tr>
<tr>
<td>Incomplete (grade 3 and 4)</td>
<td>17 (34%)</td>
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<tr>
<td>Forearm Bier’s block</td>
<td>7 (14%)</td>
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Conclusion: Ultrasound-guided peripheral nerve block is superior compared to forearm Bier’s block in providing a surgical block to patients undergoing carpal tunnel release.

4897

Comparison of Ultrasound Guided interscalene brachial plexus block and intra-articular injection of local anesthetics for Arthroscopic shoulder surgery

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Background and Goal of Study: Arthroscopy shoulder surgery is one of the most painful operation. The use of interscalene block (ISB) has been proven to be effective for pain management in shoulder joint surgery. However, ISB may be difficult to perform due to anticoagulant therapy. Total knee arthroplasty is also one of the most painful operation. Epidural anesthesia and femoral nerve block are effective for postoperative pain management. On the other hand, recently some literature reported that periarticular injection (PAI) of local anesthesia is as well as epidural anesthesia or femoral nerve block. The present study is aimed to compare PAI and ISB in patients underwent arthroscopy shoulder surgery.

Materials and Methods: The retrospective observational study was conducted with approval of local ethics committee (authorization number: 2251). Patients underwent arthroscopy shoulder surgery from January 2018 to September 2019 in this institution were included. 96 patients were assigned to PAI group (n = 21) and ISB group (n = 75). Patients were excluded if they were provided intravenous patient-controlled analgesia. Data was extracted in medical chart, anesthesia record, nurse chart and blood test. The primary outcome was whether patients used ancillary analgesics in 24 hours. The secondary outcomes were time to first use of ancillary analgesics, and times, kinds and amount of ancillary analgesics in 24 hours, and any complications. Data were analyzed by the Fisher exact test. Confounding factors were controlled by multivariate analysis. P values <0.05 were considered statistically significant.

Results and Discussion: In the patients’ characteristics, there were significant differences in oxycodone consumption post-operatively. At 6 hours (1.5, 2.2 vs 4.9) and 12 hours (2.9, 3.9 vs 5.4). There were no statistically significant differences in oxycodone consumption post-operatively.

5040

A randomized comparison of two injection techniques for supraclavicular brachial plexus block for arthroscopic shoulder surgery: extrafascial versus subfascial injection

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Materials and Methods: Patients Patients scheduled for arthroscopic shoulder surgery were randomly assigned to receive ultrasound-guided supraclavicular block either with subfascial- (intra-cluster injection, n = 25) or extrafascial-injection technique (posterolateral injection, n = 25). We assessed the incidence of HDP as the primary outcome and pain scores, supplemental analgesia, duration of analgesia, sensory and motor block, adverse effects, and patient satisfaction as secondary outcomes.

Results and Discussion: The incidence of HDP was significantly lower in the extrafascial-injection group than in the subfascial group (4% vs. 44.0%, P = 0.003). The pain score at 0.5 h (P = 0.020), and supplemental analgesia at 0.5 (P = 0.039) and 6 h (P = 0.014) after surgery were significantly different between groups. However, at other times of analysis, there were no significant differences in outcomes between the groups. The onset of sensory and motor block was significantly faster in the subfascial-injection group. The rates of complete sensory and motor block were higher in the subfascial-injection group, except 20 to 30 min after the block onset in the C4 and C3 dermatomes. Other secondary outcomes were similar between both groups.

Conclusion: The extrafascial-injection technique for SCB provides a lower incidence of HDP with similar postoperative analgesia than the subfascial-injection technique.

5094

Randomized, Controlled Trial Comparing Respiratory and Analgesic Effects of Interscalene Block with Anterior and Posterior Approaches of Suprascapular Nerve Block for Arthroscopic Shoulder Surgeries

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Background and Goal of Study: Interscalene brachial plexus block provides excellent analgesia for arthroscopic shoulder surgeries but is associated with adverse effects including hemidiaphragmatic paresis from phrenic nerve blockade. The aim of this study is to compare the respiratory and analgesic effects of suprascapular nerve block with interscalene block.

Materials and Methods: Sixty patients were recruited after taking informed consent and randomized into 3 groups, interscalene block, anterior and posterior suprascapular blocks. Lung function was evaluated at baseline and 30 minutes after the intervention. All blocks were performed under ultrasound guidance with 15 ml of 0.5% ropivacaine. Sensory and motor testing were performed 30 minutes after blocks. Pain scores were assessed at 6, 12 and 24 hours.

Results and Discussion: The interscalene group had a reduced force vital capacity of mean (SD), 31.2% (17.5) while the anterior and posterior suprascapular groups had significantly lower reduction of 3.6% (18.6) and 6.8% (6.5) respectively. Similarly, the diaphragmatic excursion in the ISB group decreased more than the anterior and posterior SSB groups; median (IQR) %, -85.7 (-95.3 to -63.3) vs -1.8 (-13.1 to 2.3) and -1.2 (-6.8 to 16.8), p<0.001. Mean pain scores in interscalene and anterior suprascapular groups were lower than the posterior suprascapular group at 6 hours (1.5, 2.2 vs 4.9) and 12 hours (2.9, 3.9 vs 5.4). There were no statistically significant differences in oxycodone consumption post-operatively.

Conclusion: Anterior suprascapular nerve block preserves lung function compared to interscalene block and has a comparable analgesic effect. The anterior suprascapular block is recommended for arthroscopic shoulder surgeries, especially in patients who have reduced lung function.
Anesthesia-controlled time of intravenous regional anesthesia with a forearm versus conventional upper arm tourniquet: a randomized controlled trial

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Background and Goal of Study: The dose of local anesthetic (LA) required to produce a good block with a forearm Bier’s block or IVRA can be decreased to non-toxic levels compared to conventional upper arm IVRA. Consequently, there is no minimal tourniquet inflation time after forearm IVRA in contrast to the suggested minimum 20-30 minutes tourniquet inflation time after conventional IVRA. Forearm IVRA may be also be associated with reduced anaesthesia-controlled time (ACT) and improved operation room (OR) efficiency. Therefore, our goal was to assess if a forearm IVRA is superior in reducing total OR stay time compared to an upper arm IVRA.

Materials and Methods: In this prospective, mono-center, randomized controlled trial, patients undergoing elective hand and wrist surgery were randomized to receive either forearm Bier’s block (n=140) with 0.5% lidocaine 25ml or upper arm Bier’s block (n=140) with 0.5% lidocaine 40ml. Minimal tourniquet inflation time after upper arm IVRA was set at 25 minutes. To improve homogeneity of the study sample, only patients operated on by one single surgeon (GdW) were selected for analysis. Total OR stay time was defined as departure time from the OR minus arrival time in the OR. Surgical time is time from incision to surgical completion and application of dressings. Differences were evaluated with the Mann Whitney U test. A p-value <0.05 was considered significant.

Results and Discussion: In total, 280 patients were enrolled in this study. Surgery was performed by GdW in 91 patients receiving a forearm IVRA and 102 patients receiving an upper arm IVRA. This resulted in data of 193 patients for analysis. Total OR stay time was significantly shorter after forearm IVRA (29 [28, 35.5] minutes versus 34 [31, 36.25] minutes; p<0.001). Tourniquet inflation time was also significantly shorter after forearm IVRA (20 [17, 23.25] minutes versus 29 [22, 25] minutes; p<0.001). Surgical time was statistically not significantly different (forearm IVRA 7 [4, 9] minutes vs Bier block 7 [5, 9] minutes; p=0.32).

Conclusion: Forearm IVRA is superior to upper arm IVRA in reducing OR stay time by reduction of anaesthesia-controlled time. Application of forearm IVRA in patients undergoing hand and wrist surgery with short surgical time may therefore improve OR efficiency.

5305
The anesthetic efficacy of intravenous regional anesthesia with a forearm versus conventional upper arm tourniquet: a randomized controlled trial
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Background and Goal of Study: Forearm Intravenous Regional Anesthesia (IVRA) has a better safety profile compared to a conventional upper arm IVRA: the dose of local anesthetic (LA) required to produce a good block with a forearm IVRA can be decreased to non-toxic levels. However, only a few studies with small sample sizes and various doses of LA have compared the anesthetic efficacy of forearm and upper arm IVRA. Therefore, our goal was to assess if a forearm IVRA is equally effective in producing a surgical block as an upper arm IVRA in patients undergoing ambulatory hand and wrist surgery.

Materials and Methods: In this prospective, randomized, observer-blinded non-inferiority trial, a total of 280 patients undergoing elective hand and wrist surgery were randomized to receive either forearm IVRA (n=137) with 0.5% lidocaine 25ml or upper arm IVRA (n=138) with 0.5% lidocaine 40ml. The surgical block was evaluated by the blinded surgeon. Complete anaesthesia was defined as a full (grade 1) or partial motor (grade 2) block combined with absence of pain and deep pressure sensibility. Incomplete anaesthesia was defined as a partial motor block, or mild pain with need for local or opioid rescue medication (grade 3) or an incomplete motor and sensory block with the need for sedation or conversion to general anaesthesia (grade 4). The quality of the surgical field, based on the degree of incomplete hemostasis was assessed by the surgeon. The patient satisfaction with perioperative analgesia was evaluated with a 7-point Likert Scale.

Results and Discussion: The results of the quality of the block are presented in table 1. No significant difference was observed in occurrence of an incomplete block after forearm IVRA compared to upper arm IVRA (p=0.301). No significant differences between forearm IVRA and upper arm IVRA were demonstrated in quality of the surgical field (Chi-square test p=0.443) nor patient satisfaction with the perioperative analgesia (p=0.021).

Table 1. Quality of the block.

<table>
<thead>
<tr>
<th></th>
<th>Forearm IVRA</th>
<th>Upper arm IVRA</th>
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<tr>
<td>Complete (grade 1+2)</td>
<td>105 (76.64%)</td>
<td>113 (81.88%)</td>
</tr>
<tr>
<td>Incomplete (grade 3+4)</td>
<td>32 (23.36%)</td>
<td>25 (18.12%)</td>
</tr>
</tbody>
</table>

Conclusion: Forearm IVRA is non-inferior compared to upper arm IVRA in providing a surgical block to patients undergoing hand and wrist surgery.

5618
Comparison of general and regional anesthesia in elderly patients undergoing shoulder surgery: A retrospective analysis
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Background and Goal of Study: Elderly patients are uniquely vulnerable and particularly sensitive to the stress of trauma, hospitalization, surgery and anesthesia. Additionally, older patients also have co-existing diseases and concurrent medications, with diminished functional status. Because the elderly are also at higher risk of adverse consequences from surgery and unresolved or undertreated pain, the effects of general and regional anesthesia on postoperative pain control and complications are discussed.

Materials and Methods: This is a retrospective study of patients older than 65 years who underwent shoulder surgery between 2014 and 2017. This study was approved by the hospital’s Institutional Review Board, and written informed consent was received from all subjects. (KHUH2018-05-202) Patients were divided into two groups: group G (n=85) with general anesthesia, and group R (n=65) with surgery under interscalene nerve block. The choice of anesthesia was determined by the patient’s choice after providing adequate explanation and time before surgery. The preoperative underlying diseases, postoperative complications, and postoperative pain were analyzed.

Results and Discussion: The patients with older age (p <0.001) and those with more underlying diseases (p <0.001) were more likely to choose regional anesthesia for surgery. Operative time (p = 0.015) and anesthetic time (p = 0.002) were statistically analyzed to be less in regional anesthesia. There was no statistical difference between the patients’ gender and length of hospital stay. The incidence of postoperative complications was not statistically significant in both groups. (p = 0.953) Postoperative pain was lower in the group R than group G in the post anesthetic care unit (p <0.001) and 6 hours postoperatively (p = 0.02), but the pain level from 12 to 48 hours postoperatively was not significant between the two groups.

Conclusion: The incidence of postoperative complications and length of hospital stay were not different between general and regional anesthesia for shoulder surgery in elderly patients, but there were differences in early postoperative pain. In elderly patients who are susceptible to pain, regional anesthesia may be more effective in controlling pain than general anesthesia.

5640
An alternative way to test the brachial plexus block
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Introduction: Ax fibres carry the somatic motor and proprioceptive input centrally. The aim of the study was to find out if the proprioceptive position of arm can be used to assess effectiveness of brachial plexus block.

Methods: After ethical approval, twenty adult patients were enrolled in the study. Prior to the block, each patient was first trained to touch the middle finger of their hand to be blocked arm with the middle finger of the unblocked hand with their eyes open in three positions (10 o’clock, 12 o’clock and 2 o’clock). 10 o’clock was 45° from the patient’s hip, 12 o’clock perpendicular to the patient, and 2 o’clock 45° from the patient’s shoulder. This was repeated in the same positions after the
arm was successfully blocked with their eyes closed. The position that the patient’s reached for with their eyes closed was recorded for each of the set of blocked hand positions.

**Results:** A total of 60 individual tests were carried out for twenty patients. The patients were able to correctly locate their blocked hand in two tests (12 o’clock and 10 o’clock). In all remaining 58 tests, patients reached between the 10 o’clock and 12 o’clock position. The commonest position was 11 o’clock (45 out of 58).

**Discussion:** Ninety-seven percent patients were unable to locate their arm after a successful brachial plexus block and went between 10 and 12 o’clock positions irrespective of the actual position of the arm. The results of this study can be useful to test the block, during the consent process, inform patients about this expected conflict and improve their experience.

**Conclusion:** This study suggests that the perceptive position of anaesthetised upper limb can be used to test effectiveness of brachial plexus block.

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**5066**

**Thoracic epidural analgesia or patient controlled intravenous analgesia for pain management following colorectal surgery. A prospective, randomized, multi-center study**

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**Background and Goal of Study:** Thoracic epidural analgesia (TEA) is recommended as first-line pain treatment for open colorectal surgery according to the latest enhanced recovery after surgery (ERAS) guidelines (1). However, as the use of minimal invasive surgical techniques increases, the use of TEA has been questioned. The aim of this study was to assess pain intensity using either TEA or patient-controlled intravenous analgesia (PCA) with morphine for open and laparoscopic colorectal surgery in the context of an established ERAS protocol.

**Materials and Methods:** In this multi-center, Swedish study, 226 patients scheduled for elective open or laparoscopic colorectal cancer surgery were randomized to TEA or PCA. Surgery and anaesthesia were standardized in both groups. Numeric rating scale (NRS) pain scores at rest and during activity were registered postoperatively for 48 h. Primary endpoint was NRS pain intensity during activity on day 1. Secondary endpoints were postoperative complications, hemodynamic instability, use of vasoactive drugs and fluids, and length of hospital stay (LOS).

**Results and Discussion:** Final analysis included 203 patients, 99 received TEA and 104 PCA. There were no differences in baseline characteristics between groups. In both groups, pain scores were generally low, specifically 24 h after surgery. Statistically significant reduction in pain on activity was seen during the first 24 h after surgery in group TEA compared to PCA (mean diff -1.8, 95% CI -2.5 to -1.1), but not thereafter. Patients who underwent laparoscopic procedures also had significantly less pain on activity during the first 24 h in group TEA compared to PCA (mean diff -2.6, 95% CI -3.7 to -1.5). Patients receiving TEA needed significantly more vasopressors during surgery (p<0.001). There was no significant difference in postoperative complications (p=0.76) or LOS (p=0.4).

**Conclusion:** Although pain on activity was lower when using TEA compared to PCA on the first day after surgery for colorectal cancer surgery after open and laparoscopic procedures, the need for vasoactive drugs was greater, and no difference was found between the groups in postoperative complications or LOS.

**References:**


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**4506**

**Relationship between gender, BMI and side of body on the size and position of nerves of the brachial plexus in axilla**

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**Background and Goal of Study:** Studies demonstrate that there are variations in the size and position of the nerves in the brachial plexus. The goal of this study was to determine the effect of age, gender, BMI and side of body on the size and position of the nerves in the brachial plexus.

**Materials and Methods:** Twenty volunteers (10 males and 10 females) were recruited. The ultrasound position of the nerves at the level of insertion of the pectoralis major muscle was confirmed by a dynamic scan. The size of the nerves was calculated directly using the freehand calliper tool. A graph was designed to analyse the position of the nerves. Student T-tests were carried out to determine the correlation between BMI and the size of nerves and gender in the musculocutaneous, radial and ulnar nerves. The centre of each nerve was plotted onto this graph. ImageJ was used to analyse the position of the nerves. Student T-tests were carried out to determine the correlation between BMI and age.

**Results:** Vertical lines were drawn which were divided into 4 quadrants using two perpendicular vertical lines. The centre of each nerve was plotted onto this graph. ImageJ was used to analyse the position of the nerves. Student T-tests were carried out to determine the correlation between BMI and age.

**Conclusion:** The position of the radial nerves was found to be variable irrespective of the actual position of the arm. The results of this study can be useful to test the block, during the consent process, inform patients about this expected conflict and improve their experience.

**References:**


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**5073**

**A study of malposition of epidural catheter inserted in our hospital outpatient department**

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**Background:** In our anesthesiology outpatient clinic, we insert an epidural catheter for the pain treatment during brachytherapy for prostate cancer in the urology department, and for vascular surgery on the next day. Radiopaque epidural catheter position is checked by X-ray after insertion, since a certain number of position errors are confirmed by X-ray.

**Materials and Methods:** After approval of ethics committee, twenty-seven cases were studied retrospectively who requested for an epidural catheter insertion to the anesthesiology clinic from January 2018 to March 2019. All epidural catheters were inserted by an anesthesiologist with over 10 years of experience. Twelve cases were placed in the lumbar region for brachytherapy for prostate cancer in the urology department, and 15 cases were placed in the thoracic region for intraoperative analgesia for open prosthetic angioplasty for abdominal aortic aneurysm on the next day. At the time of insertion, 3 ml of 1% lidocaine was injected as a test dose, and after 5 minutes, cold signs were confirmed and X-ray were checked for final confirmation. If a positional error is observed on the X-ray, catheter is reinserted.

**Results:** Of the 27 cases, 20 were correctly indwelled in the epidural space with X-ray. There were four cases of prolapse from the nerve root, and one case of not being able to follow the tip with X-ray but having an analgesic effect. In the 4 cases of prolapse, there were 1 thoracic and 3 lumbar region.

**Discussion:** Previous studies have showed the probability of intravascular placement of the epidural catheter, but the probability of prolapse from the nerve root has not been studied. We showed that a certain number of catheter prolapse from the nerve root. This pilot study suggests that lumbar catheter prolapse more often than thoracic region. Although the study could not complete sure reason. Further study may reveal the technique to avoid prolapse of the catheter.
5189

**Effect of Clonidine on heart rate variability during spinal anaesthesia: randomized clinical trial**

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**Background and Goal of Study:** Spinal anaesthesia blocks sensory, motor and autonomic nerve conduction from the periphery to the CNS. Adjuncts administered in combination with local anesthetics prolong its duration. Discharge from PACU is based on return of motor function and does not take into account recovery of autonomic activity. It is unclear in the literature whether motor block regression is accompanied by return of autonomic function. Heart Rate Variability (HRV) consists of a simple, noninvasive measurement of electrocardiogram RR intervals using mathematical methods, as well as the Chaos Theory, that represents the autonomic nervous system activity and may be useful in assessing postoperative autonomic recovery. The aim of this randomized, double-blind clinical trial is to evaluate autonomic function at the time of return of motor function in patients who received spinal anaesthesia.

**Materials and Methods:** The sample consisted of 71 ASA I to III patients who underwent surgery of the lower limbs and lower abdomen under spinal anaesthesia. They were randomized into 2 groups: group B, which received 20mg isobaric bupivacaine; and group C, which received 20mg of isobaric bupivacaine and 75mcg clonidine. HRV was evaluated at 3 moments: rest, 20 minutes after spinal block and at the time of motor function recovery, established as a grade II in the Bromage scale. Linear methods in the frequency domain and nonlinear methods, focusing in approximate entropy, were used. Data were collected using a Polar V800® HR monitor and subjected to analysis and filtering by Kubios 3.0® software.

**Results and Discussion:** Comparing the approximate entropy (p = 0.027) and frequency domain (p=0.028) of the C group HRV in T3 with T1, a significant difference was observed, indicating a persistence of sympathetic block even after return of motor function. There was no difference in the bupivacaine group when comparing the same moments.

**Conclusion:** The use of clonidine in spinal anaesthesia prolongs duration of sympathetic block, even after motor function recovery.

5322

**Boundary prediction during epidural punctures based on OCT relative motion analysis**

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**Background and Goal of Study:** Physicians mainly use their haptic impression when positioning a epidural Tuohy-needle (ETN). “Blind” techniques such as Loss-of-Resistance support the identification of the epidural space (ES). Alternatively, optical fibers are integrated in ETN to either measure forces at boundaries with embedded Fiber Bragg gratings1 or to facilitate optical coherence tomography (OCT) image based differentiation of tissue structures2. In this study, we present a concept to obtain both boundary interactions and tissue structures from a forward facing OCT probe. In addition to image analysis, we propose relative motion estimation based on the OCT phase data.

**Materials and Methods:** We integrate a forward facing optical fiber in an ETN and derive the relative motion in front from OCT phase differences of successively allocated A-scans.3 While performing ex-vivo punctures in a pig cadaver we allocate OCT intensity and phase data, track the needle pose, and measure forces at the ETN-shaft (Fig. 1, left). In addition, the physician reports his haptic impression.

**Results and Discussion:** The intensity data (gray), estimated relative motion (red), and measured force in ETN direction (blue) for one of 12 punctures are compared exemplary (Fig. 1). Comparing the force and relative motion estimates it is obvious that both indicate the boundaries B, C, E, and F. While the external forces are also reflecting friction the relative motion is much more sensitive to the actual boundary penetration. Small ruptures of structures inside the ligamentum flavum and when entering the ES are more clearly visible in the relative motion signal. Using the relative motion, we are able to detect the tissue deformations and ruptures at boundaries. Furthermore, negative forces due to re-orientations lead to negative relative motion estimations.

**Conclusion:** Relative motion estimated from within an ETN tip allows detecting tissue boundaries. Using the gray values and the motion estimates may further the precision of ETN navigation.

**References:**

5352

**Comparison between intrathecal morphine and Quadratus Lumborum block for postoperative analgesia in cesarean sections**

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**Background and Goal of Study:** Cesarean section is one of the most commonly performed surgical procedures in the world, and has great potential for postoperative pain, especially in the first 24 hours. Severe pain in the early postoperative period is still the subject of a relatively recent study, with variable incidence depending on the study, from 1% to 18%. Over the past decade, new adjuvant forms of postoperative analgesia have become more popular, such as regional blocks, for instance the Transverse Abdominal Plane Block (TAP) and the Quadratus Lumborum Block (QL) having as benefits the prolonged analgesia they provide and the low incidence of side effects. Our goal is to test QL block may offer postoperative analgesia equivalent to intrathecal morphine, with lower incidence of side effects.

**Materials and Methods:** Randomized, prospective, clinical, analytical study with blinded distribution for evaluators. It includes 75 patients scheduled for cesarean section under spinal anaesthesia to be divided into 3 groups. The first group receives spinal anaesthesia with intrathecal morphine, the second group receives morphine-free spinal anaesthesia plus quadratus lumborum block, and the third group receives spinal anaesthesia with intrathecal morphine plus quadratus lumborum block. The primary variable to be evaluated will be pain, through the numerical pain scale, and opioid consumption in the first 24 hours of the postoperative period.

**Results and Discussion:** To date, 43 patients have been included in the study. Partial analysis of the data shows that there was no statistical difference between anthropometric data, morphine consumption and pain scores in the first 24 hours. There was a statistical difference in higher urinary retention in the intrathecal morphine group. There was no difference between the groups in the incidence of chronic pain.
The efficacy of Spinal anesthesia versus combined spinal-epidural anesthesia in vaginal hysterectomy surgeries

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Background and Goal of Study: The use of neuraxial anesthesia methods in transvaginal hysterectomy surgeries has several advantages thanks to reliable protection against surgical stress with minimal systemic impact on the body [1]. The goal of this study is to compare Spinal anesthesia and combined spinal-epidural anesthesia for vaginal hysterectomy surgeries in terms of anesthesia, hemodynamic stability and postoperative analgesia.

Materials and Methods: 40 female patients were examined in the gynecology department of the «Lviv emergency hospital» who underwent a planned transvaginal hysterectomy for incomplete uterine prolapse of IInd and IIIrd degrees. Group 1 (n = 20) included patients who received a combined spinal-epidural anesthesia (CSE); the 2nd group (n = 22) received a classical spinal anesthesia. Cardiac output (CO) and cardiac index (CI) were monitored using an esCCO module (Life Scope Monitor, Nihon Kohden, Japan). In addition, blood pressure (BP), mean arterial pressure (MAP) and heart rate (HR) were measured. The postoperative pain intensity was evaluated using the VAS-scale.

Results and Discussion: In contrast to group 1, we observed a significant decrease in CO and CI after 30 minutes as well as a decreased MAP - after 60 minutes from the onset of anesthesia in group 2. A tendency towards hypotension and bradycardia was observed until the end of surgery in both groups. The total volume of infusion for the prevention of hypotension in group 1 was 1543.75 ± 55.45 ml, which equaled 21.36 ± 1.12 ml / kg body weight; in group 2, 1835.0 ± 70.7 ml, ie 26.17 ± 1.51 ml / kg (p = 0.006), the difference was 18.4%. Immediately postoperatively, the pain level of the second group exceeded with a VAS 4 the one of the first group (VAS 2) by more than 2 points on the VAS-scale. This difference remained similar till 4 hours postoperatively.

Conclusion: The CSE group needed smaller volumes of infusion, indicating a decrease in CO and CI after 30 minutes as well as a decreased MAP - after 60 minutes from the onset of anesthesia in group 2. A tendency towards hypotension and bradycardia was observed until the end of surgery in both groups. The total volume of infusion for the prevention of hypotension in group 1 was 1543.75 ± 55.45 ml, which equaled 21.36 ± 1.12 ml / kg body weight; in group 2, 1835.0 ± 70.7 ml, ie 26.17 ± 1.51 ml / kg (p = 0.006), the difference was 18.4%. Immediately postoperatively, the pain level of the second group exceeded with a VAS 4 the one of the first group (VAS 2) by more than 2 points on the VAS-scale. This difference remained similar till 4 hours postoperatively.

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Conclusion: We recommend USG should be the gold standard to identify IS level for epidural. However, in the absence of USG, we suggest that palpating T-line in lateral position is superior to sitting position for identification of IS level.

Neostigmine-Atropine for Postdural Puncture Headache

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Background: Postdural puncture headache (PDPH) is not a rare complication of spinal anesthesia. The management of PDPH can be conservative, pharmacological or even more invasive with epidural blood patch. A recent study indicated neostigmine-atropine as the addition of conservative treatment is effective to reduce the severity of PDPH. However, gastrointestinal (GI) side effects of this management could be quite bothersome.

Case Report: A healthy parturient (165cm,75kg) encountered PDPH after Fifty-nine adult patients were randomized to receive intravenously administered. All patients received standard spinal anaesthesia with room temperature solutions infusion, in terms of maintenance of core temperature and to reduce significantly the incidence and severity of post-spinal shivering, we recorded lower values in group S versus control, the difference between groups being statistically significant (p<0,001) in both situations.

Conclusion: Intravenous infusion of warm crystalloids succeeded to maintain core temperature and to reduce significantly the incidence and severity of post-spinal shivering in old surgical patients and could be used in the multimodal strategy for preventing hypothermia and post-spinal anesthesia shivering.

Liposomal bupivacaine plus bupivacaine for interscalene brachial plexus block decreases opioid consumption for up to two weeks compared to bupivacaine alone in patients undergoing total shoulder arthroplasty

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Background and Goal of Study: In the United States, the FDA approved liposomal bupivacaine (Exparel) for interscalene nerve blocks in 2018.1,2 Although it is considerably more expensive than plain bupivacaine, its main purported advantage is its extended duration, which might allow for sustained pain control and early discharge without using a perineural catheter.3 We examined whether Exparel reduces opioid consumption and pain in adult patients undergoing primary total shoulder arthroplasty surgery.

Materials and Methods: Fifty-nine adult patients were randomized to receive either 20mL of bupivacaine 5mg/mL (CTL; n = 30) or 10mL of bupivacaine 5mg/mL plus liposomal bupivacaine 133mg (EXP; n = 29) for an interscalene nerve block. All patients received IV sedation in addition to the regional anesthetic. The primary outcome was opioid consumption, measured in MME (Morphine Milligram Equivalents), from 24 to 96 hours post operatively. The secondary outcomes were cumulative opioid consumption on post-operative day 7, 14 and 30, pain scores using PROMIS Pain Intensity Scale, and length of stay.

Results and Discussion: Opioid consumption was significantly lower in the EXP group compared to CTL 24 to 96 hours post-surgery (28.79 ± 34.30 vs. 65.06 ± 33.71 MME; p < 0.001), during the first week after surgery. (45.99 ± 57.05 vs. 95.35 ± 97.96 MME; p < 0.001), and during the second post-operative week (7.59 ± 23.70 vs. 20.50 ± 35.38 MME; p = 0.01), but not during the third or fourth weeks. Additionally, patients in the EXP group reported significantly less pain intensity one week after surgery when compared to CTL (45.90 ± 38.95 vs. 52.40 ± 6.60; p = 0.01) but not thereafter. There was no significant difference in length of stay between groups.

Conclusion: The addition of liposomal bupivacaine for an ISB significantly reduces opioid consumption during the 24-96 hours post-operative period and for up to two weeks after surgery. Additionally, it leads to reduced pain intensity during the first week after undergoing total shoulder arthroplasty surgery. As the length of stay was unaffected, further studies are needed to determine whether liposomal bupivacaine can replace perineural catheters.

References:
Does perineural dexamethasone reduce rebound pain following interscalene block in patients undergoing arthroscopic shoulder surgery?

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Background and Goal of Study: Rebound pain is a condition characterized by hyperalgesia after the peripheral nerve block wears off, which may reduce or even negate overall benefits of regional anesthesia. It is well known that dexamethasone added to local anesthetic prolongs the duration of a single-shot interscalene block (SSIB). However, whether perineural dexamethasone for the SSIB affects an occurrence of rebound pain is not clear. We aimed to investigate whether the use of low-dose dexamethasone as adjuvant for nerve block reduces rebound pain after arthroscopic shoulder surgery or not.

Materials and Methods: In a double-blinded trial utilizing SSIB, 23 patients who were diagnosed with rotator cuff tear and scheduled for arthroscopic shoulder surgery were randomized to either groups: Total 12 ml of 0.5% ropivacaine mixed with dexamethasone 5mg (DEX group, n=13) or normal saline (Control group, n=10). All patients underwent SSIB and followed by general anesthesia. The primary outcome was the incidence and severity of rebound pain. Rebound pain score (numeric rating scale; 0-10) was calculated as the lowest pain score during the first 12 h before the PNB wears off is subtracted from the highest pain score during the first 12 h after the PNB wears off.

Results and Discussion: Five of 13 patients (38.5%) in Dex group and 8 of 10 patients (80%) in control group had rebound pain with a significant difference (P=0.046) and overall incidence of 56.5%. It is observed 963.0 min (IQR 811.5-2050.5) in DEX group and 695.0 min (IQR 635.5-776.7) in control group after performing SSIB (P=0.006). Of patients experiencing rebound pain, rebound pain score was 8.0 (7.0-9.5) and 8.0 (7.0-8.0) (P=0.622) and its duration was 156.0±53.7 min and 107.5±85.6 min (P=0.284), respectively. The highest pain score after the time to first analgesic request was 4.6±2.33 in DEX group and 6.5±2.79 in control group (P=0.186). Overall, the time to first analgesic request from the time of performing SSIB was prolonged significantly in dexamethasone group 1130.0 min (IQR 842.0-2331.5) compared with control group 895.0 min (IQR 625.0-795.0) (P=0.004).

Conclusion: Perineural dexamethasone demonstrated significant beneficial effects on the incidence of rebound pain as well as duration to the first analgesic request after SSIB for arthroscopic shoulder surgery.
Comparison of continuous infusion and intermediate bolus applications in patient controlled epidural analgesia

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Background and Goal of Study: Postoperative pain control is important for patient comfort, wound healing and awareness of surgical complications. During this stage, many combinations of drugs in different ways are used for therapeutic purposes. Epidural space has an important role in reducing the dose of drug used and allowing for much more effective analgesia. In this study, we aimed to compare the efficacy of two different methods (continuous infusion + intermittent bolus vs high volume intermittent bolus) for postoperative epidural analgesia.

Materials and Methods: After the approval of University Research and Ethics Committees, records of patients who underwent elective orthopedic surgery under combined spinal-epidural anesthesia in Baskent University Ankara Hospital between January 2017 - November 2018, were reviewed from patient files and electronic medical record system and patient controlled analgesia forms of patients retrospectively. Patients were divided into two groups as continuous infusion + intermittent bolus (Group 1) or high volume intermittent bolus (Group 2). Between two groups, patient pain scores, drug doses, and side effects were compared. Student’s t-test was used to compare parametric values, and Pearson’s chi-square test was used to compare quantitative data. P <0.05 was considered statistically significant.

Results and Discussion: The groups were similar in terms of age, ASA scores, and surgical type (p > 0.05), while the number of female patients were slightly higher in the infusion + bolus group (p = 0.041). The groups were similar in terms of nausea-vomiting, pruritus, hypotension and urinary retention. Ramsay sedation scale scores did not differ. Postoperative Bromage scores were lower in the bolus group at the 6th hour but were similar in the following hours. Pain scores of the patients in the first 48 hours were similar in all visits except for the 24-hour visit (significantly lower in infusion + bolus group, p <0.05), while the drug doses was significantly lower in the bolus group only.

Conclusion: When patient controlled analgesia is provided by postoperative epidural anesthesia, similar analgesic effect can be achieved by using less medication by giving only bolus at higher volume instead of infusion and bolus coexistence.

Further prospective studies will be needed to draw definitive conclusions.

Materials and Methods: After approval of the Animal Research Committee of the hospital, 8 mini pigs were studied. After the anesthesia and instrumentalization, Femoral vessels were canalized for invasive monitoring, analytical blood gas monitoring and recorded in a polygraph. After a period of stabilization, a bilateral serratus-intercostal fascial block (SIFB) was realized, with a real-time and in plane needle insertion technique using an electronic medical record system and patient controlled analgesia forms of patients.

Background: Breast surgery is one of the most common surgical procedures. The serratus-intercostal fascial block (SIFB) is an alternative to paravertebral block. This block requires no local anesthetic (LA), however, decreases the risk of other complications associated with LA administration.

Materials and Methods: We used a modified transverse aortic constriction (mTAC) model as an LVH model. Cardiac toxicity caused by bupivacaine infusion was compared between sham and mTAC rats, and the underlying mechanisms were investigated by recording Na+ channel currents (INa) using patch clamp recordings and immunocytochemistry of TRPC protein in cardiomyocytes.

Results and Discussion: The time to cardiac arrest by bupivacaine was shorter in mTAC rats than in sham rats (mean ± SD, 1302 ± 324 vs. 1034 ± 211 s, P = 0.0303) regardless of its lower plasma concentration. The maximal inhibitory concentration of bupivacaine toward INa was 4.5 and 4.3 μM, which decreased to 3.9 and 2.6 μM in sham and mTAC rats, respectively, upon co-application of 1-oleoyl-2-acetyl-sn-glycerol (OAG), a TRPC3 activator. In both groups, INa were unaffected by a membrane-impermeable, positive charged lidocaine derivative (QX-314), but was significantly decreased with QX-314 and OAG co-application ( sham: 78.6 ± 9.9 % of control, P = 0.0038, mTAC: 48.9 ± 27.3 % of control, P = 0.0202). Effects of OAG were antagonized by pyrazole compound 3, a specific TRPC3 channel inhibitor. TRPC3 expression on the plasma membrane was more dominant in mTAC rats than sham rats.

Conclusion: LVH rats were more vulnerable to bupivacaine, which was partly attributable to the “pore phenomenon” of TRPC3 channels upregulated in LVH.
at a variety of time intervals up to 30 minutes. Statistical: area under the curve (AUC) for the first 10 minutes (AUC-10) or the 30 minutes (AUC-30). Blood samples were taken for R determinations.

Results: R affected several parameters: PR interval by 17% (P=0.0001), HV by 56% (P=0.001), sinus QRS duration by 56% (P=0.0001), paced QRS at 150 bpm by 25% (P=0.0001), and at 120 ms by 143% (P=0.0001). The AUC-10 of the sinus rhythm QRS duration was significantly different among the 3 groups (P=0.003). The B group underwent a faster recovery than the C group (AUC-10: P=0.001) and with the LE group (AUC-10: P=0.015). During the first minute, 87% of the B group vs 25% in the LE or 0% of the C group had recovered more than 30% of the sinus rhythm QRS duration (P=0.001). In contrast, the trend towards a faster recovery in the LE vs the C group did not reach significance (AUC-10: P=0.16) There were not different effects in any groups on the recovery of paced QRS duration at 150 bpm and at 120 bpm.

Conclusions: In a closed-chest swine model, B was an effective treatment for the EP alterations due to established R toxicity. Restoration of most EP variables was faster in the B-group than in the C-group. B ameliorated R electrocardiographic toxicity faster than LE. Use-dependent effects of R as disclosed by ventricular pacing were prominent, however, no differences in its recovery were observed among groups.

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Does intraoperative administration of bupivacaine with adrenaline into the epidural space during major oncological surgery lead to more frequent incidence of circulatory insufficiency requiring noradrenaline infusion?

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Background and goal of study: Epidural analgesia is routinely used in our institution to enhance both intra- and postoperative pain treatment during major oncological surgery. The goal of study was to investigate whether the intraoperative administration of 0.5% bupivacaine with adrenaline to epidural space relates to more frequent events of hypotension requiring noradrenaline infusion as compared with a different approach when the epidural drugs were administered only after the completion of surgery.

Materials and Methods: We conducted a retrospective analysis of 73 patients (27 women, 46 men, age 22-83; mean age 57 years; 63 ASA 2, 10 ASA 3) who underwent major oncological surgery between 1st March and 31st August 2019. During each operation anaesthesiological procedures included both general anaesthesia and epidural analgesia. 36 patients (49.3 %, group A) were given bupivacaine with adrenaline intraoperatively, 37 patients (50.7%, group B) received only test dose. During postoperative care all patients (excluding patients who required noradrenaline infusion) received continuous epidural analgesic solution infusion (bupivacaine 1 mg/ml, fentanyl 2 mcg/ml with adrenaline 2 mcg/ml) titrated to reach adequate analgesia.

Results and Discussion: Hypotension requiring noradrenaline administration occurred in 14 patients (19,2%). Among 4 patients from group A (11,1%) it was necessary to begin the noradrenaline infusion less than 30 minutes after bupivacaine with adrenaline injection. Ten patients required noradrenaline administration just after the induction of general anesthesia: 8 from group B (21,6%) and 2 patients from group A (5,6%). Two patients from group A received bolus of bupivacaine with adrenaline regardless of simultaneous noradrenaline infusion. Clinical problems of oncological surgery patients are multifaceted and it would be essential to consider them in further study regarding the topic.

References:

6156

Claviceptoral fascia block: a true alternative

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Background: The most common technique used in clavicular fractures is the general anesthesia, with or without a plexus block(1,2). The clavicular fascia block is located under the clavicular head of the pectoralis major muscle, which occupies the space between the pectoralis minor muscle and the subclavian muscle, to shield the axillary vein, artery and nerve(2,3). This is an unprecedented block, in which the dispersion of the local anesthetic reaches the clavicular periosteum to anesthetize the structures that are responsible for its enervation. This block provides an adequate anesthesia for clavicular surgeries and avoids the complications associated with other regional techniques(3).

Case Report: Male, 52 years old, history of arterial hypertension, smoking habits with COPD moderate/severe and obesity, proposed for osteosynthesis of a clavicular fracture, under regional anesthesia with a mild sedation. The fascia block was performed perpendicularly to the clavicular plan. A quick scan was made to localize the fracture. An 80nm needle was placed in plane, first internally to the clavicular fracture and then externally. Local anesthetic was injected between the clavicular periosteum and the clavicular fascia, with an acute angle to facilitate the opening of the plan. The patient remained hemodynamically stable, without any anesthetic intercurrence. He remained painless until the night of the surgery, when 1g of paracetamol was administered.

Discussion: With this case report, we want to emphasize the claviceptoral fascia block as a true alternative to general anesthesia with plexus block, for patients undergoing clavicular surgery(3). This block allows a better post-operative pain management and a faster rehabilitation, since it’s not associated with motor blockade. The respiratory complications associated with phrenic nerve block, a common consequence of the interscalene block, are also avoided.

References:

Learning points: This block allowed an adequate alternative to clavicular surgeries without the complications of a general anesthesia and interscalene block.

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Anesthetic management of a pregnant woman undergoing exploratory laparotomy surgery — a case report

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Background: Non-obstetric surgery during pregnancy posts additional concerns to anaesthesiologists. The main goals are to preserve maternal safety and achieve the best possible fetal outcome. 1Regional anaesthesia is usually preferred in pregnancy when it is practical for the medical and surgical condition. 2A multidisciplinary approach is recommended to ensure an adequate standard of care.

Case Report: We report a case of a 24 –year-old pregnant woman with 105 Kg, who presented with progressive abdominal pain at 15 weeks and 5 days gestational age. Nuclear magnetic resonance showed an abdominal mass with 16 cm from the uterus to the mesenteric root. She was schedule for an exploratory laparotomy and a loco- regional anesthesia was planned. Lumbar subarachnoid block (SAB) followed by epidural catheter placement were performed. A mixture of 11mg of hyperbaric bupivacaine and 2 mcg of sufentanil was used for SAB, and bolus of 0.375% ropivacaine were administered to extend the duration of neuraxial block. Besides antibiotic prophylaxis and occasional phenyleprine bolus no other drugs were used. Complete surgical excision of a 20x17x12 cm size tumor (desmoid type fibromatosis tumor) with a xifo-pubic incision was successfully done. She remained hemodynamically stable during the 4 hours of surgery. Fetal vitality assessment was performed and fetus showed no signs of distress. The postoperative period was uneventful, and she was discharged 6 days after surgery.

Discussion: When a pregnant patient requires abdominal surgery, the major issues are the optimal perioperative management and the best anesthetic/ surgical approach. Our case presents to demonstrate a rare surgical condition in a pregnant woman performed under neuraxial anesthesia and successfully managed for both the mother and the fetus, without conversion to general anesthesia.

References:

Learning points: The choice of anaesthetic technique and the selection of appropriate anaesthetic drugs should be guided by indication for surgery, and site of the surgical procedure. Anaesthesia management should be well planned to preserve the pregnancy and to ensure the safety of the mother as well as the fetus.
Effective Spinal Erector Plane Block at the Level of T5 for Lower Abdominal Surgery – A Case Report

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Background: Spinal erector plane block (ESPB) has been used for analgesia in a growing number of thoracic and lumbar surgical procedures. However, there are few reports of abdominal surgeries, with considerably variable levels of anesthetic dispersion. We report a case of ESPB at the level of T5 for postoperative analgesia to a percutaneous nephrostomy.

Case Report: A 54-year-old male, with a past medical history of myelomeningocele and neurogenic bladder, was admitted to nephrectomy due to complicated pyelonephritis. Venous accesses were secured, followed by intravenous anesthetic induction with propofol, fentanyl, and atracurium. Ultrasound-guided ESPB was performed. A solution with 18ml of Ropivacaine 0.375% was administered through a 16G Tuohy needle at the level of T5, bilaterally. Next, both puncture sites were catheterized and successfully tested for local anesthetic dispersion. General anesthesia was maintained with 0.5 MAC of sevoflurane during 8 hours of surgery, which ended up being converted to bilateral nephrostomy. No additional local or venous anesthetics were required. The procedure was concluded without complications and the patient was extubated in the operating room. At PO1 the patient was asymptomatic, allowing both catheters to be removed.

Discussion: The literature on ESPB analgesia for abdominal surgeries is limited, however, an RCT of ESPB at L1 level in a pediatric population demonstrated effective lower abdominal analgesia. In a series of 11 cases of patients undergoing different abdominal surgeries, Navarro et al described that ESPB between T7-T9 levels enabled 99 patients to maintain minimum postoperative pain. A solution of Bupivacaine 0.5% and Ropivacaine 0.16% achieved analgesia extending up to 48 hours when a catheter was inserted. Thus, ESPB may be a viable anesthetic alternative for lower abdominal surgeries in patients where neuraxial analgesia is potentially unsafe.

Learning points:

Anaesthetic approach to a patient with McArdle syndrome — a rare metabolic disease

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Background: McArdle disease or glycogen storage disease type V is a rare metabolic myopathy (1:100,000) characterized by glycogen deficiency in skeletal muscles. This disease has the potential for creating perioperative anaesthetic challenges, such as hypoglycaemia, rhabdomyolysis, myoglobinuria, acute renal failure and malignant hyperthermia. This is a case report about a patient with McArdle disease and his anaesthetic management.

Case Report: A 63-year-old male, ASA II, BMI 30, with hypertension and diagnosed in 2017 with McArdle disease submitted to an umbilical herna repair. The patient described severe muscular pain and lack of strength during light exercise preventing an accurate evaluation of functional capacity. Patient had a Mallampati IV, chronic hoarseness and no neurological or kidney damage. We performed spinal anaesthesia with a 27G needle, 2.5 mcg sufentanil and 12.5 mcg levobupivacaine. Active heating was maintained during the surgery and in the recovery room. The motor block was completely reversed after 4 hours with no alterations in muscle strength. Myoglobin and CK testing in the postoperatively were similar to the preoperative period. ICU care was considered although this wasn’t necessary as no complications were recorded perioperatively.

Discussion: Patients with McArdle disease are rare and rise several anaesthetic concerns. Using regional techniques, we avoid complications such as malignant hyperthermia, metabolic alterations and hypermetabolism. In addition, it allows the patient to adapt his positioning decreasing the risk of rhabdomyolysis. We should avoid shivering in these patients since muscle damage and increase in oxygen consumption can lead to important metabolic changes. Monitoring temperature and active patient warming during the surgery are also important measures.

References:

Distal sciatic combined with saphenous nerve block in a high risk patient with lower limb ischemia.

A case report

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Background: Patients with vascular disease pose a challenge for the anaesthesiologist regardless of the type of intervention. Lower limb ischemia is a common presentation for vascular surgery. We report the case of an ASA V class patient undergoing emergent transmetatarsal amputation to highlight the potential benefits of peripheral nerve block (PNB) use.

Case Report: A 72 year old male presented in the emergency department with lower limb ischemia and indication for transmetatarsal amputation. The patient reported limited physical activity NYHA III for the past year, he was a heavy smoker and his medical history was significant for kidney failure under hemodialysis, untreated chronic obstructive pulmonary disease, hypertension and dilated cardiomyopathy. He had a permanent pacemaker and a recent echocardiography described an EF 30% and mitral valve regurgitation. Furthermore, the patient was under therapeutic dose of Low Molecular Weight Heparin. Taking all these into consideration, we decided to perform a PNB. Because of extensive foot infection an ankle block was not feasible. After informed consent of the patient, a distal sciatic combined with a saphenous nerve block was implemented with success. Under ultrasound guidance, 15ml of Ropivacaine 0.5% were injected just before the bifurcation of the sciatic nerve and 10ml Ropivacaine 0.5% in the adductor canal to target the saphenous nerves. The patient recovered uneventfully and no postoperative complications occurred.

Discussion: PNBs offer high risk patients fast track anesthesia and should be preferred for transmetatarsal surgery. However, performance on anticoagulated patients should be individualized. The increasing use of ultrasound improves block safety and effectiveness. We also consider choosing distal blocks may provide another safety point in this group of patients.

References:

Learning points: The combination of distal sciatic and saphenous nerve block can offer fast track anesthesia, increased patient satisfaction and cost limitation for patients undergoing metatarsal amputation and should thus be considered as a viable option in anticoagulated patients.
Ultrasound-guided combined interscalene-cervical plexus block with low volume for clavicle surgery analgesia – safe and opioid sparing technique

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Background: Although peripheral nerve blocks are commonly used for a wide variety of surgical procedures on the upper extremity, there are few reports regarding regional anaesthesia for surgery of the clavicle. The sensory innervation of the clavicle has been attributed to either the cervical or brachial plexus. We report the anaesthetic management of a case involving a clavicle surgery performed under ultrasound-guided superficial cervical plexus block (SCB) combined with an interscalene block (ISB), along with general anaesthesia.

Case Report: A 55 years-old male, ASA III, required a surgery repair of an acromioclavicular joint dislocation. The patient had heart failure (NYHA II), ischemic cardiomyopathy with history of acute myocardial infarction, dyslipidaemia, smoking and obesity. Considering his comorbidities, we opted for a combined regional and general anaesthesia. After adequate sedation, an ultrasound guided ISB was performed, the approach was within-plane technique targeting the upper trunk, roots C5 and C6, with an injection of 8 mL of ropivacaine 0.375%. Then, with the same needle puncture, the SCB was performed with 2 mL of ropivacaine 0.375%.

General anaesthesia was administered and intraoperative analgesia included only paracetamol 1 g. The surgery lasted for approximately 70 min. Surgery and anaesthesia were uneventful. In the Post-Anaesthesia Care Unit, the patient had no pain and therefore no other analgesia was required. In the postoperative period, up till hospital discharge (24 hour after), the patient had no pain at rest or movement with paracetamol 1 g 8-hourly, no motor, or sensitive blocks nor neurological complaints.

Discussion: Low volume and low local anaesthetic concentration ultrasound-guided upper trunk ISB and SCB provided effective analgesia in both intraoperative and postoperative periods with no side effects or complications. This method reduced the need for perioperative opioid analgesia without compromising the patient’s comfort.


Learning points: Combined ultrasound-guided superficial cervical plexus block and interscalene block (C5 and C6 roots) was a successful anaesthetic technique for surgery of the clavicle. This method had no reported complications, with no need for rescue analgesia, allowing the reduction of opioid consumption.

Opioid sparing anesthesia associated with continuous Quadratus Lomborum Block as an alternative to neuroaxial blockade for abdominal surgery

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Background: Neuroaxial anesthesia is still the gold standard technique for transurethral resection. However, when a change during surgery is needed and the surgical time may increase, it may not be enough. In urological procedures requiring open abdominal surgery, robotic or videolaparoscopic resections, interfacial blocks are an adequate alternative due to its visceral and somatic analgesia.

Case Report: A 69-year-old male patient (60Kg, 1,65m), presenting a bladder cancer, underwent a radical prostatectomy. The patient presented a past medical history included gastric cancer operated in 2016 and traumatic leg amputation. After standard monitoring, spinal anesthesia was performed with 12mg of hyperbaric bupivacaine 0.5% by 25G Quinck needle. Sedation was made with 2mg midazolam and 40µg of fentanyl IV. It was necessary to convert the surgical procedure due to a bladder lesion. Facing a possibility of a long surgical time, we decided to convert our technique to general anesthesia. Induction was made with 60mg lidocaine, 150 µg fentanyl, 70mg propofol, 70mg rocuronium and subsequent endotracheal intubation. At the end of the procedure, Quadratus lomborum block type 3 (QL3) was performed, bilaterally, guided by US with linear transducer, 22G Quinck needle and patient in lateral decubitus position. After hydrodissection with 10mL saline 0,9%, 20mL 0,25% bupivacaine with 4mg Dexamethasone were injected each side. Surgical time was 240 minutes, 90 min under neuro-axial anesthesia and 150min under general. Patient was removed to the ICU. Numerical Rating Scale (0-10) was used to evaluate pain. NRS were 2, 0 and 0, in the immediate post-op, 12h and 24h after, respectively. After 24h, patient walked and was discharged to ward with good pain control and no rescue opioid needed.

Discussion: Interficial blocks have been gaining space as an anaesthetic technique, both as a tool of sparing opioids, and as an effective postoperative analgesia. Firstly described in 2007, QL can be divided into 4 different techniques currently. QL3 was chosen due its visceral and somatic analgesia.


Learning points: Cotinuous Quadratus Lomborum Block as an opioid sparing anaesthetic technique alternative to neuroaxial analgesia.

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Discussion: QL has an important role and has since been frequently used in multimodal anesthesia in abdominal procedures. QL block can be divided into 4 different techniques and there is no superiority between then in the literature. Catheter insertion enables effective postoperative pain control. The association between this regional anesthesia technique and opioid sparing in a multimodal approach has demonstrate benefits in abdominal surgeries.

Unilateral erector spinae plane block combined with multimodal analgesia for treatment of chronic pain after open inguinal hernia repair: a case report

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Background: The erector spinae plane block (ESPB) is interfascial plane block which is successfully used for treatment of acute and chronic neuropathic pain in thoracoabdominal region. Chronic pain after inguinal hernia repair surgery is major clinical problem and can influence in patients’ quality of life. The rate of chronic pain in this type of surgery is 51.6% of the cases.

Case Report: We report one case of single-shot unilateral ESPB for management of chronic pain after open inguinal hernia repair surgery. A 68-year old male patient (weight 76 kg, height 167 cm) was admitted to the Post Anesthesia Care Unit (PACU). His comorbidities included hypertension which was well treated with enalapril, and insulin-dependent diabetes mellitus. In past three years he had three open right-sided inguinal hernia repair. One year ago pain was treated with right-sided transversus abdominis plane block (TAPB), which was ineffective. In past two years he received analgesic drugs every day (Doretia, Tramadol, Ketoprofen and Paracetamol) and all the time pain on numeric rating scale (NRS) was ranged from 8 to 10. After giving premedication with midazolam (2 mg intravenously), we gave dexamethasone 0.1 mg/kg i.v. and performed ultrasound guided right-sided ESPB with 20 ml 0.5% bupivacaine at level of T11. After the block, we gave i.v. continuous infusion of lidocaine 2 mg/kg, magnesium sulfate 40 mg/kg and ketamine 0.2 mg/kg for one hour. After 2 hours patient was discharge home and the pain score from 8-10 fell to 2-3 on NRS. Follow check up after three and six months showed no persistence of the pain and pain score of 2-3 on NRS.

Discussion: Erector spinae plane block can be successfully used in treatment of chronic neuropathic pain after an open one-sided inguinal hernia repair. Also, multimodal treatment of giving single dose of dexamethasone, lidocaine, magnesium sulfate and ketamine has been shown effective in treatment of chronic pain.

References:

Learning points: Chronic neuropathic pain after open inguinal hernia repair, which lasted for three years can be successfully treated with ESPB in a combination with single dose of dexamethasone, lidocaine, magnesium sulfate and ketamine.

Atypical complicated post-dural headache syndrome

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Background: Post-dural headache (PDH) is a possible complication after spinal anesthesia with a typical clinical syndrome. Its diagnosis is commonly based on the clinical findings after a neuroaxial anesthesia technique. Although considered benign and self-limited, it can be very life limiting, prolonged and followed by serious complications.

Case Report: 85-year-old man with clinical history of ocular myasthenia well treated and controlled who underwent an inguinal hernia repair on an outpatient basis. Anesthesia was accomplished with a subarachnoid puncture administering 10 mg of hyperbaric bupivacaine and 10 micrograms of fentanyl. Puncture and procedure was uneventful and the patient was discharged 6 hours later with no complications (Aldrete 10 points, Bromage I). 21 days after, the patient was referred to our unit for evaluation because of persistent headache. The headache appeared 21 days after discharge. It was bilateral and front-occipital. Worsening along the day, with supine position and with efforts. There was also, occasional night wake up because of cephalalgia. There was no past medical history of cephalalgia. Neurological exploration only evidenced mild walking instability. No other general exploration abnormalities or lab test were found. With no clear diagnosis, the patient was given a symptomatic treatment and transferred to neurologic unit for further investigation. The magnetic resonance imaging (MRI) showed signs of intracranial hypertension syndrome and a laminar chronic subdural hematoma. Symptomatic treatment failed and a blood epidural patch was performed with success. Three months later, the patient was asymptomatic and no pathological signs were found on the control MRI.

Discussion: PDH syndrome is a commonly easy diagnosis based on its clinical presentation after central neuroaxial anesthesia techniques. The main symptom is headache with decubitus position improvement. Many other companion symptoms can also appear. No clinical past cephalalgia is suggestive and an uneventful technique cannot discard it. Atypical presentations can occur, especially if followed by related complications. This diagnosis must be strongly considered and investigated in the presence of cephalalgia after spinal anesthesia. MRI can be helpful in no clear cases for differential diagnosis purposes. It can also discard other complications

Learning points: Atypical headache doesn’t discard PDH syndrome. MRI imaging can help in its diagnosis.

why did it turn out yellow? - incidental finding of xanthochromic cerebral spinal fluid during spinal anesthesia

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Background: Spinal anesthesia provides excellent operating conditions for surgery below the umbilicus. Usually, after placing our spinal needle in the desired interspace and reaching the subarachnoid space, a flow of clear-transparent Cerebral Spinal Fluid (CSF) is usually observed. Xanthochromia is caused by pigment in CSF and it is classically associated with subarachnoid haemorrhage.

Case Report: A 59-year-old woman, victim of a run over accident, presented with fracture of the tibia and minor cranial subarachnoid haemorrhage and was proposed for intramedullary nailing of the tibia. All routine investigations were within normal limits. Spinal anesthesia was the chosen anesthetic plan. After spinal tap and stylet removed, we observed a clear light-yellow CSF flow and chose not to inject the local anesthetic, converting into general anesthesia. Both intra and postoperative periods occurred without incidents and the patient never developed any neurological nor meningeal signs.

Discussion: Xanthochromia is classically associated with subarachnoid haemorrhage within 12 hours and it was the probable cause in this case. Following haemorrhage into the CSF, red blood cells undergo lysis and phagocytosis; the liberated oxyhaemoglobin is converted in bilirubin. Bilirubin may be detected in CSF by spectrophotometry or by visual inspection for the yellow discoloration of CSF. Other causes include a blood traumatic tap, jaundice, high CSF protein concentration. In case of detecting abnormal CSF appearance in the course of lumbar puncture done for spinal anesthesia, CSF samples should be sent to biochemistry and microbiology laboratories. However, no samples were collected at the time.

References:

Learning points: In a trauma patient, even with minor subarachnoid haemorrhage, xanthochromia can be found during spinal anesthesia without the development of neurological signs.

Perioperative management os an acute ischemia in pluripatological patient with multiple medication allergy

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Background: Decide the type of anesthesia in acute ischemia in a pluripathological patient, performing ilioinguinal block.

Case Report: A 86-year-old woman is allergic to NSAIDs, penicillin, aminoglycosides, AAS, pyrazolones, acetaminophen and omeprazole with a history of obesity, AHT, angina pectoris. The patient goes to the emergency department with coldness and pain in the lower leg being diagnosed with acute ischemia there. This situation was evaluated by vascular surgery, and an urgent surgical intervention is decided to perform a right iliofemoralpopliteal embolectomy.

Discussion: Different options for anesthetic management are presented to us in the preoperative period. The drug allergies described to analgesics could be a learning point to establish a correct plan of postoperative care, the global respiratory
failure complicates the use of general anesthesia, at last, the anticoagulation of patient contraindicates the intradural puncture as a method of loco-regional anesthesia. It was discussed and we decided to perform the surgical intervention by doing an ultrasound-guided ilioinguinal block 0.25% levobupivacaine, and sedation with midazolam and infiltration with local anesthesia. During the intervention, the patient was monitored according to the recommendations of the SEDAR, awake, spontaneous breathing, and stable clinically and hemodynamically without presenting pain during the entire surgical intervention. During her stay in the post-anesthetic recovery unit, the patient continued at almost asymptomatic at all times, showing no pain although slight discomfort, which implied the need for tramadol boluses (drug allowed according to the Allergology Service report).

**Learning points:** The use of loco-regional anesthesia in situations that the patient’s personal history contraindicates different managements, is shown as a preferred option, minimizing risks when use ultrasound as a guide. The clinical outcome presented by the patient was optimal, during the surgical intervention and the postoperative period. All of these could make us consider this type of loco-regional technique as a valid and useful alternative when the characteristics of the patient contraindicate us or difficult the classic methods of perioperative management of patients in emergencies.

**References:**

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**4883**

**Asymptomatic subcutaneous abscess at epidural catheter insertion site - Clinical Report**

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**Background:** Skin and subcutaneous abscess after epidural catheterization are extremely rare events(1). The length of epidural analgesia may increase the risk for local infection(2).

**Case Report:** A 29-year-old female presented with fractures of the left 4th-12th ribs, left hemopneumothorax and left pulmonary contusion following high kinematics trauma. On arrival at the local hospital, an epidural catheter was placed in T5-T6 for thoracic wall analgesia. The patient was transferred to our hospital four days after the trauma and in the 6th day following epidural catheter placement was referred to the Acute Pain team due to analgesia inefficacy. After attempting to optimize analgesia without success, it was decided to perform a new epidural block. While removing the catheter, a subcutaneous abscess was detected in the puncture site. No symptoms or neurological deficits were identified and the abscess was promptly drained. The following day MRI revealed subcutaneous inflammation at the level of T5-T6 with left paravertebral spreading without neuroaxial spread. There was suspicion for concomitant respiratory infection and intravenous antibiotics, which covered the bacteria identified on the swab collected from the abscess, were prescribed. With informed consent, a continuous left BRILMA (Block of the branches which covered the bacteria identified on the swab collected from the abscess) were prescribed. With informed consent, a continuous left BRILMA (Block of the branches which covered the bacteria identified on the swab collected from the abscess) were prescribed. With informed consent, a continuous left BRILMA (Block of the branches which covered the bacteria identified on the swab collected from the abscess) were prescribed. With informed consent, a continuous left BRILMA (Block of the branches which covered the bacteria identified on the swab collected from the abscess) were prescribed.

**Learning points:** The use of ultrasound as a guide in this case is shown as a preferred option, minimizing risks when use ultrasound as a guide. The clinical outcome presented by the patient was optimal, during the surgical intervention and the postoperative period. All of these could make us consider this type of loco-regional technique as a valid and useful alternative when the characteristics of the patient contraindicate us or difficult the classic methods of perioperative management of patients in emergencies.

**References:**

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**5591**

**Tracheal diverticulum on a patient refusing neuroaxial anaesthesia - An analysis of viable alternatives**

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**Background:** Tracheal diverticulum is often asymptomatic, being usually detected incidentally during thoracic CT. It has been associated with difficulties during intubation or ventilation as the endotracheal tube may enter the false passage of the diverticulum(1,2) and the positive pressure may increase its size. Additionally, one case reported an iatrogenic pneumomediastinum secondary to accidental perforation during intubation(3). We report the case of a patient with a tracheal diverticulum, submitted to bilateral halux arthrodesis, who refused neuraxial anaesthesia.

**Case Report:** A 58 year old female, ASA III, was submitted to bilateral halux arthrodesis. The patient had a history of alpha-1 antitrypsin deficit. Preoperative evaluation was normal, but thoracic CT revealed bilateral emphysema and tracheal diverticulum in the right posterolateral portion of the upper trachea with 16 mm of diameter. The anaesthetic plan was discussed with the patient, who refused neuraxial anaesthesia. Considering the risks of general anaesthesia in that situation, surgery was performed under peripheral nerve blocks. Monitoring was done according to ASA standards. The patient was premedicated with midazolam 2mg and fentanyl 0.05mg. A bilateral ultrasonography-guided sciatic nerve block with botulinum toxin was performed with 10mL of mepivacaine 1.5% and 10mL of ropivacaine 0.75%. A bilateral halux truncular block was performed under anatomic references with 6mL of ropivacaine 0.75%. Surgery progressed uneventfully.

**Discussion:** Tracheal diverticulum can be challenging for anaesthetic management. In this case, regional anaesthesia was considered the best option for the patient, as it avoids the need to instrument the likely difficult airway and possible consequences related to the tracheal diverticulum. As the patient refused neuraxial anaesthesia, peripheral nerve blocks were used as an alternative. These blocks
were also useful as a means for providing a more prolonged postoperative pain relief. Finally, considering the possibility of regional anaesthesia failure, intubation under bronchoscopic surveillance was selected as an alternative plan.

References:
1. DOI: 10.1002/anl.21840.
2. PMID: 7925920.
3. DOI: 10.1111/anea.12193.

Learning points: The case reported is interesting, not only because the challenging anaesthetic management of a tracheal diverticulum but also because of the patient refusal of a considered safer alternative technique.

5169

Make it easy: using Fascia Iliaca Compartment Block in the fascia lata autograft surgery

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Background: The fascia iliaca compartment block provides analgesia for patients undergoing lower limb surgery(1). This provides anesthesia to the femoral nerve, the lateral femoral cutaneous nerve, and in a variable percentage of cases the anterior branch of the obturator nerve(2). We report a rare indication of this peripheral nerve block, as a part of multimodal analgesia in a patient who underwent fascia lata autograft.

Case Report: A 65 years-old male patient with Rheumatic Arthritis and multiple lumbar column surgeries was scheduled for pseudomembranous colitis repair surgery, caused by a postoperative cerebrospinal fluid leak. The patient was subjected to surgical treatment of this complication. In the first instance a ventriculoperitoneal shunt was placed, and then an autograft with fascia lata had to be made to close it. In our experience the patients with fascia lata autograft have a high score at the visual analogue scale (VAS) in the postoperative period. For this reason, we tried to decrease the postoperative pain. Since the incision was made on the lateral face of the thigh, as in hip surgery, we made a multimodal analgesic plan combining general anaesthesia with ultrasound-guided fascia iliaca compartment block. In the postoperative period the patient had a low score at the VAS.

Discussion: Many reviews discuss about fascia iliaca block effectiveness focusing on the hip and knee surgery(1). However, there are not many papers that describe other indications. Our case report presents how this block could be useful for pain control during and after graft extraction.

References:

6016

Melkersson Rosenthal Syndrome: an unknown potential anaesthetic challenge

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Background: Melkersson-Rosenthal Syndrome (MRS) is a rare disorder, whose manifestations, namely angioedema can compromise the airway, thus being a problem for Anaesthesiologist(1). We report the successful case of a patient submitted to surgical correction of hallux valgus under combined regional anaesthesia.

Case Report: 63 year-old, female patient, ASA III, with a history of arterial hypertension, mitral valvuloplasty and MRS proposed for surgical correction of a right hallux valgus as an outpatient. On admission, both a mild degree of lip edema and fissured tongue were perceptible. The patient was actively warmed before entering to the operating room. Monitoring was done according to the ASA standards. She was premedicated with midazolam 1mg and fentanyl 0.05mg. An uneventful subarachnoid block was performed with 60mg of prilocaine; for postoperative analgesia an ankle block was performed with 20mL of ropivacaine 0.375%. During the procedure both the operating room and body temperature were kept constant. The surgery progressed unventfully. Throughout the stay at the Post Anaesthesia Care Unit and the general ward she remained stable, and was discharged home on the day after.

Discussion: MRS is a rare disorder originally described as a triad of facial nerve palsy, recurrent orofacial edema, and fissured tongue(2); our patient only featured the latter two. The main goal in the anaesthetic management of these patients is to avoid triggers, namely drugs or temperature changes that can aggravate the disease’s natural features, mainly larynx edema which poses a potential problem for the anaesthesiologist, due to the risk of a difficult airway. In this case, body temperature was monitored and kept constant by using warm blankets. Moreover, drugs associated with histamine release, like succinylcholine or rcurorium, should be avoided. This favours the use of regional anaesthesia as an alternative anaesthetic technique. Due to the rareness of this disease and lack of studies about these patients more reports are required in order for their ideal anaesthetic management to be established.

References:

Learning points: MRS is a rare disorder, whose patients airway management can be challenging to the Anaesthesiologist. Due to the scarce number of reports, the best anaesthetic technique was not yet established, but regional anaesthesia could be a safer alternative.

6010

Ultrasound-guided blockade of the superior laryngeal nerve for larynx biopsy in spontaneous ventilation in a patient with severe pulmonary hypertension

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Background: Pulmonary arterial hypertension (PAH) is a high-risk pathology in which mild cardiorespiratory perturbations, such as laryngoscopy and anaesthetic induction, can lead to dangerous situations. Therefore, alternatives to general anaesthesia (GA) should be considered. We present the case of a patient with severe PAH who underwent epiglottis biopsy with a bilateral superior laryngeal nerve (SLN) blockade and mild sedation in order to avoid GA.

Case Report: A 70-year-old male was scheduled for epiglottis biopsies. Medical history of COPD, chronic liver disease, auricular flutter and severe idiopathic PAH (domiciliary oxygen, macitentan-tadalafil therapy, severe right ventricle dilatation, estimated PAP of 83 ± 5 mmHg, and normal left ventricle function). He presented NYHA type II. At the operating room the patient was hemodynamically stable, with basal SpO2 86% rising up to 91% with 2L/min oxygen. We performed an ultrasound(US)-guided SLN block with a 23G Quincke needle, in direction to the virtual space between the thyro-hyoid muscle and membrane by an out-of-plane approach. A total of 1.5 ml of 1% lidocaine was injected each side. The bilateral block was performed in less than 10 minutes. Oral lidocaine was sprayed to inhibit gag reflex. Biopsies were obtained by laryngoscopy access lasting a total of 20 min. Only one event of hypotension and desaturation to 70% happened when a higher remifentanil dose was needed, recovering after phenylephrine bolus administration and discontinuing sedation. Two hours after finishing the surgery, a proof for liquid swallowing was successfully performed. The patient reported no discomfort during the procedure.

Discussion: SLN block offers greater comfort by decreasing the nociceptive response and achieving great hemodynamic stability. US provides security for facilitating the right deposition of a minimum dose of local anaesthetic and minimizing complications, allowing for a safe, easy and quick blockade.

References:
Incidence of iatrogenic pneumothorax after ultrasound guided supraclavicular nerve block for upper limb surgery: a single centre experience of 3641 blocks

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Background and Goal of Study: An ultrasound guided supraclavicular nerve block is often used as a technique to perform anaesthesia and postoperative analgesia for upper limb surgery. However, the presence of the subclavian artery and pleural cavity in the vicinity of the brachial plexus results in a possible risk for hematoma and pneumothorax. The incidence of iatrogenic pneumothorax after a supraclavicular nerve block varies between 0.03% and 6 percent. However, the overall incidence of pneumothorax diminishes with increasing experience and is further reduced with the use of ultrasound to an overall incidence of 0.05%. This audit aims to demonstrate the incidence of iatrogenic pneumothorax after ultrasound guided supraclavicular nerve block in a high volume centre.

Materials and Methods: A retrospective analysis was performed on all supraclavicular nerve blocks for upper limb surgery in our hospital between January 1, 2016 and November 31, 2019. All supraclavicular nerve blocks were performed at the discretion of the attending anaesthesiologist. The overall incidence of clinically significant pneumothorax (suspected by symptoms of dyspnea or chest pain following the performance of the block and confirmed by chest X-ray) was documented.

Results and Discussion: Between 01-01-2016 and 31-11-2019, 3641 supraclavicular nerve blocks were performed for upper limb surgery. All blocks were performed using ultrasound. 2870 blocks were performed by graduated anaesthesiologists with a variable expertise in regional anaesthesia. 771 were performed by residents. No cases of a clinically significant pneumothorax could be identified in our database. Supraclavicular nerve blocks provide excellent analgesia for upper limb surgery and are frequently used for day case surgery. Accidental pleural puncture and pneumothorax could however delay hospital discharge and increase hospital costs. The overall incidence of pneumothorax has been reported in recent years to be decreased by the use of ultrasound. Incidences lower than 0.05% have been reported (1). Our data indicate that real incidence could be even lower.

Conclusion: Retrospective analysis of 3641 ultrasound guided supraclavicular nerve blocks indicate that this is a safe procedure and confirm previous studies indicating that the overall incidence of pneumothorax is very low (< 0.05%).


Diaphragmatic paralysis and horner syndrome by supraclavicular nerve block

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Background and Goal of Study: Supraclavicular nerve block (SNB) is a commonly used technique for surgery on the upper extremities. Complications of SNB are pneumothorax, temporary (platalateral diaphragmatic paralysis (by blockade of the phrenic nerve), Horner syndrome (by blockade of the stellate ganglion). Research in partial and complete diaphragmatic paralysis and Horner’s syndrome report a variance in incidence (0-44%). This observational study was conducted to assess the incidence and influence of local anesthetic volume in daily practice.

Materials and Methods: 75 patients undergoing upper extremity surgery with SNB were approached and included in the study. Exclusion criteria were pre-existing dysfunction of the diaphragm, dyspnea and ptosis of the ipsilateral eye. The executing anaesthesiologist or resident decided on injecting location, needle movements and local anesthetic volume. Functionality of diaphragm was assessed pre- and post SNB by echography with a 2-5 hz curved probe, transversely between the mid-axillary and mid-clavicular line. Diaphragm movement of less than 1 cm movement caudally or paradoxical movement with deep inspiration was considered paralytic. Pulse-oximetry, dyspnea and Horner syndrome pre- and post SNB were also registered.

Results and Discussion: The volume of local anesthetic used ranged between 13.35 ml. 13 patients (17%) had an ipsilateral diaphragmatic paralysis. 8 of these patients had a desaturation of more than 3%. 2 of these patients had dyspnea. None of the patients had severe hypoxemia which required supplemental oxygen. 22 patients (29%) had Horner syndrome, of which 13 without diaphragmatic paralysis. 9 patients had horner and diaphragmatic paralysis. The proportion of diaphragm paralysis increased with increasing volumes of local anesthetic. No diaphragm paralysis was present with local anesthetic volumes below 20 ml.

Conclusion: Horner syndrome seems more frequent than diaphragmatic paralysis (29 vs. 17%), and Horner syndrome and diaphragm paralysis can concur independently. Paralysis rarely causes dyspnea (15%). The incidence of paralysis seems to increase with greater volumes of local anesthetic.
T2, T3 measurement times were significantly higher compared to T0. (p < 0.001). Studies investigating the effect of tourniquet on ICP were included the patients operated under general anesthesia. The end-tidal CO2 can be easily managed under general anesthesia, so that the effect of carbon dioxide which is thought to be one of the principal factors for an increase in ICP in tourniquet used surgeries, can be attenuated. Regional anesthetic techniques are most widely used for lower extremity surgeries. Knowing the fact that ICP increases in a progressive manner in patients operated under spinal anesthesia may lead to general anesthesia as a first choice in patients with low cerebral perfusion pressure.

Conclusion: The ultrasonographic measurement of ONSD increased progressively after tourniquet inflation reaches maximum level following tourniquet deflation. Therefore, we think that this increase may contribute to postoperative cognitive and neurological dysfunctions in elderly patients undergoing total knee arthroplasty.

Results and Discussion: Out of a total of 10838 patients referred to APFU, 1093 had side effects or complications. 1039 (11.4%) underwent NB and the most common side effects were: sensory (39.7%) or motor deficits (11.6%), nausea or vomiting (21.8%) and pruritus (6.4%). There were 3 cases (0.03%) of subcutaneous tissue hematoma, 3 (0.03%) of epidural abscess and 1 (0.01%) of arachnoiditis. 204 of these patients maintained need for follow-up through telephone and/or external consultation due to persistent sensory or motor deficits after hospital discharge. 54 (5.2%) patients underwent PNB, and sensory deficits were also the main complaints of these patients (51.9%), 21 of them maintained the deficits after hospital discharge, requiring also follow-up in consultation.

Conclusion: Side effects of regional anesthesia are common, but the most serious complications, such as epidural abscess or hematoma and permanent peripheral nerve damage, are rare, as found in this study. All candidates for regional anesthesia should therefore be rigorously evaluated and informed of possible complications, making a high index of suspicion essential for their diagnosis and timely treatment.

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5899

Implementation of regional anesthesia guidelines in clinical practice, does it happen in real life?

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Background and Goal of Study: Clinical practice often lags behind evidence presented in the literature. Current guidelines advocate the use of low volumes of local anesthetics during peripheral nerve blocks (PNB), accept the safety of PNB performance under general anesthesia (GA) and recommend the use of combining ultrasound (US) and nerve stimulation (NS) during PNB. This audit aims to evaluate if clinical practice has changed according to guidelines.

Materials and Methods: An audit was performed on all supraclavicular (SCB) and interscalene blocks (ISB) for upper limb surgery executed in a single centre in 2016 and 2019. All blocks were performed at the discretion of the attending anesthetist. Statistical analysis using Student’s t-tests and Chi square tests was performed on the volume used, the combined use of US and NS and the performance of PNB under sedation or GA.

Results and Discussion: In 2016 and 2019, 826 and 866 SCB were performed. There was a significant reduction of the mean volume used from 35 to 26mL (p<0.05). In 2016 both US and NS was used in 76% of cases where in 2019 this was only 37% (p=0.05). Only a small minority of patients received a PNB under GA (4 in 2016, 5 in 2019), there was a significant reduction in the use of sedatives from 2016 to 2019 (90% in 2016 vs 15% in 2019, p<0.05). In 2016 and 2019, 576 and 645 ISB were performed. There was no difference in the volume used (19.4mL vs 18.6mL). The use of US and NS increased from 2016 to 2019 (20% vs 50%, p<0.05). ISBs were performed under general anesthesia in 46 patients in 2016 and 7 in 2019 (p<0.05), there was a significant reduction in the use of sedatives (45% vs 12%, p=0.05). Acceptance of guidelines in clinical practice is diverse. There was an increase in the use of NS combined for US for ISB but not for SCB. The fear of unexpected movement with the needle in close proximity to the pleura was the main reason for anesthesiologists not to use NS in SCB. In contrast to SCB, the volume used for ISB was already low preventing a further reduction. The logistic organization with the presence of a block room explains the unchanged and low proportion of patients receiving a PNB under GA.

Conclusion: Our audit demonstrates that in a high volume centre adoptation of clinical guidelines is slow or even non existent. Further research is necessary to detect the barriers that prevent implementation of clinical guidelines.

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5672

Comparison The Prophylactic Administration Of Pregabalin And Acetaminophen On Post-Dural Puncture Headache After Spinal Anesthesia - a randomised double-blind, placebo controlled study

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Background and Goal of Study: Post-dural puncture headache (PDPH) is a known complication of neuroaxial anesthesia and may be associated with significant morbidity. To avoid the need for invasive methods of treating PDPH such as blood patch, the search for novel pharmacological agents to manage PDPH continues. Our prospective, randomised, double-blind, placebo-controlled study was planned to compare the preventive effect of pregabalin, acetaminophen and placebo on relative frequency and intensity of PDPH after spinal anesthesia.

Materials and Methods: After obtaining Ethics Committee approval and written informed consent, 84 patients (ASA I-II) aged between 18 and 50 years, admitted for the lower extremities orthopedic elective operation under spinal anaesthesia, were included in the study. The patients were randomly divided into three groups (n=28, in each group) to receive an hour before spinal blocking, either 500 mg acetaminophen (group A), 100 mg oral pregabalin (group B) or placebo tablets (the control group, group C). Headache was evaluated using visual analog scale (VAS), at the time which PDPH symptoms began and was followed 6,12, 24, 48 and 72 h after it. The pain scale consisted of a 10 cm horizontal line marked from 0 (denoting no pain) to 10 (denoting worst possible imaginable pain). Student’s t-test and Chi-square test were used for analysis.

Results and Discussion: Patients in group B had lower incidence of PDPH (3.57% vs. 14.28% for group A and 17.85 % for group C with P < 0.05), the highest incidence of complete response, and also, less analgesic requirement compared with groups A and C, throughout 6-72 h (1.2 ± 0.4 vs. 2.3 ± 0.75 for group A and 3.3 ± 1 for placebo group with P < 0.05).

Conclusion: A single pre-operative dose of 100 mg of pregabalin reduced PDPH better than using acetaminophen in patients who underwent lower extremity surgery under spinal anesthesia.

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6328

Assessment Of Main Complications Of Regional Anesthesia

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Background and Goal of Study: Regional anesthesia, due to the scientific evidence of its advantages, has been increasingly used. Although this is a technique with a low number of complications described, some are associated with devastating morbidity. The aim of the study is to evaluate the incidence of postoperative complications associated with the use of regional techniques, such as neuraxial block (NB) and peripheral nerve block (PNB).

Materials and Methods: After approval by the São João Hospital Health Ethics Committee, the clinical data of patients referred to the Acute Pain Functional Unit (APFU) were retrospectively collected from 1st January, 2011 to 31th December 31, 2017.

Conclusions
4916

Damage control regional anaesthesia

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Background: The desirable respiratory and cardiovascular effects of regional anaesthesia makes it suitable technique in patients who are unfit for general anaesthesia due to severe physiological derangements. This can facilitate interim surgery to save life and improve physiology prior to definitive surgical intervention under general anaesthesia.

Case Report: A 58 years old patient presented with Takotsubo cardiomyopathy with left ventricular ejection fraction of 14%. This type of cardiomyopathy was developed as a result of septicaemia from infected collection at humeral fracture site, which was sustained by a mechanical fall prior to hospital admission. She was in decompensated cardiorespiratory state with pulmonary oedema, bilateral septic emboli and atrial fibrillation. She was on 5L/min oxygen via facemask with respiratory rate of 35 cycles/minute and SPO2 of 96%, Blood pressure of 93/50 mmHg and atrial fibrillation rate of 92bpm on amiodarone infusion. She was on broad-spectrum antibiotics with a CRP of 300 mg/L and WCC of 13 x 109/L. Under ultrasound guided interscalene and infracavicular brachial plexus with intermediate cervical plexus block a deltiopectoral and infratroval surgical approach of humerus was performed for abscess washout and debridement. Vancomycin loaded beads insertion at fracture site and into humeral shaft, surgical drain placement, tissue biopsy and glenohumeral joint aspiration for microscopy, culture and sensitivity. The patient vital signs remained unchanged throughout the procedure, which lasted for 70 minutes from knife to skin.

Discussion: Within one week after surgery there was marked clinical improvement. Vital signs stabilised and left ventricular ejection fraction improved to 40% on repeated ECHO. CRP dropped down to 39 mg/L and WCC to 6.2 x 109/L. The patient is currently awaiting ORIF of humeral fracture once infection is completely cleared.

Learning points: Damage control regional anaesthesia is valid anaesthetic option for damage control surgery

4868

Practice of Regional Anaesthesia in Belgium – A National Survey

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Background: National surveys are useful to assess the state of regional anaesthesia (RA). They can serve as a basis to implement new guidelines. Given that such information is lacking in Belgium, we conducted a survey to evaluate our practice of peripheral nerve block performance (PNB), with a particular focus on safety aspects.

Methods: A survey was sent by email to Belgian anaesthesiologists using national society and university mailing lists. Respondents completed the survey anonymously through the SurveyMonkey® platform. Data were collected between September 2019 and October 2019.

Results: Among the 1600 anaesthesiologists to whom the survey was sent, 324 responded. Among the 278 questionnaires which could be used for analysis, 96% of responders said that they perform a PNB more than once a week. Almost all anaesthesiologists (99%) placed a venous access before performing the block. More than 90% of patient were monitored with peripheral pulse oximetry and 55% with NIBP, ECG and peripheral pulse oximetry. The majorit of patients remained monitored for at least 30min after injection. However, 8% remained under visual observation in the vicinity of the surgical room.

Ultrason-guided RA was performed in 89%. The neurostimulator was totally abandoned in 20%. For those who used a neurostimulator, 44% sought for a motor response and 56% kept it as sentinel (with mean minimal intensity 0.46mA (95% CI 0.40-0.44)). Monitoring of the injection pressure was considered in 21%. More than 50% of responders use complete sterile measures (combining sterile gloves, surgical drapes, mask). Concerning local anaesthetics (LA), 52% never mixed LAs and the adjuvant use varied between 10% (never) and 15% (always) with dexametason being the most popular one (IV and LA-solution). Most practitioners (97%) knew where intralipid was located in case of local anaesthetic systemic toxicity and a flash card was attached (83%) nearby. 93% of the responders stated that this medication can be found in the operating room or in its vicinity.

Conclusions: This survey suggests a correct level of safety in the practice of PNB in Belgium according to recent French guidelines[1]. This survey can serve as a benchmark for future comparisons and evaluation of RA techniques.

References:

4858

What is the impact of unilateral diaphragm paralysis on obstructive sleep apnea? A scoping review

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Background and Goal of Study: Unilateral diaphragm paralysis (UDP) occurs in all patients undergoing interscalene brachial plexus block (ISB), and may result in worsening of obstructive sleep apnea (OSA). Current guidelines recommend ISB for shoulder surgery in patients with OSA, but the impact of UDP in this population is unknown. This review aims to evaluate the effects of UDP on OSA severity as measured by the apnea-hypopnea index (AHI) or respiratory disturbance index (RDI). We hypothesized that UDP worsens the severity of OSA.

Materials and Methods: We searched the US National Library of Medicine (MEDLINE), Embase and Cochrane Database of Systematic Reviews for studies evaluating OSA severity in adults with UDP. Our primary outcome was OSA severity as measured by the apnea-hypopnea index (AHI) or respiratory disturbance index (RDI). Secondary outcomes included nocturnal mean oxygen saturation (mean SpO2%), CT090 (percentage of total sleep time with an oxygen saturation of <90%) and pulmonary function tests (PFTs). A qualitative synthesis of literature was also performed.

Results and Discussion: Six studies with a total of 100 patients with UDP were included. Compared to controls (no DP), UDP was associated with increased RDI. Moreover, compared to controls, UDP was associated with a higher rapid eye movement (REM) sleep and supine sleep RDI, and lower mean SpO2% during all sleep stages and body positions. Compared to controls, UDP was associated with a restrictive pattern on the PFTs.

Conclusion: The available evidence suggests that OSA severity and nocturnal oxygenation is worse in patients with UDP, particularly during REM sleep and while sleeping in the supine position. Future findings should help to inform the risk-benefit discussions when considering ISB for patients with OSA.
Effects of ultrasound-guided bilateral suprasyzygomatic maxillary nerve block on postoperative pain after elective orthognathic monomaxillary osteotomy in adult patients

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Background and Goal of Study: Maxillary osteotomy is a surgery procedure of the orthognathic surgery field for correction of dental and facial abnormalities. The anesthetic management of these patients is a challenge because of the difficult airway management and the perioperative pain control. Multimodal approach for pain control is a fact, and the use of local and regional anesthetics techniques (LRA) is mandatory. The researchers propose ultrasound-guided bilateral suprasyzygomatic maxillary nerve block (USMNB) for a proper control of postoperative pain after orthognathic maxillary osteotomy (OMO).

Materials and Methods: In this clinical trial, after ethical committee approval patients were randomly assigned to 2groups to receive (study group) or not (control group) the USMNB (4ml Ropivacaine 0.5%) together with local infiltration with Lidocaine (10ml Lidocaine2%) and general anesthesia. The main objective was the consumption of opioids. Pain, postoperative nausea-vomiting (PONV) and complications derived from USMNB were also recorded.

Results and Discussion: The researchers present the preliminary results of this clinical trial. Patients who received USMNB presented better results in terms of: lower intraoperative opioids consumption (p=0.029), lower rate of patients who demanded methadone (100% control vs 0% study, p=0.029) and lower dose of methadone administered (4mg control vs 0mg study, p=0.029) at 24hrs postoperatively, lower level of pain at any time of the first 8hours postoperatively (p=0.029), and lower incidence of PONV (75% control vs 0% study, p=0.048). No complications derived from the USMNB were reported.

Conclusion: The results obtained suggest that the USMNB is a promising LRA technique to decrease opioid consumption and greater patient comfort for OMO. The small size of the sample prevents generalization, and may involve risks of overinterpretation and publication bias. Larger studies need to be conducted to corroborate the efficacy of this LRA.

References:

5307

New strategy for locoregional anesthesia for bi-maxillary osteotomy: mandibular nerve block and sub orbital block. Retrospective and comparative study

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Background and Goal of Study: Locoregional anesthesia may reduce postoperative pain and vomiting after Bi-maxillary osteotomy (BMO)(1). The technique for mandibular (MNB) and maxillary (MXB) nerves blocks is well described. We made the hypothesis that MNB may be sufficient for all the nerves travelling in the pterygopalatine fossa. Yet, we adopted a new locoregional strategy based on a MNB and a sub orbital block (SOB) for pain management after BMO. The aim of this study is to compare the result of this approach with the conventional one.

Materials and Methods: This is a retrospective monocentric study. We selected all the patients who had BMO from January 2012 to December 2018. Three groups were set: Group 0: analgesia with morphine, Group 1 MNB with anatomical landmarks and MNB with neurostimulation and Group 2 MNB with neurostimulation and SOB with ultrasonography. The main outcome was the amount of morphine consumed in recovery room. The secondary outcomes were the time to extubation, the length of stay (LOS) in recovery room and in the hospital. The kuskal wallis test was used for quantitative data and the Fischer exact test for qualitative data. The p value was 0.05.

Results and Discussion: The time to extubation was 63 +/- 43 min in group 0; 20 +/- 22 min in group 1 and 15 +/- 14 in the last group, p < 0.001. The LOS in recovery room was 169 +/- 49; 118 +/- 44 and 105 +/- 56 min in group 0, 1, 2; p < 0.001. The LOS in the hospital was 4 +/- 1 days, 3 +/- 1 and 3 +/- 1 in the 0 and 1 and 2 group, p=0.008.

Table 1: Characteristics of patients

<table>
<thead>
<tr>
<th>Group 0</th>
<th>Group 1</th>
<th>Group 2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients:</td>
<td>21</td>
<td>31</td>
<td>30</td>
</tr>
<tr>
<td>Age (mean):</td>
<td>20 +/- 69</td>
<td>22 +/- 9</td>
<td>25 +/- 12</td>
</tr>
<tr>
<td>Male sex (%)</td>
<td>52</td>
<td>45</td>
<td>40</td>
</tr>
<tr>
<td>ASA status VI (%)</td>
<td>83/1/9</td>
<td>93/5</td>
<td>79/5</td>
</tr>
<tr>
<td>Length of surgery [min]</td>
<td>270 +/- 61</td>
<td>225 +/- 50</td>
<td>199 +/- 56</td>
</tr>
</tbody>
</table>

4407

Risk factors for postoperative hypothermia in urologic surgery using large-volume irrigation fluids

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Background and Goal of Study: Inadvertent hypothermia can lead to multiple complications postoperatively. Several factors known to be associated with the development of perioperative hypothermia include age, BMI, irrigation fluid temperature, and duration of surgery. The Holmium Laser Enucleation of the Prostate (HoLEP), one type of transurethral surgery, requires large volume irrigation fluids during surgery and, thus, may increase the incidence of postoperative hypothermia. We noted hypothermia even when forced heated air and warm irrigation fluids were used during HoLEP. We undertook this study to determine the incidence and risks of hypothermia in patients who underwent HoLEP.

Materials and Methods: Data from the perioperative period of patients who underwent elective HoLEP under spinal anesthesia were retrospectively collected from June 2016 to June 2018. A sensor to measure core body temperature (Spoton™ Temperature Monitoring System) was placed on the patient’s forehead before initiation of spinal anesthesia. Distilled water for irrigation was kept warmed at 38°C using a heated cabinet in the operation room (OR). Core temperature, noninvasive blood pressure, heart rate, oxygen saturation and electrocardiogram were monitored continuously. Additionally, the anesthesiologist noted the core temperature during surgery and amount of irrigation fluid used. Hypothermia was considered if the postoperative temperature decreased to below 36°C.

Results and Discussion: Seventy-six patients met the inclusion criteria. Of these, 18 (24.3%) patients experienced hypothermia after surgery. We compared this group with patients who did not experience hypothermia, and found the following: preoperative temperature (36.2°C vs 36.6°C) and BMI (21.7 kg/m-2 vs 24.0 kg/m-2) were both statistically significantly different (p<0.001 and p=0.02, respectively).

Conclusion: Our study suggests that preoperative core temperature and BMI are associated with postoperative hypothermia. Warming before surgery might prevent postoperative hypothermia in patients undergoing HoLEP.
Background and Goal of Study: Ultrasound elastography (UE) tends to improve the ultrasound diagnosis accuracy. The strain elastography (SE) depicts the pathological tissue loss of elasticity in response to an external pressure applied by the operator (pure color code-based visual assessment). It is now recommended for benign/malignant parenchymal process differentiation and for muscle and nervous rigidity assessment & follow-up. We postulated, the SE was able to differentiate the normal nerves from their musculo-vascular environment based on their different own elasticity tofacilitate the preliminary nerve location.

Materials and Methods: 30 healthy ASAI-II adult patients (lower limb surgery) were included into this prospective observational study. The femoral (F) and the popliteal sciatic (PS) nerves were studied using B&W 2D sonography (S) and SE (Fig.1). About the FSE, the colorimetric scale (CS) goes from red (stiffer) to blue (softer) differentiating 6 main colors at the visual assessment (Fig.1). Second, the FSE was transformed into a 3 points tissue classification related to F & PS stiffness for easier reading (Fig.1). Results are presented as percentages (Fig.2).

Results and Discussion: F & PS S was normal in all the patients confirming the different morphology of each kind of nerve with a high level of patient-to-patient reproducibility. SE detected as «stiff» the F & PS in respectively 87 and 83% of the patients (Fig.2). Finally, a superposition between sonogram and elastogram greater than 50% was observed in 54 & 70% of the patients. Conclusion: SE represents a promising technique that may complement S to try to improve the quality of nerve localization. Further studies are needed for a better understanding.
with low opioids usage and decrease of side-effects.

Conclusions: Continuous perineural infusions of local anesthetic are a safe and effective method for reducing post-amputation opioid analgesic medications after major lower limb amputation.

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Ultrasound-guided thoracolumbar interfascial plane (TLIP) block and intrathecal fentanyl: A feasible choice for Enhanced Recovery After Spine Surgery (ERAS) and early deambulation
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Background and Goal of Study: ERAS pathway is a multidisciplinary, multimodal approach to improve expedited functional recovery and early postoperative mobilization. There is a paucity of literature regarding the implementation of ERAS in spine surgery with the use of regional anesthesia. We present a case series of 15 patients undergoing minimally invasive (endoscopic) lumbar spinal surgery in which TLIP block and fentanyl intrathecal were performed as a part of the multimodal analgesia into the ERAS protocol. The aim was to determine the percentage of patients who mobilized at 6 hours of P.O, hospital-length of stay (LOS) and readmission at 30-90 days.

Materials and Methods: A retrospective study included 15 patients (60 to 85 y.o) undergoing minimally invasive lumbar spine surgery following ERAS protocol. Premedication: Midazolam 2mg, dexketoprofen 50 mg, paracetamol 1 gr, ondansetron 4 mgrs. MgSO4: 1.5gr i.v. Intrathecal Fentanyl 25 mcg (sitting position) and US-guided bilateral TLIP were performed in all patients (prono position) with bupivacaine 0.25% and dexamethasone 8mgrs (20ml each side). General anesthesia: fentanyl 2.0 mcg/kg i.v, propofol 2.0-3.0 mcg/ml (TCI) following BIS, ketamine 0.15 mg/Kg/h, rocuronium 0.4 mg/Kg. Normetomia and euvolemia were maintained. Foley catheter and drains were avoided.

Results and Discussion: No i.v. fentanyl was needed during surgery. Time of surgery 3.5±0.5 hrs. Rescue of methadone P.O : 21mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O hrs):3/10-2/10. 3.5±0.5 hrs. Rescue of methadone P.O : 21mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O hrs):3/10-2/10. 3.5±0.5 hrs. Rescue of methadone P.O : 21mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O hrs):3/10-2/10. 3.5±0.5 hrs. Rescue of methadone P.O : 21mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O hrs):3/10-2/10. 3.5±0.5 hrs. Rescue of methadone P.O : 21mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O hrs):3/10-2/10. 3.5±0.5 hrs. Rescue of methadone P.O : 21mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O hrs):3/10-2/10. 3.5±0.5 hrs. Rescue of methadone P.O : 21mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O hrs):3/10-2/10.

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Quadratus lumborum block for postoperative analgesia after abdominal surgery: a systematic review and meta-analysis
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Background and Goal of Study: Adequate postoperative analgesia is important for postoperative recovery after abdominal surgery. Previous clinical studies have shown that quadratus lumborum block (QLB) could not only stop somatic pain but also inhibit visceral pain. This systematic review was conducted to assess the analgesic utility of QLB following abdominal surgery.

Materials and Methods: PubMed, Embase, the Cochrane Library were searched from inception until October 2019. Trials were eligible if comparisons of QLB were shown that quadratus lumborum block (QLB) could not only stop somatic pain but also inhibit visceral pain. This systematic review was conducted to assess the analgesic utility of QLB following abdominal surgery.

Results and Discussion: Eleven studies with a total population of 672 patients were identified. QLB significantly reduced 24-h pain scores during movement (MD, -1.27; 95% CI, -2.51 to -0.03), but no at rest (MD, -0.52; 95% CI, -1.43 to 0.4). Morphine consumption was significantly reduced with QLB during the first 24 h (MD, -8.23 mg; 95% CI, -15.03 to -1.43) after abdominal surgery.

Conclusion: QLB can improve postoperative pain control, reduce opioid consumption for abdominal surgery.

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Comparison between crystalloid coload with ondansetron administration and crystalloid coload to prevent spinal anesthesia induced hypotension, a randomized controlled trial
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Background and Goal of Study: Spinal anesthesia-induced hypotension is the most common cardiovascular complication after performing spinal anesthesia. Many studies suggested crystalloid coload to have lower incidence of spinal anesthesia induced hypotension than preload in non-obstetric surgery. There are studies suggested efficacy of ondansetron administration before performing spinal anesthesia to reduced incidence of hypotension but lack of evidence in non-obstetric surgery and with coload administration. The purpose of this study was to compare the efficacy of prevention of spinal anesthesia-induced hypotension in non-obstetric surgery between ondansetron with coload administration and coload administration.

Materials and Methods: 94 patients (ASA classification I-II, aged 18 – 50 years) undergoing orthopaedics surgery, general surgery, gynecologic surgery, receiving spinal anesthesia were randomized to receive ondansetron 4 mg and coload with lactate Ringer’s solution 10 ml/kg (O group, n=47) or NSS 2 ml and coload with lactate Ringer’s solution 10 ml/kg (N group, n=47). SBP, DBP, MAP, heart rate, oxygen saturation and nausea and vomiting symptoms were measured at baseline (T0) and 3, 6, 9, 12, 15, 20, 25, 30, 35, 40,45 minutes (T3, T6, T9, T12, T15, T20, T25, T30, T40, T45) after performing spinal anesthesia. The incidence of hypotension, rescue drugs, nausea and vomiting were measured.

Results and Discussion: There was no statistically significant difference between two groups in demographic data, and operation. The incidence of hypotension in ondansetron group (O group) was 34.04% and normal saline group (N group) was 29.79% with no statistically significant (p = 0.658). There was also no statistically significant difference in SBP, DBP, MAP, heart rate, nausea vomiting symptoms, and adverse effects along the time of observation between two groups. Although stimulation of serotonin receptor (5HT-3 receptor) may be associated with stimulation of Bezold-Jarisch reflex (BJR) that can cause spinal anesthesia-induced hypotension, the effect of level of sympathetectomy by spinal anesthesia may be different.

Conclusion: Ondansetron administration before spinal anesthesia with lactate Ringer’s solution coload was not superior than coload in prevention of spinal anesthesia-induced hypotension.

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Ultrasound assessment of diaphragmatic function after VATS for pulmonary biopsy in interstitial lung disease: a single center preliminary study
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Background and Goal of Study: In patient with suspect of interstitial lung disease (ILD), non-intrabative surgical biopsy has proven to be feasible (1). Despite physiopathological likelihood of increased risk for pulmonary complication after general anesthesia (GA), there is no evidence of superiority of locoregional techniques (LR). In our center, type of anesthesia is agreed with the patient according to clinical condition case-by-case. We decided to assess pulmonary and diaphragmatic function in patient undergoing VATS for pulmonary biopsy under GA or with LR anesthesia (usually thoracic epidural).

Materials and Methods: Our study was observational: patient scheduled for lung biopsy were prospectively enrolled and data regarding pre-op arterial blood gas analysis (ABG) and spirometry gathered. Diaphragm function was evaluated through ultrasound: both Thickening Fraction (TF%) and Diaphragmatic Inspiratory Amplitude (DIA) were measured. Data regarding anesthesia were recorded. 12h after surgery ABGs was checked and spirometry and diaphragm ultrasound repeated. NRS was also evaluated. According to type of anesthesia (GA or LR), patients were dived in two groups. Data were analyzed comparing the percentage decreased between pre and postop value. Analysis was conduct with STATA 12.0 software for last comparison.

Results and Discussion: 26 patients were enrolled in a 11-month period. Of these, 4 were lost to follow up. Of the remaining 22, 16 were in the LR group and 6 in the GA group. We observed no statistical differences between groups in term of percentage decrease of FVC, FEV1 and FEV1/FVC. TF post was increased by 15% in the left in the LR group and decreased by 35% in the GA (p=0.02). On the right, site of the surgical incision, TF was decreased of 4% in LR and of 20% in GA. Concerning

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33 obstetricians and 9 anesthesiologists completed the survey. Volatile anesthetics are known to decrease diaphragmatic function in greater extent than GA. According to our results, ultrasound was more sensitive in assessing such benefit.

Conclusion: In ILD patients, LR anesthesia for VATS biopsy preserves diaphragmatic function significantly better than GA.

References:

Results and Discussion: The number of patients with excessive bleeding was the leading cause of maternal morbidity and mortality worldwide. Uterotonic drugs are used to prevent and treat postpartum hemorrhage. The aim of this study was to determine how doctors in our hospital, both obstetricians and anesthesiologists, use uterotonic drugs for vaginal deliveries and cesarean sections and to investigate decision making process and prioritization when managing postpartum hemorrhage.

Materials and Methods: 65 questionnaires where handed out to obstetricians and anesthesiologists in our hospital, both trainees and specialists. They were asked to answer anonymously about their preferences and use in practice of uterotonic drugs, dosages, way of administration and timing for cesarean sections and vaginal deliveries for women at low and high risk for postpartum hemorrhage. 44 completed anonymous questionnaires where collected and statistical analysis was performed using MATLAB.

Results and Discussion: 33 obstetricians and 9 anesthesiologists completed the questionnaire. The majority of the obstetricians had less than 5 years of clinical experience (70%), while most of the anesthesiologists were very experienced (78%). Oxytocin was reported as the first line uterotonic drug for vaginal delivery while the most commonly used dose was 5 IU intravenous bolus plus maintenance infusion 1% for 2 hours. Ergonovine was also used routinely as 0.2mg intravenously without any monitoring. For low risk for postpartum hemorrhage cesarean sections oxytocin was the first line uterotonic drug. Intravenous doses ranged from 3 to 10 IU followed by oxytocin infusions. For high risk for postpartum hemorrhage cesarean sections almost half of the participants (45%) use carboplatin usually as a bolus dose of 100mcg. Amongst the second line uterotonic drugs ergonovine was used by most of the doctors, 0.2mg given slowly or rapidly bolus, with variable timing intervals. Misoprostol was also used at 200-800mcg. Most of the participants use 400 mcg per rectum. The choice of second line uterotonic was mainly based on perceived efficacy.

Conclusion: There is lack of a unified approach to the use of uterotonic drugs for postpartum hemorrhage management in our hospital. To improve the management of postpartum hemorrhage due to uterine atony literature update is needed.

A comparison of volatile anesthetics and propofol on hemorrhage during dilatation and curettage: A systematic review and meta-analysis

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Background and Goal of Study: Volatile anesthetics are known to decrease contractility of uterine muscle. Thus it may induce more bleeding during gynecologic procedures. There have been several studies comparing volatile anesthetics to intravenous drugs such as propofol to clarify the effects on blood loss. Some of them suggests the possibility of less blood loss when maintained by propofol, but it still remains unclear. We conducted a meta-analysis to compare the effect of propofol and volatile anesthetics on the amount of hemorrhage during dilatation and curettage.

Materials and Methods: This study was a systematic review and meta-analysis. A search was conducted of published literature in MEDLINE, EMBASE, Web of Science, and Cochrane Central Register of Control Trials databases. Randomized control trials that compared volatile anesthetics with propofol for patients undergoing dilatation and curettage were included. Continuous data were summarized using mean difference with a 95% confidence interval (CI). If the 95% CI included a value of 0, we considered the difference not to be statistically significant. We used the random effect model (DerSimonian and Laird method) to combine the results. Heterogeneity was quantified with the I^2 statistic. The primary outcome from the present meta-analysis was blood loss during procedure. The secondary outcome was the number of patients with excessive bleeding.

Results and Discussion: Four trials (343 patients) were included with 173 patients receiving volatile anesthetics. Use of volatile anesthetics was associated with increased blood loss compared with propofol (mean difference of 97.6 ml, 95% CI
We enrolled women in a randomized, double-blind, Placebo-controlled, parallel-group study. A total of 155 women underwent randomization, 78 in the low-dose group and 77 in the high-dose group. The estimated blood loss ≥ 500 mL, interventions to stop bleeding, neonatal outcomes, and adverse effects did not differ significantly between the two groups. The frequency of use of additional uterotonic agents was 28.2% in the low-dose and 77.9% in the high-dose group (relative risk, 1.09; 95% CI, 0.93-1.26). The estimated blood loss ≥ 500 mL, interventions to stop bleeding, neonatal outcomes, and adverse effects did not differ significantly between the two groups.

**Background and Goal of Study:** Oxytocin is known to prolong QT time corrected (QTC), induce ST-depression and stimulate release of myocardial biomarkers. We aim to investigate if carbetocin causes similar changes.

**Materials and Methods:** Forty healthy, singleton pregnant women were randomized to a 1:1 i.v. injection of oxytocin 2.5 IU or carbetocin 100mg after C-section. QTC, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4, Schiller). We measured Troponin I, QTc, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4, Schiller). We measured Troponin I, QTc, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4, Schiller). We measured Troponin I, QTc, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4, Schiller). We measured Troponin I, QTc, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4, Schiller). We measured Troponin I, QTc, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4, Schiller). We measured Troponin I, QTc, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4, Schiller).

**Results and Discussion:** QTC increases significantly with time, reaching maximal values within 6-9 minutes after administration of study drug, P<0.001. No difference in QTC was found between treatment groups, P=0.13, Fig. 1. A tendency of more pronounced ST-depression (OR 5.71) and tachycardia (67% vs 57%) was found in the carbetocin group, however group differences were not significant. The opposite is true for myocardial biomarkers, finding a tendency of increased values in the oxytocin group, Fig. 2.

**Conclusion:** Oxytocin 2.5IU and carbetocin 100mg causes similar increase in QTC. The pilot trial is underpowered to answer which drug causes more ST-depression and release of myocardial biomarkers. Change in Troponin I from baseline is most pronounced at 10 hours after administration of study drug. Based on this difference, power calculation was performed. CMT2-study, including 240 women, is now conducted to answer if there are group differences in release of Troponin I.

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**Is it neurogenic or hemorrhagic? – Shock management in a puerperal uterine inversion – Case report**

**Background:** Uterine inversion (UI) is a rare, complex emergency. While a neurogenic shock can play a major role in the first stage, with placental delivery and increased blood loss the shock can become hemorrhagic. The efficacy of these treatments are only reported in a few series. In our case, although we try to minimize her postoperative bleeding, but it continued. We believed that the macrometric baby in combination with some to extent coagulopathy and hypofibrinogenemia led to atonic, uncontrollable and an emergency life-saving hysterectomy despite our aggressive medical treatment.

**References:**


**Learning points:** Risk factors for postpartum hemorrhage in GT may extraordinarily potentiate the risk of bleeding and result in severe situation. Prinatal consideration of the proper arrangement is essential.

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**Carbetocin Myocardium Trial, results from a pilot RCT on cardiac effects after oxytocin 2.5 IU or carbetocin 100mg**

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**Background and Goal of Study:** Oxytocin is used for initiating uterine contraction and preventing postpartum hemorrhage during cesarean delivery. Using the lower dosage of oxytocin may cause effective initial uterine contraction and lower adverse effects than the higher dosage. We evaluated the uterine contraction, additional uterotonic agents and adverse effects of a 5 IU bolus of oxytocin with a 10 IU standard bolus of oxytocin during Caesarean delivery.

**Materials and Methods:** We enrolled women in a randomized, double-blind, Placebo-controlled, parallel-group study. The proportion of women with adequate uterine contraction during the first 3 minutes was 84.6% in the low-dose and 77.9% in the high-dose group (relative risk, 1.09; 95% CI, 0.93 to 1.26). The frequency of use of additional uterotonic agents was 28.2% in the low-dose and 36.4% in the high-dose group (relative risk, 0.78; 95% CI, 0.49 to 1.23). The estimated blood loss ≥ 500 mL, interventions to stop bleeding, neonatal outcomes, and adverse effects did not differ significantly between the two groups.

**Conclusion:** The 5 IU bolus of oxytocin was comparable to the standard 10 IU bolus of oxytocin for the effectiveness of adequate uterine contraction and adverse effects did not differ significantly between the two groups.
Use of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) in management of Morbidly Adherent Placenta

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Background and Goal of Study: Obstetric hemorrhage is the leading cause of maternal morbidity and mortality, at highest risk are women with Placenta Accreta Spectrum. The prevalent approach is cesarean hysterectomy with the placenta left in situ after delivery. Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a minimally invasive procedure used as an alternative to surgical aortic cross-clamping for temporary control of bleeding arising below the diaphragm. Used predominantly in the setting of trauma, recently it has been used during Cesarean Section to control obstetric hemorrhage and improve patient outcome. It can be deployed rapidly for use in smaller centers.

Materials and Methods: This retrospective study evaluates all patients underwent Cesarean Section with an antepartum diagnosis of Invasive Placentation from January 2018 to November 2019 at Shaare Zedek Medical Center. In March 2019 we’ve introduced REBOA as a new treatment modality in CS with a high suspicion of invasiveness which was diagnosed in US or MRI before surgery. Since then it was used in 5 cases, including one emergency CS. We compare patient outcome to Standard Approach (SA) in prior 11 cases. A vascular surgeon inserted REBOA under US, with balloon inflation after clamping of the cord. Inflation time mean was 15.2 minutes with Standard Deviation(SD) ±6.05. We’ve analyzed data such as blood loss, transfusion, urinary tract injury, hysterectomy rates, procedure duration and ICU admission in both groups. Descriptive statistics were performed.

Results and Discussion: Blood loss (ml) and transfusion rates were significantly higher with SA, mean ± SD: 640 ± 296.6 vs 4400 ± 2787.0, P =0.01. In the REBOA group no blood products were given while in SA, median =4 with 6 patients (54.5%) receiving ≥4 units. FFP, Cryoprecipitate and PLT units (mean) given in the SA group were 3.63, 6 and 3.62 respectively. 10 patients (90.9%) in SA and 5 patients in the SA group required post-surgical ICU admission vs none with REBOA. Bladder injury occurred in 5 cases (45%) of SA vs 1(20%) with REBOA. No significant difference in surgery time P =0.11, or anesthesia P =0.34. Conclusion: Use of REBOA during CS with invasive placentaation is an effective, uterus preserving treatment modality. It reduces bleeding, enables better operating conditions and improves patient outcome.

Down-regulation of Cx43 expression on PIH-HUVEC cells attenuates monocyte–endothelial adhesion

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Background and Goal of Study: Pregnancy-induced hypertension (PIH) is the most common serious complication of pregnancy, resulting in significant maternal and fetal morbidity and mortality. Vasospasm is the main pathogenesis of PIH, which leads to the hemodynamic changes and the injury of vascular endothelial cells. However, the underlying mechanism is still unclear. Monocyte–endothelial adhesion is always considered to be one of the most important indicators of vascular endothelial cell injury. Connexin43 (Cx43) plays an important part in monocyte–endothelial adhesion. Thus, we explored effects of Cx43 on cell adhesion in PIH-induced vascular endothelial cells injury.

Materials and Methods: We obtained human umbilical vein endothelial cells (HUVECs) from patients with or without PIH. Different methods, such as inhibitors: oleamide and Gap26, or specific siRNA were used to alter Cx43 channels function or protein expression in normal or PIH-HUVECs. U937-HUVECs adhesion, adhesion molecules expression,such as VCAM-1 and ICAM-1, and the activity of PI3K/AKT/NF-κB signaling pathway were determined.

Results and Discussion: Monocyte–endothelial adhesion on PIH-HUVECs was much more obvious than that on normal HUVECs. Inhibition of Cx43 protein expression could attenuate cell adhesion significantly, however, function of Cx43 channels had no effects on it. Alteration of Cx43 protein expression on PIH-HUVECs mediated VCAM-1 and ICAM-1 expression via regulating the activity of PI3K/AKT/NF-κB signaling pathway. Conclusion: We firstly reported Cx43 protein expression on PIH-HUVECs was much higher than that on normal HUVECs. Elevation of Cx43 protein expression within the vasculature resulted in PI3K/AKT/NF-κB signaling pathway activation and VCAM-1 and ICAM-1 over-expression, which ultimately lead to monocyte–endothelial adhesion increase.

A retrospective study of prophylactic arterial occlusion balloon catheter for abnormal attachment of the placenta

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Background and Goal of Study: Placenta accreta and placenta previa may cause massive bleeding during delivery, leading to life threatening. In the case of massive bleeding, it is unavoidable to have a hysterectomy. Recently, in cases where massive bleeding is expected, balloon catheter is placed prophylactically. But there is no firm consensus on where to place the balloon (Internal iliac artery, common iliac artery or Abdominal aorta).

Materials and Methods: From April 2014 to March 2019, 11 women with placenta accreta or placenta previa were examined. Demographic data, preoperative diagnosis, anesthetistic induction, duration of anesthetistic/operation, position of balloon, blood loss, complication, with or without hysterectomy, pathological diagnosis were recorded.

Results and Discussion: The mean age of 11 patients is 34.5 years old. Preoperative diagnosis were placenta accrete (5 cases), placenta previa (5 cases), placenta accrete and previa (1 cases). Anesthetistic techniques were 1 case of spinal anesthesia and 10 cases of combined spinal-epidural (CSE). Of these patients, 4 patients added general anaesthesia. The average of blood loss was 2352 ml. All of the patients was received the occlusion balloon in internal iliac artery. There were 2 patients who had ischemia-reperfusion injury. Of the cases, 5 patients had massive obstetric hemorrhage and had to undergo a hysterectomy. In these 5 cases, the pathological diagnosis were placenta accrete. Preoperative internal iliac artery balloon occlusion (IIABO) has been widely performed to minimize blood loss for an abnormal attachment of the placenta. Pelvic organs blood flow is mainly from common iliac artery but partly from ovarian artery and inferior mesenteric artery. Also, the development of collateral circulation has large individual difference. In some cases, only preoperative internal iliac artery balloon occlusion cannot control massive bleeding. It should be considered Intra-aortic occlusion balloon or transcatheter arterial embolisation.

Conclusion: Prophylactic arterial occlusion catheter for placenta accrete may be insufficient for successful conservative management. It is needed propriate preparation for massive blood loss.
**An opioid free sedation approach for manual placental removal after vaginal delivery: Is Ketodex a viable option?**

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**Background:** Retained placenta is the second leading cause of significant and even fatal bleeding in the obstetric population. Once the diagnosis is made, the placenta is usually extracted manually. Because this procedure is painful, adequate anaesthesia must be obtained prior to a manual extraction attempt.

**Case Report:** A 30-year-old female patient, 70kg, without comorbidities, was referred to the operating room for manual placental removal after vaginal delivery. Without previous fasting, arrived with heavy bleeding and hypotension. It was decided to perform sedation with Dexmedetomidine + Dextroketamine (1:1), 0.5mcg + 0.5mg/kg intravenous bolus. When the procedure was about to start, it was decided to associate Propofol 0.5mg/kg (underdose) to assure hypnosis. Patient remained hemodynamically stable, in spontaneous ventilation without supplementary oxygen throughout the whole process, woke up 30min after sedation, VAS (Visual Analog Scale) 0/10, collaborative and without memory of the procedure.

**Discussion:** There is no evidence suggesting an ideal anesthetic regimen for this procedure. Considering the hypotension that most patients present, neuroaxial block seems not to be a good option for some cases. Among sedation processes, the most commonly used regimen in Brazil is the combination of propofol with fentanyl, however, high doses of propofol can only be used in patients with complete fasting due to the risk of bronchoaspiration, not to mention the fact that it is a powerful hypotensive agent, also the use of opioids during the procedure increases the incidence of complications such as urinary retention, nausea and vomiting. Thus, the association of Dexmedetomidine with Dextroketamine: called Ketodex, balances the sympatholytic effects of Dexmedetomidine, while concomitantly attenuates the undesirable effects caused by Dextroketamine on the central nervous system, seems to be a viable choice for manual placental removal in cases where hypotension is a significant morbidity factor.

**References:**
2. Learning points: There is no evidence suggesting an ideal anesthetic regimen for manual placental removal, but opioid free sedation reduces morbidity. Ketodex seems to be an alternative and viable option specially in cases where hypotension is a significant morbidity factor.

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The effect of thromboembolism prophylaxis on prenatal and postnatal complications in patients with pregnancy-related hypertensive disorder

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**Background and Goal of Study:** Hypertension is the most common maternal complication in pregnancy and its incidence is 1/10. Hypertensive disorders during pregnancy include gestational hypertension and preeclampsia. They increase cardiovascular diseases, associated hemodynamic disturbances and also maternal and fetal morbidity and mortality. Especially in patients with preeclampsia, the risk of thromboembolism in pregnancy and puerperal period is higher compared to those without preeclampsia. Pulmonary embolism is still one of the leading causes of maternal mortality. Low molecular weight heparin (LMWH) has been proven to be effective and safe in prophylaxis and treatment of venous thromboembolism. The aim of this study is to determine the effect of thromboembolic prophylaxis on the occurrence of thromboembolic event in pregnant patients with hypertensive disorder.

**Materials and Methods:** This retrospective study included 386 patients with preeclampsia undergoing cesarean section between 2012 and 2018 at the Obstetrics Clinic of our hospital. The patients were divided into two groups as without (Group 1) and with thromboembolism prophylaxis (Group 2). Demographics, thromboembolic event rate, amount of blood transfusion, laboratory values, the length of hospital stay and mortality were recorded.

**Results and Discussion:** There was no statistically significant difference in demographics (p>0.05). The duration of hospital stay was significantly lower in patients receiving anticoagulants compared to patients not using them (p<0.05). Eleven thromboembolic events were observed in 210 patients without thromboprophylaxis, whereas thromboembolic events were detected in only two (1%) of 176 patients with thromboprophylaxis. Although the rate of blood product use in patients with embolism was higher than in patients without embolism, no statistically significant difference was observed (p>0.05). The length of hospital stay and arrhythmias were significantly higher in patients with embolism than those without embolism (p<0.05).

**Conclusion:** Hypertensive diseases of pregnancy increase the susceptibility to thromboembolism. We concluded that prophylaxis for thromboembolism significantly reduces morbidity.

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**4388**

Labour analgesia in a patient with argininosuccinic aciduria: a case report

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**Background:** Argininosuccinic aciduria (ASuria) is an inborn metabolic disorder caused by deficiency of argininosuccinic acid lyase, an enzyme of the urea cycle, resulting in intermittent hyperammonemina postparturially or during catabolic states. 1 Main symptoms of uncontrolled disease include anorexia, lethargy, vomiting and there is risk of cerebral edema. The authors present a case of successful combined spinal-epidural analgesia for labour in a patient with ASuria.

**Case Report:** A 27-year-old woman, diagnosed with ASuria at age 15, was on her first pregnancy. She had regular following by obstetrics, metabolic disorders and nutrition teams and was controlled with low-protein diet, arginine and sodium benzoate. She was thoroughly assessed by an anesthesiologist at 38 weeks and neuraxial analgesia techniques were discussed. At 40 weeks, she presented in spontaneous labour with 5 cm dilation and a combined spinal-epidural technique for analgesia was safely performed and maintained with patient controlled epidural analgesia and mandatory intermittent boluses of ropivacaine and sufentanil. Her blood screen at admission revealed hyperammonemia (199 μmol/L). She was asymptomatic, with no signs of metabolic encephalopathy, and started hydration with normal saline and 10% dextrose infusion at 2 mL/kg/h per protocol. 8 hours after admission, shortly before delivery, ammonium levels were 62 μmol/L and dextrose infusion rate was increased to 4 mL/kg/h. The delivery required vacuum extraction and the infant weighted 3325g with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively. The postpartum period went uneventfully with close monitoring of plasma ammonium. She was discharged 4 days after delivery.

**Discussion:** Successful therapy and genetic counseling has allowed women with ASuria to consider pregnancy. There are 3 case reports in the literature of uneventful pregnancies and deliveries in such patients. However, none of them refer to any kind of intervention by the anesthesiologist.1,2,3

**References:**

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**Upper limit of normal (ULN) 20.7s**

**122** Obstetric Anaesthesiology
Background: Epidural and spinal anesthesia are well-known anesthetic techniques for caesarean section (CS). The aim of this study is to compare the changes in intraocular pressure after the conduction of both techniques.

Materials and Methods: We studied 36 parturients between 38 and 40 weeks of gestation (mean age: 30.3). Exclusion criteria were: arterial hypertension, diabetes mellitus, refractive disorders of the eye, neurological diseases, such as multiple sclerosis, cardiac diseases, therapy with corticosteroids and pulmonary infections. We divided the parturients in 2 groups: Group A, which consisted of 18 women who underwent CS under spinal anesthesia with ropivacaine 10mg and fentanyl 20γ and Group B, which consisted of 18 women who underwent CS under epidural anesthesia with ropivacaine 120mg and fentanyl 50γ. A statistical analysis and we found no statistical significance in the changes of intraocular pressure in both eyes between spinal and epidural anesthesia (p=0.45).

Results and Discussion: From the 36 parturients, we excluded one from Group A, because she suffered from headache after the first 24 hours. We conducted a statistical analysis and we found no statistical significance in the changes of intraocular pressure in both eyes between spinal and epidural anesthesia (p=0.45).

Conclusion: Intraocular pressure is not affected by significant changes after the conduction of either spinal or epidural anesthesia in parturients who will undertake CS.

Discussion: The mechanism underlying this complication is often the formation of knots or aberrant trajectories. This didn’t seem to be the case, as resistance to traction was felt at approximately the same distance as the epidural space was found. We hypothesize that the catheter was stuck in the ligament or surrounding bony structures. Whether the catheter’s defect was a true or consequence is unclear. A recent article proposed an algorithm for management of entrapped catheters.1 In retrospect, the recommendations were followed and a plan for CT scan was underway. A particularity of this case was the fact that the complication arose during labour, and our success highlights the need to consider repeating lumbar flexion manoeuvres after delivery, as the reduction in uterine size may allow optimal flexion.

References:

Learning points: Entrapped epidural catheters have an uncertain management. During labour, removal should be tried after delivery.
4711

Confirmation of epidural catheter location by epidural pressure waveform recordings by the CompuFlo Epidural instrument

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Background and Goal of Study: Pulsatile waveforms originating from the spinal cord and transmitted through the dura in synchrony with heart rate have been used to confirm the epidural location of the catheter. Objective lumbar epidural space identification using the CompuFlo epidural computer controlled instrument have been reported and validated. The aim of this preliminary study was to evaluate the new CompuFlo instrument's ability to locate the epidural space and determine the catheter tip location. Materials and Methods: We tested 30 epidural catheters previously successfully used for obstetric anesthesia or analgesia and about to be removed. All patients were given 5 mL 2% lidocaine to test the catheter before its removal. After priming with 5 mL saline, the catheter was connected to CompuFlo to record the occurrence of pulsatile waveforms and/or their disappearance during its removal. The epidural catheter was marked at the skin level to record the distance between the skin at the time of measurements. The power analysis required a sample of 30 observations to set 80% test power and 95% significance level. Results and Discussion: Pulsatile waveforms were observed in all the catheters properly located in the epidural space (confirmed by the occurrence of L2-3 sensory block after the test dose) (28/28) and disappeared when the catheter was extracted from the epidural space (28/28). The mean length of epidural catheter withdrawal associated with its exit from epidural space was 3.56 cm (CI95% 3.14-4.01) and this can be considered as the cut-off value (P=1.27e-15). No waveforms were recorded in 2 cases in which no sensory block occurred after the test dose (catheter dislodgement). The pressure waveform analysis through the epidural catheter had a sensitivity of 100%, a positive predictive value of 100%, specificity of 100% and a negative predictive value of 100%. Conclusion: The primary trial pulsatile pressure waveform recording with CompuFlo through the epidural catheter resulted in high sensitivity and positive predictive value. This adds further value to the CompuFlo epidural instrument which, in addition to accurately identifying the epidural space, has also now proved capable of identifying the correct positioning of the epidural catheter. Further and larger confirmatory studies should be performed at the time of catheter insertion to confirm this preliminary finding.


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4725

Evaluation of labour epidural analgesia through ultrasound in Asian parturients: A pilot analysis

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Background and Goal of Study: Lumbar lordosis during pregnancy may interfere with surface estimation for epidural insertion. More than 40% of clinical estimations for epidural insertion in caesarean delivery are ≥1 vertebra higher than those determined using ultrasound for Caucasian parturients in a sitting position. However, differences between surface epidural insertion estimation and ultrasound localization among Asian populations, who often receive labour epidural analgesia due to the high rate of caesarean section, are not well understood. Materials and Methods: In this preliminary trial, ultrasound pressure waveform recording with CompuFlo through the epidural catheter resulted in high sensitivity and positive predictive value. This adds further value to the CompuFlo epidural instrument which, in addition to accurately identifying the epidural space, has also now proved capable of identifying the correct positioning of the epidural catheter. Further and larger confirmatory studies should be performed at the time of catheter insertion to confirm this preliminary finding.

4526

Zikv and analgesia technique for labour

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Background: Zika virus (ZIKV) is a Flaviviridae RNA virus. It is transmitted through infected Aedes mosquito bites, producing significant alterations in multiple organs. In 2016, WHO declared Zika a public health emergency of International concern. Case Report: A 36-year-old Brazilian, in the 39th week of pregnancy comes to our hospital due to labour pain. She is 4cm cervical dilation and regular uterine contractions. No controls during pregnancy. It is considered to perform an analgesic technique. Patient’s medical history: normal analysis and coagulation. Conclusion: ZIKV can be transmitted mother-child (placenta, breastfeeding), sexual, blood transfusion. The worst effects may be Guillain Barre Syndrome (GBS) to the mother and microencephaly in the newborn. It is suggested that this virus, because of its nature, the iatrogenic brain-blood crossover during neuraxial anaesthesia (NA) is negligible. Each case must be individualized, since ZIKV has been associated with alterations in inflammatory states of the central nervous system (CNS). Literature indicates NA can be done when patient does not report any active symptoms: fever, maculopapillary rash, dehydration, headache, haematological anomalies. It is important blood, coagulation and liver tests prior to any puncture. ZIKV is associated with thrombocytopenia (TP), leukopenia and elevation of transaminases, TP may increase bleeding risk and neuraxial complications. There is an association between acute ZIKV and GBS. Therefore after NA placement surveillance should be maintained for signs of greater sensitivity to local anaesthetics, airway obstruction, fever and coagulopathies (3).


Learning points: Global warming, ZIKV, labour analgesia.

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5626

Combined spinal-epidural versus low-dose epidural for mobile regional analgesia during labour: efficacy, obstetric outcome and patient satisfaction

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Background and Goal of Study: Mobile regional analgesia (MRA) could preserve motor function and reduce obstetric interventions. This observational study aims to analyse the efficacy, obstetric outcomes and patient satisfaction in MRA using low-dose combined spinal-epidural (CSE) technique and low-dose epidural (LDE) technique. Materials and Methods: Collected data of patients who requested MRA pain relief between 1 May 2019 and 1 Nov 2019. Evaluated pain (Visual Analogue Scale) before and 30 minutes after the procedure, time of mobilisation and mode of delivery. Surveyed patient satisfaction on labour pain relief within 1 month of MRA based on a scale of 0% “not satisfied” to 100% “very satisfied.” Results and Discussion: The study was based on 46 instances of MRA (76% LDE, study. Furthermore, some anaesthetists in our institute considered the intercostal line to be L3. Mean (SD) dosage consumption during the first stage of labour for the two most common ultrasound-confirmed epidural levels, namely L3-4 and L4-5, were 11.8 (3.9) and 13.3 (5.7) mL (p = 0.35). Conclusion: The accuracy of clinical estimates of epidural levels was approximately 60% among Asian parturients in the lateral position.
24% (CSE) administered to women. In Group LDE, 64% reduction in immediate pain (VAS score from 7.2 to 2.6) was observed and in the Group CSE, the reduction was 78% (VAS score from 7.9 to 1.72), p<0.03. Total length of mobility was 240±132 minutes in Group LDE and 202±84 minutes in group CSE (p=0.49). Normal vaginal, instrumented and caesarean delivery rate was 69%, 11% and 20% in Group LDE and 73%, 9% and 18% in Group CSE respectively. Patient satisfaction with LDE and CSE was 78% and 79% respectively. Type of delivery and patient satisfaction showed no significant differences between both techniques.

Conclusions: High patient satisfaction was achieved with MRA. While CSE gives significantly less immediate pain scores compared with LDE, the study found no statistical differences in the length of mobility, mode of delivery and patient satisfaction between both techniques.

Results and Discussion: The characteristics that we found to be independent risks factors for DEP were BMI (odds ratio (OR) of 1.06), gestational age (OR 0.968), sitting position of the pregnant woman (OR 0.776), and L2-L3 level of puncture (OR 2.498). A higher patient’s BMI was found to be associated with multiple epidural punctures to accomplish success. On the other hand, the advanced gestational age correlates with less epidural attempts. Interestingly, an upper level of epidural puncture (L2-L3) and pregnant lateral position during the technique were found to be association with DEP. It is important to note that analgesia records of the technique usually describe the successful last attempt. Therefore, interpreting these results accordingly, they suggest that the last attempt is performed in L2-L3 rather than lower spaces. Regarding the position, we don’t have data to inform us if the position was altered during the attempts.

Conclusion: In our population, higher BMI and lower gestational age are independent risk factors for DEP. Further study need to be done in order to confirm L2-L3 puncture and lateral position during the technique as risk factors.

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**5851**

Does lunar phases influence number of births per day? A time series analysis

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Background and Goal of Study: Contradictory results regarding the influence of lunar phases have been found concerning the time of births. In general, the influence of the lunar cycle on deliveries is considered as a not evidence based myth. A Fourier Transform (FT) can show us what the frequencies of the seasonal components of our data are. In a retrospective study of 2480 births throughout 2014, we performed a time series analysis of the number of births per day, aiming to find out any lunar phase influence. This is preliminary results of a broader study gathering data over a decade.

Materials and Methods: We created a fully anonymized database registering number of births for each day of 2014 at our hospital. We used our latitude (-34.60) and longitude (-58.42) along with OCE (Analysis of Oceanographic Data) package to remove seasonal trends in our data. FT was applied to our data, so we were able to further decompose our dataset, eliminating the seasonal component of the frequency we’ve found. Then we plotted overlapped births per day series with moon illumination sinusoidal wave (Figure 1-b).

Results and Discussion: ADF test (p-value: 0.01) confirmed our data to be stationary (read: steady over time). A visual exploratory analysis suggested that number of births was approximately two fold higher at 0%-25% and 75%-100% moon illumination groups than the others (Figure 1-a). FT showed a relevant seasonal frequency at 3.5 days.

Conclusion: Lunar phases might have a relationship with the number of births per day at a maternity ward. Time series analysis methods might be further explored on this matter.
Prevalence of Aspiration During General Anesthesia Induction for Cesarean Delivery: Is METOCLOPRAMIDE a Necessary Prophylaxis?

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Background and Goal of Study: Parturient was found to be a risk factor for aspiration during induction of GA and intubation due to numerous causes such as difficult airway, increased intra-abdominal pressure, and delayed gastric emptying time due to progesterone effect. Thus, there is a recommendation in the literature for aspiration prophylaxis with prokinetics and/or antacid for parturient prior to intubation with emphasis on close to term parturient before CS. In this research we want to question the necessary of prokinetics and/or antacid for the prophylaxis of aspiration in parturient.

Materials and Methods: We retrospectively investigated the use of pramine prophylaxis for aspiration in a cohort of 48,609 parturient undergoing cesarean section between November 2007 to December 2016 in Soroka and Shaare Zedek, two major medical centers in Israel.

Results and Discussion: The amount of cesarean deliveries in Soroka and Shaare Zedek was somewhat similar (26529 vs 22080 respectively). However, a significant difference in the percentage of general anesthesia was observed (5% vs 81.3% respectively). We found six cases of clinical aspiration with significant pulmonary sequelae in the cohort, out of them only three occurred during induction (1:10793). In the statistical analysis we found no significant benefit for routine use of prokinetic prophylaxis in parturient undergoing cesarean section.

Conclusion: The usage of routinely aspiration prophylaxis in parturient undergoing cesarean section is questionable. We found that clinical aspirations is linked to the type of anesthesia (general vs. neuroaxial) and urgency of the procedure, and not to the use of pramine prophylaxis.

How to avoid perineal pain and pruritus following intravenous bolus of dexamethasone before Caesarean section?

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Background and Goal of Study: Dexamethasone becomes increasingly popular in obstetric anesthesia because of its anti-inflammatory and antieptic properties. Single intravenous (IV) dose of 8 mg dexamethasone reduces antiemetic and analgesic requirements in the postoperative period. Preneesthetic IV administration may cause exacerbating pain, and/or pruritus in the perineal region. The aim was to investigate whether unpleasant effects could be avoided if intravenous bolus of dexamethasone was administered after spinal anesthesia.

Materials and Methods: After ethics committee approval and written consent, 60 pregnant women, aged 28±4.7 years, ASA II-III, scheduled for elective cesarean section under spinal anesthesia, were included in this prospective randomised study. Group A (30 patients) received 8mg of dexamethasone IV, 15 minutes before spinal anesthesia. Group B (30 patients) received 8mg of dexamethasone, immediately after performing spinal anesthesia.

Results and Discussion: Results showed no significant difference regarding age and BMI between groups. Difference in incidence of nausea and vomiting and postoperative pain was not statistically significant 4h, 12h and 24h postoperatively. Statistical analysis was conducted using Student’s t test and Chi-squared test.

Conclusion: Results showed no significant difference regarding age and BMI between groups. Difference in incidence of nausea and vomiting and postoperative pain was not statistically significant 4h, 12h and 24h postoperatively.

Fixed dose versus height - adjusted dose of intrathecal hyperbaric bupivacaine for caesarean delivery: a prospective, double-blinded randomized trial

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Background and Goal of Study: Universal protocol of spinal anaesthesia with following spinal anesthesia.

Background and Goal of Study: Circadian variation in biological rhythms has been identified as affecting the pharmacological properties of many anaesthetic agents such as local anesthetics. There is a growing body of evidence suggesting circadian patterns of LAS activity in the fields of local, dental anesthesia and labour pain analgesia with important differences among diurnal and nocturnal phases. The purpose of this study was to investigate whether a circadian rhythm exists in the efficacy of intrathecal bupivacaine (9-13mg) and 25mcg of fentanyl. Sensory block of at least T5 within 10 minutes of hyperbaric bupivacaine and 25mcg of fentanyl was given intrathecally in all patients at different times: group A (08:00am - 12:00am), group B (12:00am - 4:00pm), group C (4:00pm - 8:00pm), group D (8:00pm - 12:00pm), group E (12:00pm - 08:00am). Pinprick or cold, the four-point modified Bromage scale (0-3) and the numerical scale (NRS 0 - 10) were used respectively for the assessment of the sensory blockade, motor blockade and pain.

Results and Discussion: Results showed no significant difference regarding age and BMI between groups. Difference in incidence of nausea and vomiting and postoperative pain was not statistically significant 4h, 12h and 24h postoperatively. Statistical analysis was conducted using Student’s t test and Chi-squared test.

Conclusion: Results showed no significant difference regarding age and BMI between groups. Difference in incidence of nausea and vomiting and postoperative pain was not statistically significant 4h, 12h and 24h postoperatively. There was no statistically significant difference in height, weight and BMI between groups. There were no significant differences in terms of complications between FD and AD groups (all p>0.05).

Conclusion: Spinal block using 12.5mg of bupivacaine regardless of parturient’s height.
height when compared to height - adjusted dose regimen based on relatively high doses of bupivacaine does not appear to increase the risk of complications, which may aid clinical decision-making process in elective, as well as non- elective cases.

5002

Incidence and determinants of failed epidural for emergency caesarean section: a retrospective analysis

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Background and Goal of Study: Epidural analgesia remains the most efficient pain relief for labour. Around 25% of parturients in the UK receive epidural catheter. The epidural failure rate is reported to be as high as 21%2 while the conversion rate to general anaesthesia should not exceed 3%3 according to the Royal College of Anaesthetists. The main objective of this study was to find out the percentage of patients on epidural analgesia who required conversion to spinal or general anaesthesia for all but category I caesarean sections.

Materials and Methods: A retrospective study was performed in our hospital after approval from local audit committee. The data was collected over 18 months from May 2018 to November 2019 and included patients who underwent emergency caesarean section with epidural in situ.

Results and Discussion: A total number of patients who required caesarean section on epidural accounted for 319, whereas 22 cases were converted to general anaesthesia and 2 cases to spinal anaesthesia (overall conversion rate is 7.52%).

The risk factors noted for failure were insufficient epidural analgesia in the ward and short time from dose administration to incision. Moreover the results showed the diversity in doses and volumes for epidural top-ups among anaesthetists (Table 1.). Of note, a significant number of cases were converted intraoperatively after baby delivery.

Conclusion: The conversion to GA may increase both maternal and fetal risks. In our audit we found that the incidence of conversion is two times higher than recommended. Uniformity among clinician top-up and early recognition of inadequate analgesia remain crucial.

References:

5535

Augmentation of Labour Epidural for emergency Caesarean Section

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Background: The Augmentation of epidural analgesia for caesarean section has clinical and legislation implications. The Audit performed to observe the current practice of augmentation of labour epidural for emergency caesarean sections in regional teaching hospital of Ireland.

Methods: A total of 80 patients were included in a period of 6 months. Data was collected on proforma immediately following surgery. Total of (53/60) 88% of patients received the full dose of the local anaesthetic mixture in the labour ward, while (07/60) 7% of patients were topped up in operation theater with simultaneous application of AAGBI monitoring.

Results: The average time for the transfer of the patient from labour ward to theatre was 11 mins following epidural top-up in the delivery suit. All Patients (53/60) who received epidural augmentation in labour ward were brought to the theatre without AAGBI standard monitoring along with absent fetal monitoring (CTG). Total of (37/60) 62% of patients were reported having a drop-in blood pressure of more than 20% between NIBP reading taken before epidural top-up and first NIBP reading in the theater. Only of (03/60) 5% of patients were accompanied with emergency drugs. None of the patient was reported high blocks/local anaesthetic toxicity. Only (01/60)2% of total patient was converted to general anaesthesia due to inadequate sensory block after epidural top-up.

Conclusions: Epidural top-ups for emergency caesarean section are used frequently but routinely performed in the delivery suite. Drugs, doses, and volume used differ greatly among anaesthetists. During transport, available equipment and drugs were limited.

Recommendation: Lack of monitoring during transfer can lead to adverse maternal and fetal outcomes. We highly recommend epidural top-up and transfer under AAGBI monitoring accompanied with emergency drugs.

6161

Neuroaxial anaesthesia versus general anaesthesia for caesarean delivery in a patient with acute appendicitis, which is the best option?

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Background: Surgery can be indicated at any stage of pregnancy. The anaesthesiologist should take into account the maternal and foetal risks associated with each different anaesthetic technique.

Case Report: A 33 year old woman, in the 30th week of gestation, ASA II, asthmatic, 60 Kg, 160 cm, with acute appendicitis, who is operated at the same time of caesarean and appendectomy. For both interventions, we performed a combined neuroaxial anaesthesia, placing an epidural catheter at the level of L3-L4 and dispensing into the intradural space 10 mg of bupivacaine 0.5% hyperbaric and 10 micrograms fentanyl with a 27G needle. The surgery proceeds without incidences, first the caesarean and then the appendectomy. The anaesthetic level was optimal, and the patient remained comfortable throughout the intervention.

Discussion: Regarding to this clinical case, we consider what factors influence the anaesthesiologist when choosing the anaesthetic technique in the pregnant woman, as well as the benefits and consequences of each one of them. The American Society of Anesthesiologists and the Society for Obstetric Anesthesia and Perinatology recommended the use of neuroaxial anaesthesia over general anaesthesia for most caesarean deliveries. However, there is still a tendency to perform general anaesthesia in caesarean delivery without a justifiable cause. Factors that may influence choice include the presence of fetal emergencies, the anaesthesiologist’s specialization in obstetrics, or certain patient characteristics such as race. Acute appendicitis is the main non-obstetric surgical emergency in pregnant women. The appendectomy by open approach allows spinal anaesthesia to be performed, with a very low rate of conversion to general anaesthesia.

References:

Learning points: Neuroaxial anaesthesia is the most widely recommended technique in pregnant women. If general anaesthesia is necessary, the anaesthesiologist must know the risks and possible teratogenic effects of the drugs to be used depending on the patient’s gestational trimester.
Anesthetic techniques for C-section in morbidly obese pregnant patients. A retrospective observational study in University Hospital

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Background and Goal of Study: Obesity represents a worldwide epidemic. Maternal overweight increases the risks of preeclampsia, gestational diabetes, labor induction, cesarean section, postpartum hemorrhage, puerperal infections and maternal death. General anesthesia is undesirable regarding the risks of difficult airway (obesity and pregnancy) and maternal mortality. Anesthetic management of obese parturient is challenging and requires adequate planning. We did a retrospective observational study describing the best neuraxial technique for woman with BMI >> 40 who underwent C-section in terms of lower complications, block failure and safety.

Methods: Ethical Committee approval (CAAE: 0454.0.146.000-08), we did a retrospective analysis (Jan 2016 - Dec 2017), where 200 pregnant woman with BMI > 40kg/m² had C-section with neuraxial techniques: single spinal, intermittent epidural (IE) and continuous spinal (CSE). Demographic data, obstetric and anesthetic data was recorded. Variables: Age, weight, height, BMI, anesthetic technique, technical difficulties, block failure, hemodynamic instability. Statistical analysis: 1.Categorical variables: Chi-square or Fisher’s Exact Test. Numerical variables: Mann-Whitney and Kruskal-Wallis. The level of significance adopted was 5%, p<0.05.

Results: 200 patients analysed with BMI >> 40 were submitted of C-section. 123 (61.5%) had BMI 40-45, 54 (27%) 45-50 and 23 (11.5%) >50. There was statistical significance between BMI for: anesthetic technique (more frequency for single spinal in BMI 40-45 and 45-50 (obesity class 3) and CSE in BMI > 50 (super obesity). The more frequent vasopressor utilized were metaraminol with BMI= 40-45 and >50. Overweight in woman with CSE and intermittent epidural. There was no statistical significant regarding hypotension and failure. Discussion and Conclusion: Obesity is a multisystem disease with several associated comorbidities, significant maternal and fetal complications. It is of extreme importance to perform an anesthetic technique with great effectiveness, safety and without complications. In our study, we showed that CSE for C-section in super obese woman was a good choice because of faster onset associated with maintenance of an epidural catheter to infuse LA in small increments, to complement or improve the block, avoiding hypotension, total spinal block and allowing better postoperative pain control.

5077

Spinal tumor and pregnant women: neurosurgery and caesarian delivery dilemma

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Background: Pregnant women have different pathophysiological changes, and often current diseases. We present a rare case of a pregnant women suffering from spinal tumor diagnosed during her second pregnancy. The progressive neurological deficit makes inevitable the tumor removal in the 29-th week of pregnancy.

Case Report: A 21 years old pregnant women was diagnosed in the 29-th week of pregnancy of spinal tumor based on her clinical signs (backache, and progressive paresis of left lower limb). MRI and CT scan revealed a spinal tumor on TH10-L1 level. The progressive motor deficit of neurosurgical approach and strict fetal monitoring in perioperative period. This case was discussed by multidisciplinary team of the mother were similar in groups (Table 1).Although the umbilical cord clamping times and neonatal birth weight were similar between groups, the APGAR scores in first and fifth seconds in POINT group were statistically significant (Table 1). There was no statistically significant difference in umbilical cord blood gas values (Table 2).

Conclusion: We are in the opinion that, the application of preoxygenation with HFNO might be a preferable technique to improve the APGAR values of newborn in the cesarean operations.Clinical trial registration:NCT03903003

5621

Anesthetic management in a spinal muscular atrophy type III parturient cesarian section: a case report

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Background: Anesthetic management in parturients with spinal muscular atrophy type III (SMA) is challenging and requires some strategies to deal with the anatomical and physiological alterations presented by this patients. We report a case of a successful technique, with satisfactory analgesia and safe delivery.

Case Report: A 22-years-old woman, 33 weeks pregnant with spinal muscular atrophy type III, hypothyroidism and pregnancy induced hypertension was scheduled to undergo cesarian section due to hypertensive peaks. The patient, which was followed by the obgyn team, presented a severe lung restriction, a strong hypoplastic lung, besides no neck extension and 2.3cm distance between incisions. Due to the difficulty to perform regional anesthesia and the impossibility of laryngoscopy, it was planned a general anesthesia with awake intubation by optical fibroscope. After explanation about the procedure, we provided analgesia with fentanyl 2mcg/kg and dexmedetomidine 0.3mg/kg/h intravenous and topical anesthesia with lidocaine 2% through the nose and mouth. A nasal intubation with optical fibroscope was performed with the patient collaboration, and after the correct placement of the tube, the induction was made with fentanyl 10mcg/kg and propofol 2mg/kg. After 2 minutes and 45 seconds, the baby was born alive with apgar score 2/3/10. The general anesthesia was maintained with propofol (TCI of 2.2-2.5) and dexmedetomidine 0.5mcg/kg/h. At the end of surgery, the patient was stable, intubated and receiving an Dexmedetomidine infusion. Due to the long time waiting for an ICU room, after 2 hours and the full recovery of general anesthesia, the patient was extubated in the operating room, and did not present any sign of muscular weakness. proceeded to the UCI, awake and with no more complains.

Discussion: Parturients patients with SMA may present challenges to anesthesiologist due to severe scoliosis and difficult positioning of the patient on operation table that makes it difficult and unpredictable the realization of neuraxial anesthesia. General anesthesia also presents many challenges to be done because of the intubation anatomy unfavorably (fibroscope IO is the most frequent described in case reports) and due to severe restrictive lung disease that is often present in SMA.

References:

Learning points: Special approach of parturients with SMA it’s challenges.
Optimization with levosimendan prior to cesarean section in a patient with left heart failure and severe pulmonary hypertension

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Background: Heart failure and pulmonary hypertension (PHF) in the pregnant population is associated with historically high morbidity and mortality for both mother and child (35-66% and 11-28% respectively). Women with known PHF are therefore recommended to avoid pregnancy but undiagnosed cardiopulmonary disease can debut during pregnancy due to the increasing cardiovascular stress of pregnancy.1 Case Report: We report a 33y.o G3P1A1 woman. Past medical history of systemic lupus and antiphospholipid syndrome. The patient was asymptomatic until week 27 when she sought medical attention due to abdominal pain. Investigations revealed PHF (SPAP 100mmHg), severe mitral valve prolapse and atrial fibrillation. Due to clinical deterioration and rapidly increasing p-BNP at week 34 (max value of 10900ng/l) a multidisciplinary team recommended a sub-acute cesarean section. The patient received a levosimendan infusion of 0,1mcg/kg/min over 24h prior to surgery with marked clinical and biochemical improvement (post p-BNP 5640ng/l). Surgery was performed under invasive blood pressure and a central venous catheter at an operating room with possibility for cardiopulmonary bypass. The patient received a combined spinal-epidural (5mg hyperbaric bupivacaine + 100mcg morphine + 10mcg fentanyl in the spinal room) and a slow epidural titration with ropivacaine for a total dose of 124mg over 30 minutes to achieve a T4 level. A phenylephrine infusion of 0.25mcg/kg/min was needed (total dose 2.28mg). Surgery went uneventful, with minimal blood loss (300ml) and spontaneous conversion from atrial fibrillation to sinus rhythm shortly after extraction of a healthy baby.

Discussion: Recent case series indicate a decrease in maternal mortality to 16% when specially during postpartum and directly related to the degree of PHF2. Pregnancy is still considered contraindicated, but if the pathology develops later, specific treatments should be promptly initiated. The use of levosimendan proved to be an excellent choice in optimizing the patient prior to surgery.

References:

Learning points: A multidisciplinary approach to heart disease during pregnancy lead to substantial decrease in morbidity and mortality. Regardless of the anesthetic technique, the main aim is to avoid hypotension and acute volume overload. Preoperative levosimendan proved excellent in optimizing the patient prior to surgery.

Onset of pulmonary arterial hypertension due to congenital heart disease (PHTN-CHD) after cesarean delivery

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Background: Acute respiratory failure (ARF) during the peri-partum period is a possible situation due to different disorders related to pregnancy-specific conditions or an increased risk of other medical conditions due to changes of gestational maternal physiology. We report a case of an ARF, with a final diagnosis of PHTN due to a congenital defect occurring after cesarean delivery.

Case Report: We report a case of a 35 year old woman, who was admitted for an induced labor. An emergency c-section was indicated due to a fetus sustained bradycardia. At the recovery room she developed ARF. An angiotomography excluded pulmonary thromboembolism but showed chronic signs of PHTN confirmed with echocardiography. The patient was transferred to an Intensive Care Unit where an extended study was ruled out and showed precapillary PHTN due to a left-to-right shunt. The cardiac magnetic resonance imaging (MRI) showed persistence of the left-to-right shunt and an anomalous right superior pulmonary venous return (APVR) to vena cava instead of to the left atrium. Pulmonary vasodilators were initiated with clinical improvement, and the patient was discharged home 14 days after.

Discussion: The prevalence of CHD in adults is unspecific but it is estimated around 5-10% in the population in Europe (1). It is reported that 5-10% of adults with CHD develop PHTN. The continued exposure of a high pulmonary blood flow due to systemic to pulmonary shunts and high pressure, could cause an obstructive lung artery disease which results in high pulmonary vascular resistance. PHTN during pregnancy is a high risk situation and it is considered a contraindication of pregnancy due to high maternal mortality and morbidity (2). The goal of this article is to present an unusual case of ARF during the peri-partum period and rule out an interesting differential diagnosis, including PHTN-CHD.

References:

Learning points: Onset of PHTN-CHD as ARF at peripartum period is an unusual situation and it should be taken into account in the differential diagnosis. The morbidity and mortality is high so the need of interdisciplinary collaboration is key as well as the management in a tertiary multidisciplinary Hospital.
5016
C-Section in Single Ventricle Patient. Case report, anesthetic considerations
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Background: In functional single ventricle (FSV) patients blood flow into the pulmonary arteries is passive with no intervening pump, resulting in systemic venous congestion and limited capacity to increase cardiac output. This abnormal condition might be further challenged by pregnancy, with its described increases in plasma volume and cardiac output. (1) Women with significant cardiac pathology are best cared during pregnancy by a multidisciplinary approach, in experienced specialized centres. (1) FSV patients are advised against becoming pregnant because of higher peripartum mortality or occurrence of persistent heart failure. Successful pregnancy and delivery in FSV patients have been reported in the United States, Japan and Korea, but none have been reported in Argentina. (2)

Case Report: A 37 y/o woman with 34 weeks’ gestation and a single ventricle with pulmonary cecal surgery at six month old, scheduled for c-section and tubal ligation. She’d had one at 31 weeks’ gestation in, followed by postpartum hemorrhage, giving birth to a 1700 gr live child. She was advised not to get pregnant again. In 2013 she’d had a pacemaker placement due to a complete auriculoventricular block. She’d had also a breast implant surgery. In a cardiac catheterization at that time, right and left atrium pressure was 15 mmHg, unique ventricle pressure was 110 mmHg, pulmonary artery measured 29/14/20 mmHg and aortic systo dia-stolic pressures were 110/70 mmHg. At 2017 a new catheterization study along with angiocardiography stated that she had a single left ventricle with pulmonary cecal and barely restrictive bulboventricular foramen, mild pulmonary hypertension and good ventricular function. SaO2 was between 85% to 88%. A combined spinal epidural anesthesia (CSE) was performed with hyperbaric bupivacaine (10mg) and fentanyl (25μg) administrated intrathecally. An epidural catheter was placed. Post operative care was provided at our hospital cardiac intensive care unit.

Discussion: Reports of single ventricle patients giving birth are scarce. This was an extremely rare and anesthesiologist challenging event, being her second child. CSE might be a good anesthetic technique for c-section in high cardiac risk patients. It allows lower spinal dose of anesthetics and using epidural catheter if needed.

References:

5064
Perioperative management of cesarean section in pregnant patients with pulmonary arterial hypertension
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Background and Goal of Study: Maternal mortality in pregnancy with pulmonary arterial hypertension (PAH) is high, and perioperative management during cesarean section (CS) in pregnant patients with PAH must be performed carefully. However, appropriate anesthesia or perioperative management is unknown yet. Concerning appropriate anesthesia and perioperative management is still controversial. Therefore, we investigated past CS cases in pregnant women with PAH at our hospital and examined anesthesia and perioperative management according to the patient’s condition.

Materials and Methods: The study was approved by the ethics committee of our hospital. This is a retrospective observational study for pregnant patients with PAH or at risk of developing PAH among the CS cases performed at our hospital from January 2009 to March 2019. We investigated the causative diseases of PAH, preoperative PAH, anesthesia, perioperative management, hemodynamic changes, and mortality during pregnancy.

Results and Discussion: There were 2231 CS performed from January 2009 to March 2019, of which 2 cases were complicated with PAH and 4 were at risk of developing PAH during the perinatal period. Maternal mean age was 34.7 ± 6.7 years and gestational week was 29.7 ± 7.0 weeks. The causative diseases of PAH were 3 cases of mixed connective tissue disease (MCTD), 2 cases of congenital unilateral absence of a pulmonary artery (UAPA), and 1 of ventricular septal defect (VSD). In 3 MCTD patients, 2 patients had complicated with PAH, and 1 had hypoxemia without PAH. All 3 cases with MCTD were managed under general anesthesia during CS, and pulmonary artery catheters were inserted into 2 cases with PAH, in whom PAH worsened after CS. There was no perioperative maternal death, but one died within 5 years. 2 cases of UAPA and 1 of VSD, who were at risk of developing PAH, were managed under regional anesthesia. 2 patients of UAPA were inserted pulmonary artery catheters, there was no development of PAH during the perioperative period.

Conclusion: In CS of pregnant patients with PAH, a pulmonary artery catheter was useful for monitoring pulmonary artery pressure, and general anesthesia was selected because of the wide safety range. Patients at risk of developing PAH could be managed with regional anesthesia. We managed the patients safely according to the preoperative risk of each patient.

6276
Can a pregnant woman with Hypertrophic Cardiomyopathy be a problem to the anaesthesiologist's coronary arteries?
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Background: The number of pregnant women with cardiovascular disease is increasing. 1 In fact, cardiovascular disease is the leading cause of maternal mortality in much of the developed world. Some cardioc diagnoses hold significant risk of mortality during pregnancy but there are strategies to reverse this trend. A multidisciplinary team must work together to manage these complex patients.

Case Report: A 36-year-old pregnant woman, ASA II, with severe Hypertrophic Cardiomyopathy be a problem to the patient’s condition.

In CS of pregnant patients with PAH, a pulmonary artery catheter was useful for monitoring pulmonary artery pressure, and general anesthesia was selected because of the wide safety range. Patients at risk of developing PAH could be managed with regional anesthesia. We managed the patients safely according to the preoperative risk of each patient.

Discussion: Hypertrophic Cardiomyopathy (HCM) was admitted to an anesthesiology appointment to assess the best strategy to her labor analgesia. During pregnancy, pharmacological measures consisted of Methyldopa, Bisoprolol and Enoxaparin. After consulting the multidisciplinary team, they can be successfully managed throughout pregnancy and delivery.

Learning points: Although women with cardiomyopathy have more risks, with an experienced multidisciplinary team, they can be successfully managed throughout pregnancy and delivery.

invasive fluid therapy. Our case report illustrates the importance of preparing complications to allow for an effective execution of care.

References:
Pulmonary arterial hypertension (PAH) is an acceptable choice.

Anesthesia and cardiology: a successful partnership managing Catecholaminergic Polymorphic Ventricular Tachycardia in pregnancy

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Background: Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT) is a genetic disorder characterized by life-threatening arrhythmias in response to stress, either physical or emotional. It usually begins in childhood or adolescence, and no relation with structural heart disease or prolonged QT interval is present.

During pregnancy, many cardiovascular changes occur, and despite the risk of additional episodes is still uncertain, attention must be paid with a carefully planned multidisciplinary approach. We present a case report of successful pregnancy in a woman with previous diagnosis of Catecholaminergic Polymorphic Ventricular Tachycardia.

Case Report: A 36-year-old pregnant female, classified as ASA III, presented with history of mitral valve prolapse and CPVT triggered by exercise but with no recent episodes. Although she was aware of her condition, a non-planned pregnancy occurred and in order to decide how to manage the patient, a multidisciplinary team was brought together. Cardiology, in order to understand if she was a candidate for an implantable cardioverter - defibrillator or if maintaining her regular beta-blocker throughout pregnancy was enough; anaesthesiology and maternal-fetal specialists to decide the optimum timing, mode of delivery and analgesic technique. At 39 weeks she was admitted for a programmed C-section with an epidural technique. No complications were reported.

Discussion: A possible arrhythmia during pregnancy can be fatal for the mother or, even when the treatment is successfully managed to the mother, jeopardize the fetus. An hemodynamic compromise of placental blood flow may occur or even expose the fetus to adverse effects of the drugs used, having in mind their potential teratogenic effects. Also, as the literature shows and this case acknowledges, pregnancy and post-partum arrhythmic risk in CPVT patients does not appeared to be elevated compared with the nonpregnant period, although more studies are needed. Our case report illustrates how an interdisciplinary approach is critical balancing the emotional consequences of avoiding a pregnancy and the risk of major cardiac events. An experts team was required to ensure safety throughout pregnancy, labour and delivery.

Anaesthesia for caesarean section in women with sarcoidosis induced pulmonary hypertension

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Background and Goal of Study: Pulmonary hypertension (PH) is a complication of advanced sarcoidosis [1] is associated with increase risk of perioperative complications and adverse outcome in pregnant women[2]. The aim of this case report is to report anaesthesia for caesarean section and management of postpartum complications of patient with sarcoidosis induced PH.

Materials and Methods: 39 years old pregnant woman at 35 weeks of gestation age with known sarcoidosis diagnosis was admitted to Pauls Stradiņš Clinical University Hospital (Riga, Latvia) with dyspnea, lower limb edema, acrocyanosis. On admission – hemodynamics was stable, but EchoKGY showed right ventricle systolic pressure 110mmHg. On the 2nd day caesarean section was performed under epidural anaesthesia. Required level of anaesthesia was achieved using Sol. Bupivacaini 0.125%5ml/h combined with fentanyl 50mkg. After surgery she was admitted to the cardiac ICU. For postoperative analgesia continuous epidural infusion of Sol. Bupivacaini 0.125%5ml/h was used. On the 3rd day patient was discharged to the maternity ward. On the day 14 she was readmitted to general ICU with rapidly progressing septic shock due to pelvic abscess. Cardiorespiratory failure progressed and on the day 15 patient had negative outcome.

Results and Discussion: Epidural anaesthesia is advocated for caesarean section to the patients with severe PH, because lower risk of cardiopulmonary compromise. General anaesthesia decreases venous return and increases pulmonary vascular resistance. Spinal anaesthesia was avoided because of the risk of sudden decrease in the systemic vascular resistance. [3] Treatment of sarcoidosis usually includes systemic immunosuppressants which increase the risk of infection. [1]

Conclusion: Epidural anaesthesia during caesarean section is a method of choice for patients with PH. Underlying causes of PH that require additional treatment can even more increase mortality.

References:

Maternity in women with pulmonary arterial hypertension: what is the anaesthetist’s role?

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Background and Goal of Study: Pulmonary arterial hypertension (PAH) is an uncommon disease that affects mostly women in childbearing age. Despite all advances in PAH therapy, maternal mortality remains high. The aim of this study is to review the anesthetic management and outcome of these patients.

Methods: A retrospective descriptive study of 10 pregnant women with idiopathic or heritable PAH treated in a tertiary referral hospital between 2011 and 2017 was performed.

Results and Discussion: PAH was diagnosed before pregnancy in 8 out of 10 patients. Another patient was diagnosed during the first trimester and the last one during the puerperium. Three of them decided to terminate pregnancy due to high maternal risk. The 6 women who decided to continue the pregnancy were followed during the puerperium. Three of them decided to terminate pregnancy due to high maternal risk. The only death registered was a woman with previous diagnosis of Catecholaminergic Polymorphic Ventricular Tachycardia.

Conclusion: A pregnant woman with PAH represent a challenge for the anaesthesiologist. In selected patients, with good functional status and an adequate treatment response, regional anaesthesia could be the best option.

References:
Mechanism of pregnancy bidirectional effect on the pulmonary circulation in rats with pulmonary hypertension

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Background and Goal of Study: To observe the changes in the tension of pulmonary artery rings and the morphology of pulmonary arterioles and discuss the pathogenesis of pulmonary arterial hypertension and the effect of pregnancy on pulmonary arterial hypertension.

Materials and Methods: 55 female 6-week-old SD rats were randomly divided into 4 groups: Blank control group, (n=10), monocrotaline (MCT) group (n=13), pregnancy group (n=12) and pregnancy MCT group (n=20). After successful modeling, hemodynamic data were collected by internal jugular catheterization and femoral artery catheterization. Subsequently, the third-stage pulmonary artery rings of the rats were taken to observe the changes in pulmonary artery tension for the rats in all groups. At the same time, lung tissue specimens were collected to observe the damage to pulmonary arterioles.

Results and Discussion: Compared with pregnant group, MPAP was significantly increased in pregnant MCT group (p<0.05); the Ach-induced endothelium-dependent arterial diastole rate in the MCT group was significantly lower than that in the blank control group (p<0.05), and the Ach-induced endothelium-dependent arterial diastole rate in the pregnant MCT group was significantly lower than that in the pregnant group or MCT group (p<0.05). There was no significant difference in pulmonary endothelium-dependent diastolic function between the pregnant group and the blank control group (p>0.05). In the MCT group and the pregnant MCT group, the thickness of the rats’ pulmonary artery wall and pulmonary arterioles increased, the inner diameter gradually narrowed, hemangioma capillanisum was formed in the pulmonary arterioles, and some small blood vessels were obviously occluded.

Conclusion: Pregnancy further reduces pulmonary endothelium-dependent diastolic function of PAH rats and promotes the damage to pulmonary arterioles.

References:

Anaesthetic management of a case of early onset severe preeclampsia with HELLP syndrome for hysterotomy – TEG guided management: A case report

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Background: HELLP syndrome, a complication of severe pre-eclampsia occurs in 10–20% cases of severe pre-eclampsia1 and represents an advanced clinical stage of pre-eclampsia. It can lead to significant maternal (up to 24%) and perinatal mortality (up to 40%).1 Onset earlier than 28 weeks is rare and there is little published data on maternal and perinatal outcome.2 Anaesthesia management of these cases for emergency surgery can be challenging and TEG can play an important role in perioperative management of these cases.

Case Report: 36-year-old lady, GSP3 previous one caesarean section, gestational age 21 weeks, was admitted to labour ward with hypertensive crisis (180/100 mm Hg) and HELLP. She was taken up for emergency hysterotomy because of uncontrolled blood pressure despite of IV antihypertensive and prophylactic magnesium sulphate. Given the case severity and contraindications to neuraxial blockade, we opted for general anaesthesia with arterial line for continuous BP monitoring. Hysterotomy through classical uterine incision was done. Thromboelastogram done cooperatively showed findings consistent with thrombocytopenia and early coagulopathy. Estimated blood loss was 1100ml. We transfused 2 units of PRBC, 6 units of pooled platelets and 4 units of fresh frozen plasma along with 2gm fibrinogen and 1gm injection tranexamic acid guided by the TEG findings. At the end of surgery, patient was extubated in the operating room and shifted to ICU.

Discussion: Emergency surgery with a triad of uncontrolled blood pressure, ongoing DIC changes and haemorrhage makes anaesthesia for patient with HELLP challenging. TEG demonstrate the global interaction of platelets in the coagulation cascade (aggregation, clot strengthening, fibrin cross-linking, and fibrinolysis) and can guide transfusion strategy.3 Based on TEG analysis, correction can be provided with specific blood product administration. We managed our patient with same principles and had smooth anaesthesia and post-operative recovery.

References:

Learning points: Early onset severe Preeclampsia and HELLP is a challenge for anaesthetist. General anaesthesia if indicated needs careful planning. TEG can go a long way in successful outcome in such cases.

Use of deep neuromuscular blockade in intrauterine myelomeningocele correction surgery. Series of seven cases

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Background: Adzick et al demonstrated the benefits of surgical correction of the neural tube defect in prenatal period.1 Maintenance of deep neuromuscular block (PTC < 5) was performed to guarantee intraoperative immobility. This case series describes the use of deep neuromuscular block for this type of fetal surgery. Case Report: A series of seven cases is reported in which deep neuromuscular block was used in the management of neuromuscular relaxation in intrauterine myelomeningocele correction surgery. The data are presented in table 1. The aim of relaxation was PTC <5 responses. To maintain deep neuromuscular block, a bolus of rocuronium 0.3 mg/kg (1x ED95) was given if needed. Sugammadex was used for reversal in all patients. Fetal surgery and anaesthesia occurred uneventfully.

Deep Neuromuscular Blockade (n=7)

| weight (kg) | 73.57 ± 11.97 |
| height (cm) | 167.57 ± 4.99 |
| age (years) | 34 ± 3.6 |
| surgical time (min) | 201.42 ± 37.27 |
| anaesthesia time (min) | 272.14 ± 49.31 |
| rocuronium (mg) | 147.17 ± 26.15 |
| sugammadex (mg/kg) | 3.54 ± 1.08 |
| reversal time (sec) (mg/kg) | 112.5 ± 74.2 |
| reversal time (sec) (mg/kg) | 132 ± 161.3 |

Discussion: The level of neuromuscular block at the diaphragm has a major impact on surgical conditions, especially during abdominal and thoracic procedures. We hypothesize that surgical correction of intrauterine myelomeningocele also fits this definition. Thus, maintenance of deep level of neuromuscular block might reduce adverse surgical events, improve the outcome of this procedure and may contribute to an increased safety during surgical correction of intrauterine myelomeningocele. Further studies are needed to confirm this hypothesis.

References:

Learning points: Neuromuscular management in intrauterine myelomeningocele correction surgery.
Ex utero intrapartum bronchoscopy and selective intubation followed by delivery and neonatal pneumonectomy. A case report

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Background: Fetuses with large congenital pulmonary airway malformations (CPAMs) are at an increased risk of cardiopulmonary collapse after birth. Ex utero intrapartum treatment (EXIT) allows the selective intubation of the normal lung while on placental support and potentially prevents collapse after delivery on initiation of positive pressure ventilation (PPV).

Case Report: A 24 year-old woman with 36.5 weeks’ gestation, whose fetus was diagnosed with a large left CPAM, mediastinal shift and polyhydramnios. Right lung development was normal. A c-section with EXIT protocol, selective intubation and pneumonectomy after delivery were decided. Anesthesia for the c-section was combined spinal epidural anesthesia and general anesthesia with rapid sequence induction with propofol, rocuronium and remifentanil. Noepinephrine infusion was used to maintain arterial blood pressure. A nitroglycerine continuous infusion with sevoflurane (less than two MAC) provided multimodal uterine relaxation. After fetus exposure, pulse oximetry sensor was placed (showing 30-40%) and intramuscular anesthetic delivered (fentanyl, vecuronium and atropine). Rigid bronchoscopy and selective intubation were performed, PPV initiated and separation of placental circulation completed. SpO2 increased to 85-90% on 30% O2. Umbilical catheters were placed and the patient was transferred to the congestive theatre for thoracotomy and CPAM resection. A balanced general anesthetic with remifentanil and sevoflurane was used. After left lung exposure the endotracheal tube was withdrawn to allow for left lung insufflation. Only the lingular segment showed signs of air entry, so pneumonectomy was decided. Lung hilum manipulation lead to desaturation and hypotension, but SpO2 increased and hemodynamics were restored after epinephrine infusion and FiO2 titration. An US guided paravertebral block was done before transfer to NICU. The patient required PPV for 6 days and was discharged on day 22.

Discussion: EXIT procedures constitute an excellent delivery strategy for fetuses with prenatally diagnosed airway malformations. A complete evaluation of prenatal images and an organized multidisciplinary team are key factors for a successful approach.

Learning points: EXIT procedure allowed to secure the airway and provide PPV after delivery in a patient diagnosed with CPAMs. Adequate patient selection and organized multidisciplinary management is fundamental for successful treatment of neonates with large CPAMs.

References:

Learning points: Prenatal PPDH is scarcely reported in literature. Development of PPDH, epidural anesthesia and ultrasound for PPV are indications of EXIT strategy.

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Case Report: A 24 year-old-woman with 36.5 weeks’ gestation, whose fetus was diagnosed with a large left CPAM, mediastinal shift and polyhydramnios. Right lung development was normal. A c-section with EXIT protocol, selective intubation and pneumonectomy after delivery were decided. Anesthesia for the c-section was combined spinal epidural anesthesia and general anesthesia with rapid sequence induction with propofol, rocuronium and remifentanil. Noepinephrine infusion was used to maintain arterial blood pressure. A nitroglycerine continuous infusion with sevoflurane (less than two MAC) provided multimodal uterine relaxation. After fetus exposure, pulse oximetry sensor was placed (showing 30-40%) and intramuscular anesthetic delivered (fentanyl, vecuronium and atropine). Rigid bronchoscopy and selective intubation were performed, PPV initiated and separation of placental circulation completed. SpO2 increased to 85-90% on 30% O2. Umbilical catheters were placed and the patient was transferred to the congestive theatre for thoracotomy and CPAM resection. A balanced general anesthetic with remifentanil and sevoflurane was used. After left lung exposure the endotracheal tube was withdrawn to allow for left lung insufflation. Only the lingular segment showed signs of air entry, so pneumonectomy was decided. Lung hilum manipulation lead to desaturation and hypotension, but SpO2 increased and hemodynamics were restored after epinephrine infusion and FiO2 titration. An US guided paravertebral block was done before transfer to NICU. The patient required PPV for 6 days and was discharged on day 22.

Discussion: EXIT procedures constitute an excellent delivery strategy for fetuses with prenata
Optimizing multimodal uterine relaxation for laparoscopic myelomeningocele repair guided by EEG spectrogram

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Background: Myelomeningocele (MMC) is a neural tube defect that affects approximately 5-10 pregnancies per 10,000 in the United States. There is evidence showing that prenatal repair might be the best choice. New surgical techniques like laparoscopic MMC repair have been developed.

Case Report: A 34 y/o woman scheduled for laparoscopic MMC repair surgery at 23+5 weeks’ gestation was admitted to our hospital. A latex free environment was provided from admission to discharge. Magnesium sulfate infusion protocol was administered for fetal neuroprotection. A combined spinal epidural anesthesia was performed. Hyperbaric bupivacaine (10 mg) with fentanyl (25 μg) was administered intrathecally. An epidural catheter was placed for postoperative pain management. Rapid sequence induction was carried out with fentanyl (100 μg), propofol (80 mg) and rocuronium (60 mg). Maintenance of anaesthesia was achieved with target controlled infusion (TCI) of remifentanil 4-8 ng/ml, sevoflurane below 1.2 Minimum alveolar concentration (MAC) and fentanyl boluses. A Multimodal Uterine Relaxation (MUR) strategy was adopted: intrarectal indomethacin (before and after surgery), atosiban (7.5 mg before surgery, 300 μg/h for 3 h and 100 μg/h for 48 h), intraoperative nitroglycerin (0.1 μg/kg/min and 20 and 40 μg boluses when required) and intrathecal sevoflurane titrated according to EEG spectrogram. Uterine relaxation status was assessed by surgeons.

Discussion: Sevoflurane has been widely used as an effective uterine relaxant, but there is an increasing concern about an FDA warning about neurodevelopmental issues in children exposed to certain general anesthetics. Taking that into consideration, we aimed to lower exposure to general anesthetics with a MUR approach guided by EEG spectrogram for achieving both, an effective uterine relaxation and an optimal depth of anesthesia. It captures the effectiveness of individual agents in optimal dosages that maximize efficacy and minimize side effects.

References:

Learning points: EEG spectrogram is a useful tool for lowering MAC. MUR should be considered for open or laparoscopic MMC repair.

5703

The effect of remifentanil infusion on respiratory status in pregnant women undergoing fetal surgeries

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Background and Goal of Study: Since remifentanil undergoes extensive placental transfer, maternal administration has been used for fetal immobilization and/or maternal sedation during fetal surgeries. Generally, remifentanil is known to induce respiratory depression in proportion to the concentration of remifentanil (1). The aim of this study was to evaluate the effect of remifentanil on maternal respiratory status during fetal surgeries.

Materials and Methods: We examined obstetric and anesthetic data in pregnant women with twin-to-twin transfusion syndrome who underwent fetoscopic laser coagulation in our hospital between November 2018 and November 2019. The patient received combined spinal-epidural anesthesia with intrathecal injection of hyperbaric bupivacaine 7.5 mg, and local anesthetics were administered epidurally as necessary to obtain an adequate sensory block level. After confirming fetal conditions by obstetricians, remifentanil infusion was initiated at 0.1 μg/kg/min just prior to surgical procedure. When the fetal movement was observed by obstetricians, infusion rate of remifentanil was increased to attain optimal operative conditions. 2 L/min oxygen was supplied via nasal cannula and maternal respiratory condition was monitored by CapnostreamTM 20P (Medtronic, Minneapolis, MN, USA), which can measure both accurate end-tidal CO2 (ETCO2) and respiratory rate (RR) continuously.

Results and Discussion: Thirty patients were enrolled in this study. The mean (SD) age, BMI, and gestational weeks at the were 33 ± 4, 24 ± 4 and 21 ± 2, respectively. The median (IQR) sensory block level prior to the procedure was T8H (4-10). Maternal RR gradually decreased until 10 mins after the initiation of remifentanil infusion, then remained constant level, and finally gradually increased until 15 mins after the infusion and then remained constant level (Fig.1). Serious respiratory depression was not observed in any patients.

Conclusion: In our study, maternal RR decreased until 10 mins and ETCO2 increased until 15 mins after the infusion of remifentanil, then remained constant level.

References:

6382

Triplet pregnancy with preterm rupture of membranes in the setting of two prior Cesarean deliveries, high risk of placenta accreta and morbid obesity

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Background: 31yo obese (BMI 47, Mallampati 3) G8P3 woman with 2 prior cesarean deliveries (CD), 2 dilatation and curettage (D&C), uterine fibroids and a history of eclampsia presented with preterm rupture of membranes at 18-week gestation of a spontaneous monochorionic triamniotic triplet pregnancy. Blood pressures and laboratory tests were within the norm. Concerns for serious adverse outcomes following D&C included: (1) a morbidly adherent placenta (accreta) since a single anterior placenta overlying the previous uterine scars was identified on ultrasound, (2) uterine rupture in the setting of multiple previous uterine surgeries, and (3) postpartum hemorrhage (PPH) in the setting of fibroids, possible accreta and morbid obesity.1 Anesthesia-related concerns included: history of difficult intubation, obstructive sleep apnea and asthma. Patient was told to avoid general anesthesia (GA) when possible and requested neuraxial anesthesia, which was also our preference.

Case Report: Two large bore IV lines (16G) were placed, 1g IV prophylactic vancomycin and cefazolin. Intraoperative nitroglycerin (0.1 μg/kg/min and 20 and 40 μg boluses when required) and intrathecal clonidine were given. Difficult airway equipment was available in case of accreta or PPH. Spinal anesthesia was performed in the sitting position with a 25G Whitacre needle; a long-acting single shot spinal with hyperbaric bupivacaine 15mg, fentanyl 20mcg and clonidine 50mcg were given. Difficult airway equipment was available in case of accreta, uterine rupture, PPH and/or need for GA. Additional IV clonidine 75mcg was given for additional sedation. The procedure was completed with blood loss <300ml. The anesthetic lasted 4 hours and the patient was discharged home 9 hours after spinal anesthetic.

Discussion: Spontaneous triplet pregnancies occur in 32/100,000 pregnancies. Odds of placenta accreta or uterine rupture increase with every pregnancy and uterine incision/procedure. Given this patient’s multiparity and multiple obstetric procedures, her risk for accreta was as high as 61%.2 Clonidine has been shown to increase duration of neuraxial by an average 128 minutes. Clonidine also increased sedation and anxiolysis, but did not increase the risk of hypotension, pruritis or postoperative nausea/vomiting.

References:
Factors Associated with Unsuccessful Fetal Immobilization during Fetoscopic Surgery with Remifentanil Infusion

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Background and Goal of Study: Fetoscopic laser photocoagulation (FLP) is a procedure used to treat twin-to-twin transfusion syndrome (TTTS). We perform this procedure under combined spinal epidural anesthesia (CSEA) where the maternal administration of remifentanil is used to provide fetal immobilization and analgesia. Although remifentanil infusion is shown to attain adequate operative condition due to sufficient fetal immobilization during fetal surgeries (1), in our experience remifentanil infusion produces insufficient fetal immobility. Herein, we investigated the factors associated with unsuccessful fetal immobilization in anesthetic management with remifentanil infusion during FLP for TTTS.

Materials and Methods: Pregnant women with TTTS who underwent FLP in our hospital between January 2016 and April 2019 were included in this study. Patients were divided into 2 groups: pregnant women with successful fetal immobilization (Movement group) and unsuccessful fetal immobilization (Non-movement group).

Results and Discussion: Maternal age was 35 (34-38) years of age and 31 (29-37) years of age in movement group (n=13) and non-movement group (n=58), respectively (P=0.018). Gestational age was 23.6 (21.6-24.0) weeks and 19.9 (18.4-22.6) weeks in non-movement and movement groups, respectively (P=0.004). Estimated fetal body weight in both groups and recipients was larger in non-movement than in movement group (donors: 431 (277-510) vs. 200 (128-349) p=0.003 and recipients: 596 (411-649) vs 286 (188-518) p=0.001, respectively).

Conclusion: Unsuccessful fetal immobilization was 18% in CSEA with remifentanil infusion during FLP for TTTS. Higher maternal age, higher gestational age, and larger fetal body weight were associated with unsuccessful fetal immobilization.

References:

Heterotopic pregnancy: infrequent case with anesthetic implications

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Background: Heterotopic pregnancy, where 2 embryos implant in different sites, usually peritoneal hyperstimulation syndrome, in vitro fertilization or tubarian anesthetics used were propofol and fentanyl. Anesthetic maintenance with sevoflurane. Hemodynamic stability was kept, with slight hypotension upon induction, reversed with 5mg ephedrine. As no other anesthetic interferences ensued and considering the physiological parameters of pregnancy, peracetamol 1g and metoclopramide 10mg were administered. Peracetamol was kept post-op. A month after surgery, exams showed normal pregnancy progress.

Discussion: Research on anesthetic-surgical acts during pregnancy is scarce. As the patient’s clinical state may demand invasive methods, obstetric risks are reduced with clinically approved procedures(2). Risks of laparoscopy on pregnant women do not differ from all other patients, as it is still invasive. General anesthetic management consists of rapid-sequence induction with standard agents, tracheal intubation, and maintenance with a volatile agent. Propofol and sevoflurane are harmless anesthesia inducers. Phenylephrine is the consensual vasopressor, though others can be used(3). NO has been considered safe, but it acts on methionine synthase and DNA metabolism and it is not critical, so it is avoidable(3). Morrhine and suxamethonium are used as muscle relaxants. Remifentanil infusion is a safe anti-emetic, and paracetamol and fentanyl are harmless pain killers(3).

References:
in the GDFT group received more fluid than did those in the preload group (1126 ± 106 vs. 1245 ± 200 mL; p < 0.001), but the incidence of postspinal hypotension (78.1% vs. 70.6%) in the preload group and GDFT group respectively; p = 0.578) and dose of norepinephrine (12.0 ± 10.4 vs. 14.1 ± 12.7 mg) in the preload and GDFT groups, respectively; p = 0.269) were comparable between the two groups. Neonatal umbilical blood pH and pO2 were lower in the GDFT group, but these values were within the normal range. The incidence of maternal adverse effects was comparable between the two groups, although fewer parturients in the GDFT group experienced nausea (35.3% vs. 59.4%; p = 0.0634). CNAP and oscillometric systolic pressure were poorly concordant with each other (54.6%), and the CNAP detected two more hypotensive parturients. No CNAP normotensive parturient experienced maternal adverse effects, but two oscillometric normotensive parturients experienced nausea.

Conclusion: GDFT with a CNAP device did not ameliorate postspinal hypotension but may be beneficial for nausea. In addition, CNAP-defined normotension is useful in absence of maternal adverse effects.

5067

Predictability of preoperative carotid artery corrected flow time for hypotension after spinal anesthesia in patients undergoing cesarean section

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Background and Goal of Study: Spinal anesthesia induced hypotension is frequently reported in cesarean section. The related mechanisms are reduction of systemic vascular resistance and effective intravascular volume resulted from sympathetic block, which is more aggravated from aortocaval compression. Corrected blood flow time (FTc) is affected by left ventricular preload and is inversely related to systemic vascular resistance. Our hypothesis was that pre anesthetic carotid artery FTc could predict hypotension after induction in patients undergoing cesarean section under spinal anesthesia.

Materials and Methods: This prospective observational study was performed in 47 patients aged 20 to 40 years scheduled for elective cesarean section under spinal anesthesia. Two faculty anesthesiologists performed two assessment of carotid artery FTc before spinal anesthesia. FTc was calculated by Bazett’s formula and Wodey’s formula and recorded as FTc (B), and FTc (W), respectively. The incidence of hypotension was recorded from the spinal anesthetic injection until the fetus was delivered. The definition of hypotension is that the systolic blood pressure drops to less than 80 mmHg, or less than 75%. The areas under the receiver operating characteristic curves were calculated to measure predictability of FTc on occurrence of hypotension.

Results and Discussion: 35 patients completed the study. Hypotension occurred in 21 cases (60%). FTc (B) and FTc (W) were significantly higher in non-hypotension group than hypotension group (365.8 ± 18.1 ms vs. 334.7 ± 10.9 ms, P < 0.001; 342.4 ± 15.0 ms vs. 316.0 ± 8.6 ms, P < 0.001; respectively). Receiver operating characteristic curve analysis revealed FTc (B) 346.4 ms and FTc (W) 326.9 ms as the optimal cut-off values for prediction of hypotension with outstanding prediction ability (Table 1).

<table>
<thead>
<tr>
<th>AUROC curve (95% CI)</th>
<th>Optimal cut-off value (ms)</th>
<th>Gray zone (zone %)</th>
<th>Patients in gray zone (%)</th>
<th>Youden index J</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTc (B)</td>
<td>0.785 (0.757-0.813)</td>
<td>346.4</td>
<td>322.0-380.2</td>
<td>14 (14)</td>
</tr>
<tr>
<td>FTc (W)</td>
<td>0.822 (0.779-0.865)</td>
<td>326.9</td>
<td>322.0-321.0</td>
<td>5 (14)</td>
</tr>
</tbody>
</table>

AUROC, area under the receiver operating characteristic. CI, confidence interval.

Conclusion: In the current study, carotid artery FTc was found to be predictive indicator of hypotension with AUC more than 0.9. Considering the gray zone, FTc (W) is a better indicator than FTc (B).

5773

A randomized controlled trial of prevention of hypotension during elective caesarean section with a fixed-rate noradrenaline infusion versus a fixed-rate phenylephrine infusion

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Background and Goal of Study: Spinal anesthesia for cesarean section can be complicated by hypotension, with untoward effects for both the mother and fetus. Phentolamine can be used as a superior alternative, with better maintenance of cardiac output as compared to the former. The aim of this double-blind randomized study was to compare a fixed-rate prophylactic noradrenaline infusion to a fixed-rate prophylactic phenylephrine infusion during elective caesarean section under combined spinal-epidural anesthesia.

Materials and Methods: Eighty-two parturients were randomized to Group N (noradrenaline 4 μg/min) or Group P (phenylephrine 50 μg/min) fixed-rate infusions, starting simultaneously with the administration of the subarachnoid solution. Rescue bolus interventions of ephedrine 5 mg for hypotension or atropine 0.6 mg for heart rate<55 bpm were administered accordingly. The primary end-point of the study was the incidence of maternal bradycardia (HR<60 bpm). Additionally, maternal hemodynamics, the incidence of hypotension (SBP<80% of baseline) or bradycardia (HR<55% of baseline), the requirement for atropine or ephedrine, the incidence of maternal hypotension during caesarean section under spinal anaesthesia: A systematic review and network meta-analysis

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Background and Goal of Study: Maternal hypotension during the elective caesarean section is often induced after spinal anaesthesia and vasopressors are the most reliable method for counteracting this hypotension. We conducted a systematic review and network meta-analysis to compare and specifically evaluate the most effective vasopressor for preventing maternal hypotension, and decreasing fetal acidosis in parturients undergoing spinal anaesthesia for caesarean section.

Materials and Methods: We performed systematic and comprehensive search to detect all of the randomized controlled studies on vasopressors for the management of maternal hypotension during caesarean section under spinal anaesthesia, published until June 30, 2019. We conducted a network meta-analysis to combine the direct and indirect comparisons of the vasopressors. The primary outcomes are minimum systolic blood pressure and incidence of hypotension and fetal acidosis. StatA SE 15.0 was used for the meta-analysis.

Results and Discussion: Forty-one studies (n=2,885) with 6 different vasopressors injected in various ways were included. According to surface under the ranking curve (SUCRA) value, IV continuous infusion of norepinephrine (SUCRA value 90.2%) was found to be the most efficacious vasopressor that had lowest incidence of hypotension, followed by norepinephrine (38.3%), and phenylephrine (75.4%). The predictive interval plot showed that IV continuous infusion of all kinds of vasopressors were more effective than control. On the other hand, phenylephrine IV continuous infusion (83.9%) was most efficacious for maintaining relatively higher minimum SBP. In terms of preventing fetal acidosis, only angiotensin II IV continuous infusion (87.9%) was efficacious for resulting closer pH to 7.4. However, there was no statistical significance on 1 min and 5 min Apgar score.

Conclusions: All analyzed vasopressors are more effective only when those were infused continuously comparing with IV bolus injection in managing maternal hypotension. Therefore, clinicians should infuse any vasopressors continuously in this condition. According to the SUCRA, norepinephrine IV continuous infusion ranked the most efficacious vasopressor that had lowest incidence of maternal hypotension. Therefore, it may be suggested as a potential alternative to phenylephrine. On the other hand, there was no significant difference in umbilical arterial pH except angiotensin II IV continuous infusion.
0.014, 0.037 and 0.019, respectively), while Aggar scores did not differ. No difference in the occurrence of hypotension, hypertension or in the requirement for bolus vasocorticosteroid medication was demonstrated.

Conclusion: A fixed-rate infusion of 4μg/min of noradrenaline is as effective in the management of hypotension during spinal anaesthesia for caesarean section as a fixed-rate infusion of phenylephrine, with the avoidance of phenylephrine-induced bradycardia and its potential untoward effects on maternal cardiac output. The more favorable neonatal acid-base profile of noradrenaline might be due to better maintenance of placental blood flow in the noradrenaline group due to its beta action, while the higher fetal glucose concentration in the same group might result from a catecholamine-stimulated glucose metabolism increase and a beta-receptor mediated insulin decrease.

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Retrospective evaluation of maternal and fetal effects of shock index value in hypertensive diseases due to pregnancy

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Background and Goal of Study: Maternal Early Warning Criteria including: systolic - diastolic blood pressure (SBP - DBP), peripheral oxygen saturation and urine output, is a useful marker for predicting postoperative complications. Shock index (SI) is the ratio of heart rate to systolic blood pressure and was used to determine the need for fluid and transfusion in hypovolemia. The normal range was between 0.5-0.7, and as it is >1, it is correlated with postpartum severe bleeding in patients. The modified shock index (MSI) is a recently developed marker for the same purpose as the ratio of heart rate to mean arterial pressure. The aim of this study is to evaluate the effectiveness of SI and MSI as a parameter of early warning system in predicting maternal and fetal complications and mortality in pregnancy-related hypertensive diseases (GHT).

Materials and Methods: Following the local Ethics Committee approval, between 2012-2017, 192 patients between the ages of 13-47, undergoing cesarean section due to pre-eclampsia and eclampsia were enrolled in this study. We included 140 patients with preeclampsia, 15 with eclampsia, 24 with chronic hypertension and 13 with GHT. Vital signs, demographics and postoperative complications were recorded. IBM SPSS Statistics 22 was used for the statistical analysis. The results were evaluated at 95% confidence interval and a p-value less than 0.05 was accepted as statistically significant.

Results and Discussion: Maternal age was significantly lower in patients who were internalized due to eclampsia (p <0.01) and SI, MSI were high. Heart rate, SBP-DBP, SI and MSI values at the time of admission were similar after the operation. Postpartum SI was significantly higher in eclampsia and GHT group compared to other groups (p <0.05). SI and MSI values of the patients at admission and delivery were significantly higher in all groups. The number of epileptic seizures and length of stay in the Intensive Care Unit, intubation rate of fetuses were higher in the eclampsia group (p <0.05). There was a positive correlation between admission SI values and embolism and arrhythmia at admission MSI and between MSI at birth and IURS.

Conclusion: We concluded that MSI and SI values may be an important predictor of predicting complications in mother and fetus as well as evaluating SBP-DBP measurements as risk markers, especially in pregnancies with eclampsia.
Anesthesia for pregnant patient: A report on myasthenia gravis and scleroderma

V. Myasthenia gravis is an autoimmune chronic disease with prevalence of 1 in 7,000. Scleroderma affects mostly young women, in which pregnancy increases the disease in 50% of the patients.

Case Report: A 20-year-old patient, PS3E, gestational age 33 weeks and 4 days, diagnosed with myasthenia gravis and limited cutaneous scleroderma was hospitalized for severe pre-eclampsia. Previous cesarian-section since 11 months with fetal death of 27 weeks due to eclampsia. Came to obstetric emergency with blood pressure of 170 x 100mmHg and strong headache. Cesarian-section was indicated. The pre-anesthetic evaluation was observed predictors of difficult airways: mouth opening 2cm, Mallampati 4 and thyromental distance 6cm. Opted for spinal anesthesia and the presence of 2 anesthesiologists at the operation room. The general surgery team was present if it was necessary emergency surgical approach of airways. Monitoring: oximeter, non-invasive pressure, cardiocopy with 5 derivations. Spinal anesthesia was performed with Quincke 26G needle, a median puncture after second attempt at L3-L4 vertebral interspace. Hyperbaric bupivacaine 13mg and morphine 100mcg were injected at subdural space. The level of sensory block reached T4. Intravenous drugs as cefazolin 2g, dexamethasone 10mg, octocloctic 5 UI and ondansetron 8mg were made. After the procedure, the patient was directed to the recovery room in spontaneous ventilation, staying under observation for 24 hours. The patient evolved without complications, being directed to the infirmary.

Discussion: Patients with myasthenia gravis usually need ventilatory support after the surgery. The muscular strength seems adequate during the immediate postoperative, but it can deteriorate some hours later. The anesthetic evaluation of the patients with scleroderma must show attention to the narrowing of the oral opening due to the cutaneous stiffness and the laryngoscopy by optical fiber might be necessary.

References:
2. Learning points: Coexisting diseases can severely increase the anesthetic risk in pregnant patients.

Obstetric Anaesthesiology

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Anesthetic and surgical outcomes for placenta accreta cesarean delivery in the hybrid versus the labor ward operating room: Retrospective cohort study

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Background: Prophylactic balloon occlusion (PBO) may reduce hemorrhage during cesarean delivery for suspected placenta accreta spectrum (PAS). We report planned use of a hybrid operating room (hOR) using PBO prior to cesarean delivery compared with management in the labor ward operating room (lwOR).

Methods: Retrospective study (IRB approved) identified all PAS (01/01/2016 to 31/12/2018) from hOR and lwOR. Primary outcome was estimated blood loss (EBL). Anesthesia mode was at the anesthesiologist’s discretion [neuraxial or general anesthesia(GA)]. Maternal, obstetric and perioperative characteristics are reported using descriptive statistics. EBL was compared (hOR vs. lwOR) using Mann-Whitney U test and anesthesia mode using Chi-square.

Results: Twenty-four women were identified, hOR=10 and lwOR=14. All hOR cases had ≥ 1 PAS ultrasound (US) characteristic, 4 cases had surgically confirmed PAS. All lwOR cases had surgical confirmation of PAS and 6 had US characteristics. Median(IQR) EBL was 900(500-1125)mL vs. 1100(1000-1625)mL, hOR vs. lwOR respectively, p=0.048. Nine hOR cases underwent spinal (for balloon insertion) followed by GA; one underwent the procedure combined spinal epidural. In lwOR, 6 cases had GA, 7 had spinal and one had spinal followed by GA. The rate of pure GA was significantly higher for women in lwOR, p=0.014. Total network packed cells transfused 11 vs. 23 for hOR and lwOR respectively with mean(SD) of 1.1(1.7) vs. 1.5(2.1), respectively; p=0.06. Mean(SD) cryoprecipitate transfusion was also lower in hOR compared to lwOR: 1(3.2) vs. 2(7.4). No platelets or plasma were transfused in hOR compared to total of 33 units transfused in lwOR. Length of surgery differed; 102(67) vs. 54(30) minutes, hOR vs. lwOR respectively, p=0.026. Complications from the PBO included one thrombus requiring thrombectomy and two cases of self-limiting groin hematomas.

Conclusion: EBL was significantly higher among women undergoing cesarean for PAS in the lwOR. Our data suggest that planned use of hOR is potentially beneficial for women with suspected PAS undergoing delivery, with a greater likelihood of undergoing the procedure under neuraxial anesthesia.

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Epidural conversion for emergency cesarean section – a nationwide Israeli survey

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Background and Goal of Study: Epidural augmentation/conversion from analgesia to emergency c-section anesthesia is a common practice. According to literature, best practice is no more than 3% failed conversions. In this survey we examined the common augmentation practices among different hospitals in Israel. We investigated whether practices vary by hospital size (determined by annual deliveries), and if different factors correlate with success rate.

Materials and Methods: A questionnaire containing 43 questions was sent to obstetric anesthesia unit heads and to four additional anesthesiologists (residents + senior) in 24 obstetric anesthesia units nationwide. Answers were received anonymously and online, using the Monkey Survey method.

Results and Discussion: 99/120 participants responded to the survey (82.5%). Reports on success rates were highly variable – ranging from 0-40%. Only 26% of hospitals reported best practice rates (no more than 3% failed conversions).

Conclusion: Breakthrough pain during a CS is extremely uncomfortable for the mother. A pro-active policy is required in order to prevent breakthrough pain or discomfort during CS. Early identification of problematic epidural catheters for labor analgesia is essential in the prevention. Strategies to reduce the incidence may include a reduction in duration of surgery and administration of a prophylactic epidural top-up if duration of surgery is prolonged.
80% of large hospitals have a detailed epidural augmentation protocol (p=0.034). More than 80% use Lidocain. 74.2% supplement with bicarbonate. 24.2% add adrenalin, mostly in large hospitals (p<0.001). The most commonly used drug combination is lidocaine+fentanyl+bicarbonate, with no adrenalin (41%). In large hospitals, 98% initiate drug bolus before entering operating room (p<0.001). We found that hospitals that require official training in obstetric anaesthesia have lower failed conversion rates (p=0.036). We found that successful conversion is weakly correlated with bicarbonate supplementation (p=0.08).

Conclusion: We report variations in common practices, depending on hospital size. However, these have little effect on success rate. Proper training to anaesthesiologists who work regularly in delivery rooms, and bicarbonate supplementation can improve epidural conversion for c-sections.

Acknowledgements: Dr. Amir Giladi, Tali Bdolah-Abram.

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Fast-track in caesarean section: a multidisciplinary challenge

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Background and Goal of Study: The publication of the Enhanced Recovery After Surgery in caesarean delivery guidelines has created a pathway for postoperative care. Recommendations include nausea and vomiting prevention, postoperative analgesia, early mobilization and urinary drainage. It is a multidisciplinary challenge that involves obstetricians, anaesthesiologists and midwives. The aim of our study is to assess whether the non-insertion or early removal of urinary catheter (UC) after caesarean section (CS) affects the time of first micturition and the time to mobilization, as well as how these times are affected by morphine on neuraxial anaesthesia.

Materials and Methods: An observational study is being conducted in our centre. According to obstetric criteria, the non-placement of UC or its early removal (<6h) are conducted when possible in CS. Demographic and obstetric data, type of CS, time of UC removal, type of anaesthesia and opioid used, complications, time of first micturition and time to mobilization were collected. Data were analysed using Stata v15.

Results and Discussion: 37 women, mean age 34.1 years (SD 5.3) are currently included in the study. 24 underwent elective CS, 9 had CS in labour and 4 had urgent CS. UC was placed in 27 patients, early removed in 21 and not placed in 10. Epidural anaesthesia was used in 9 patients and spinal anaesthesia in 28. Neuraxial morphine was used in 18 patients. Comparing patients who received morphine to those who did not, no differences were found in the time of first micturition and the time to mobilization (p>0.05), nor in postoperative complications. A difference of 6.9 hours (IC95% 1-12.8h, p=0.02) was found between the time of mobilization in patients in which UC was not placed or early removed compared to those with late removal (>6h), with no differences in the time of first micturition after UC removal. Conclusions: The non-placement of UC or its early removal promotes early mobilization without promoting urinary retention. Low dose of neuraxial morphine does not delay first micturition or mobilization and does not increase postoperative complications. This is an ongoing study and more data should be collected to provide stronger recommendations.

References:

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Re-audit of postoperative monitoring of women undergoing caesarean section (CS) under neuraxial block with diamorphine: A monitoring tool of improved perioperative care and measure of practicality of guidance

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Background and Goal of Study: Poor postoperative care was found to be a contributing factor for three maternal deaths on CEMID triennium report. NICE has suggested an hourly 12-hour monitoring at the ward level for women who received intrathecal diamorphine on its 2004 guidance to avoid delayed respiratory depression (1).

Materials and Methods: We conducted a prospective audit to check whether post-operative CS patients with opioids were monitored for all 3 parameters i.e. pain score, sedation score (AVPU), respiratory rate for up to 12 hours in the recovery and ward as per the NICE guideline, and also see whether any improvement from previous audit had been done. Fifty women who had CS in theatres were followed up the next day and their notes were reviewed to see how many observations of pain score, sedation score and respiratory rate were actually done in the recovery and the ward.

Results and Discussion: Our previous audit showed compliance rate of 42% in terms of observations numbers. Following the implementation of recommendations our compliance rate has improved to 49.4%. We aimed for a target compliance of 80% to NICE guidance (2). Staff shortage, work load on the ward, simultaneous presence of other scoring systems (e.g. MEWS, MODIS) and local training availability are all contributing to not achieving 100% compliance. Our correspondence with NICE on the points of reality and level of evidence was taken up for consideration to review the current guidance by the NICE developers.

Conclusions: Although rare, delayed respiratory depression following intrathecal opioid administration can be fatal in post-partum women. More studies are needed to determine who are likely to be at risk. Meanwhile, monitoring is essential. Clinical audit is known as an effective tool to measure compliance level with guidance. Our study has proven to be a realistic tool to measure the practicality of an idealistic guidance in our practice.

Learning point: Clinical audit not only improves the clinical practice and patient safety, but is also a realistic tool to measure the practicality of an idealistic guidance.

References:

5613
Spinal Anesthesia for Cesarean Delivery in a Parturient with Klippel-Feil Syndrome

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Background: There are no specific recommendations for type of anaesthesia in patients with Klippel-Feil Syndrome (KFS). We report successful anaesthetic management in parturient undergoing C-Section (CS) under spinal anaesthesia (SA).

Case Report: A 30 year old primipara 151 cm in height, 48 kg weigh, with low hairline and short neck with restricted neck movements and severe thoracic kyphoscoliosis was scheduled for CS. Preoperatively laryngoscopy was performed by otorhinolaryngologist and have presented features of difficult airway (Mallampati 3). Her vital capacity was 24% of predicted with an FEVI/FCV ratio of 0.85. We use SA with 8 mg 0.5% subarachnoid bupivacaine, 20 mcg fentanyl and 100 mcg morphine (total volume 2.2 ml). This provided anaesthesia up to T4 sensory level, without significant effects on cardiovascular or respiratory function. No side effects occurred and the parturient was discharged after 7 days.

Discussion: The clinical findings of short neck, limited neck movement, low posterior hair line and thoraco-lumbar kyphoscoliosis led to diagnosis of KFS although various other congenital anomalies can be associated with it (1). The major anaesthetic considerations while managing a patient with KFS are spinal deformities, which can lead to anticipated difficult airway due to fused cervical vertebrae. Epidural anaesthesia can be a technique of choice for the majority of CS but there is concern regarding to identification of the epidural space and unpredictable spread of
anesthetic within the modified epidural space in KFS (2). Low dose SA minimize this inadequacy, providing a more reliable sensory block, but care is given to choose the right spinal dose. It is our experience to limit the dose of isobaric bupivacaine up to 10 mg which in many cases proved to be correct.

References:

Learning points: Spinal low-dose anesthesia in some situations might also be successful alternative technique for CS in patients with KFS.

5156

Cauda equina syndrome following combined spinal-epidural anesthesia with levobupivacaine and sufentanil for elective cesarean section

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Background: Cauda equina syndrome (CES) is a rare complication of spinal and epidural anesthesia, more frequently reported with lidocaine. We describe a case of CES following spinal administration of levobupivacaine.

Case Report: A 33-year-old female (72 kg, 160 cm), ASA II, with no relevant background or known allergies, underwent elective cesarean section under locoregional anesthesia. The combined technique was performed in the sitting position, first attempt, with 18G Tuohy epidural and 27G lancet spinal needles at L3-L4 interspace. Levobupivacaine 0.5% (8mg) and sufentanil (1.5 mcg) were injected intrathecally. No adverse events, pain or paresthesia were reported during the procedure. After the uneventful cesarean and upon recovery from motor block, she was discharged to the obstetrics ward. Postoperative analgesia with levobupivacaine 0.25% (15 mg), via epidural bolus, 4/4h was initiated. Within 34 hours, patient referred neurological symptoms: diminished strength and abolished osteoendontous reflexes (OTR) in the left lower limb (LLL), bilateral L4-L5 and sacral dermatomes hypoesthesia, sphincter dysfunction and saddle anesthesia. Lumbarosacral CT scan and MRI revealed no hematoma or compression of the cauda equina nerve roots or spinal medulla. Patient began a 7-day course of IV methylprednisolone (1g q.d.). At hospital discharge, she could walk short distances, no sphincter dysfunction and saddle anesthesia. Nine-month follow-up revealed no sphincter dysfunction and improved strength with autonomous walking but maintenance of diminished OTR in the LLL and saddle anesthesia.

Discussion: Cauda equina syndrome is a rare complication of spinal and epidural anesthesia, more frequently reported with lidocaine. We describe a case of CES following spinal administration of levobupivacaine. No adverse events, pain or paresthesia were reported during the procedure. After the uneventful cesarean and upon recovery from motor block, she was discharged to the obstetrics ward. Postoperative analgesia with levobupivacaine 0.25% (15 mg), via epidural bolus, 4/4h was initiated. Within 34 hours, patient referred neurological symptoms: diminished strength and abolished osteoendontous reflexes (OTR) in the left lower limb (LLL), bilateral L4-L5 and sacral dermatomes hypoesthesia, sphincter dysfunction and saddle anesthesia. Lumbarosacral CT scan and MRI revealed no hematoma or compression of the cauda equina nerve roots or spinal medulla. Patient began a 7-day course of IV methylprednisolone (1g q.d.). At hospital discharge, she could walk short distances, no sphincter dysfunction and saddle anesthesia. Nine-month follow-up revealed no sphincter dysfunction and improved strength with autonomous walking but maintenance of diminished OTR in the LLL and saddle anesthesia.

Discussion: Cauda equina syndrome is a rare complication of spinal and epidural anesthesia, more frequently reported with lidocaine. We describe a case of CES following spinal administration of levobupivacaine. No adverse events, pain or paresthesia were reported during the procedure. After the uneventful cesarean and upon recovery from motor block, she was discharged to the obstetrics ward. Postoperative analgesia with levobupivacaine 0.25% (15 mg), via epidural bolus, 4/4h was initiated. Within 34 hours, patient referred neurological symptoms: diminished strength and abolished osteoendontous reflexes (OTR) in the left lower limb (LLL), bilateral L4-L5 and sacral dermatomes hypoesthesia, sphincter dysfunction and saddle anesthesia. Lumbarosacral CT scan and MRI revealed no hematoma or compression of the cauda equina nerve roots or spinal medulla. Patient began a 7-day course of IV methylprednisolone (1g q.d.). At hospital discharge, she could walk short distances, no sphincter dysfunction and saddle anesthesia. Nine-month follow-up revealed no sphincter dysfunction and improved strength with autonomous walking but maintenance of diminished OTR in the LLL and saddle anesthesia.

Discussions: Prompt suspicion of neuroaxial complications, early detection and treatment are vital to minimize the risk of permanent damage.

5821

Perioperative management for elective cesarean section in a woman with superior vena cava syndrome

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Background: Patients with superior vena cava syndrome (SCVS) bring out two main problems for anesthesiologists: hemodynamic and respiratory compromise (1). Pregnancy per se is already associated with increased hemodynamic and respiratory risk, which hinders SCVS diagnosis. SCVS in a pregnant woman generate a particularly with high perioperative risk scenario (2).

Case report: Pregnant woman with SCVS due to a diffuse B-cell non-Hodgkin lymphoma of the primary mediastinal type who underwent elective cesarean section at 32 week gestation time. A titrated epidural was performed successfully hemodynamic stability during surgery. In case of failed epidural we pre-planned a general anesthesia with fiberoptic guided intubation if hemodynamic stability and fetal wellbeing was preserved or a general anesthesia with rapid sequence induction otherwise. The cardiac surgery team was physically present on the surgical block and cardiopulmonary bypass (CBP) and/or extracorporeal membrane oxygenation (ECMO) was readily available.

Discussion: SVCS in pregnant management is scantily reported in anesthetic literature (3). We believe that there is no ideal anesthetic plan for this clinical scenario. Yet neuroaxial techniques are a sound first option management. Other anesthetic procedures can be nevertheless be considered in each individual case. Having a detailed plan of action is crucial regardless on the anesthetic technique of choice.

References:
Cesarean section in a patient with Severe Aortic Stenosis: an anaesthetic approach

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Background: Aortic stenosis (AS) may present for the first time during pregnancy, and severe form poses a high risk with heart failure occurring in 10% and arrhythmia in 3-25%. We present a case of severe AS submitted to caesarean section under general anaesthesia.

Case Report: A 42-years-old primigravida, 36 weeks gestation, was submitted postpartum depression is the common complication after childbirth, affecting about 10-15% of women and is associated with serious long-term consequences for the mother and the family. Whether or not neuraxial labour analgesia could prevent postpartum depression has been debated and remains controversial (1,2). The purpose of this systematic review and meta-analysis is to determine the effect of neuraxial analgesia on the incidence of postpartum depression.

Learning points: Multidisciplinary approach and timing for cesarean decision are vital for uncomplicated discharge of both mother and baby.

Systematic review and meta-analysis of the association between labour neuraxial analgesia and breastfeeding

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Background and Goal of Study: Breastfeeding is recommended by the World Health Organization as it confers health benefits to both, mother and child (1). Some studies have shown that neuraxial anesthesia, the gold standard for labor analgesia, has a negative effect on breastfeeding (2), a finding not corroborated by others (3).

Materials and Methods: For this meta-analysis we included studies that compared neuraxial analgesia to alternate analgesia (intravenous opioids or N2O) or no analgesia and assessed the success of breastfeeding after two to twelve weeks. A systematic literature research was performed across various databases to identify retrospective or prospective studies. We aggregated the retrieved data in a conventional meta-analysis, using the random effects model.

Results and Discussion: We included six studies and 2314 participants. Women with neuraxial analgesia were less likely to breastfeed, odds ratio and 95% confidence interval, (95%CI) being 0.67 (0.53 to 0.85). Heterogeneity was not elevated with ID2=0%. One study had a high weight and omitting these data from analysis (leave-one-out meta-analysis) then yielded no significant difference between the neuraxial and the alternate or no analgesia group: OR 0.83, 95%CI 0.58, 1.19 (Figure 1).

Conclusion: Our data suggests that neuraxial analgesia does not reduce the likelihood of breastfeeding after two to twelve weeks. Women who have chosen to deliver without neuraxial analgesia may be more inclined and motivated to breastfeed, may have had shorter and easier labors, and may be less sensitive to pain. All these factors rather than the neuraxial analgesia may influence breastfeeding maintenance.
Accidental dural puncture (ADP) is the most common complication related to anesthesia in the obstetric patient. An ADP causes a temporary leak of cerebrospinal fluid and may produce a typical headache pattern (1). Therefore, the risk to develop a PDPH should depend on the needle size (1). The goal of this study is to establish whether the size of the dural puncture is a risk factor to develop a PDPH.

Results and Discussion: The size of the dural puncture may not be a risk factor to develop a post-dural-puncture headache. The conclusions of this study should not be explained only by pain scores.

References:

Background and Goal of Study: Accidental dural puncture (ADP) is the most common complication related to anesthesia in the obstetric patient. An ADP causes a temporary leak of cerebrospinal fluid and may produce a typical headache pattern. Therefore, the risk to develop a PDPH following an ADP should depend on the needle size. The goal of this study is to establish whether the size of the dural puncture is a risk factor to develop a PDPH.

Results and Discussion: The size of the dural puncture may not be a risk factor to develop a post-dural-puncture headache. The conclusions of this study should not be explained only by pain scores.
Epidural analgesia is sited in around 30% of patients received labour epidural/spinal to elective caesarean. Both had no previous pathological medical history however...
Prevention of postdural puncture headache: retrospective analysis of 12 years experience in a tertiary obstetric referral center

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Background and Goal of Study: Post dural puncture headache (PDPH) following accidental dural puncture (ADP) is a common complication of neuraxial anaesthesia and represents a relevant cause of short term morbidity in parturients. The aim of our study was to evaluate factors influencing headache incidence, duration and intensity following accidental dural puncture in obstetric patients.

Materials and Methods: We conducted a retrospective study in a tertiary referral center between January 2007 and December 2018. During this period, 26711 neuraxial blocks were performed: 4321 epidural and 4321 combined spinal-epidural. Record sheets of all patients who experienced either ADP or PDPH were reviewed. Headache intensity was stratified as absent, mild, moderate or severe and duration classified in four groups (<24h, 24-48h, 48-72h, >72h).

Descriptive analyses of variables were used to summarize data and chi-square, Fisher’s exact or Mann-Whitney U tests were performed (significance p<0.05).

Results and Discussion: There were 87 ADPs (0.3%), 63 (72.4%) observed and the remaining cases being PDPH following suspected/recognized ADP. Conservative prophylactic measures (bed rest, adequate hydration, caffeine, oral analgesics) were immediately initiated in 44 (50.6%) ADPs. Seventy (80.5%) women developed PDPH. Prophylactic measures significantly reduced PDPH incidence (88% vs 93%, p=0.003) and intensity (p<0.001), but increased duration (p=0.03). After detected ADP, re-siting epidural catheter at a different lumbar interspace was associated with decreased incidence (66.6% vs 100%, p=0.03) and intensity (p=0.02), but did not influence the duration (p=0.58) of PDPH when compared with catheter insertion in the same space. PDPH incidence and character was not significantly influenced by maternal age, body mass index and parity, gestational age, neither by neuraxial technique type, performance in sitting vs lateral decubitus position, interspace level or spinal/epidural needle caliber.

Conclusion: Incidence of PDPH was similar to previously published reports. After suspected or witnessed ADP, immediately prophylactic measures and epidural catheter re-siting at different lumbar interspace may help to prevent or alleviate PDPH symptoms.

Treatment of post dural puncture headache: review of 26,711 obstetric cases at a single centre

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Background and Goal of Study: Accidental dural puncture (ADP) and post-dural puncture headache (PDPH) remains a disabling outcome in the obstetric population. We aimed to evaluate its management among obstetric anaesthesiologists.

Materials and Methods: We conducted a retrospective review of all ADP cases at a tertiary obstetric referral center. Between January 2007 and December 2018, 26,711 neuraxial blocks were performed: 21,953 epidural, 437 spinal and 4,321 combined spinal-epidural. Descriptive analyses of variables were used to summarize data.

Results and Discussion: There were 97 ADPs (0.3%), 42 (72.4%) observed and 16 (27.6%) in which PDPH followed unrecognized/ADP. Seventy (80.5%) women developed PDPH in total. Conservative management (bed rest, adequate hydration, caffeine, oral analgesics) was performed in all patients. An epidural catheter was advanced to the subarachnoid space and left in place for up to 24h in 7 women (9%) but this was not significantly associated with decreased incidence of PDPH (p=0.10). Epidural blood patch (EBP) was performed in 24 (38%) of women after known ADP and 14 (58%) of initially unrecognized ADP always after at least 48h of PDPH installation with a median volume of 20 mL of blood. A different vertebral space to the one where ADP happened was chosen in 57.7%. Repeat EBP was needed in 2 (5.3%). Median duration of hospitalization was 4 days (interquartile range 2-5). Twelve women (17.1%) were readmitted due to persistent symptoms, with a median duration of hospitalization of 4 days.

Conclusion: Incidence of ADP, PDPH and EBP was similar to the literature. In our series, the EBP was only performed as the conservative measures failed and occasionally mandated a second procedure. PDPH is associated with an increased length of stay and post partum readmissions.
Acute standord type b aortic dissection in a puerperal patient with borderline marfan syndrome (MS)

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Background: Cardiovascular morbidity is the main cause of maternal complications during pregnancy. Aortic disease is its main contributor, although connective tissue disorders are becoming an increasing etiology. We report the case of a patient with borderline MS criteria that developed an acute type B aortic dissection (AAD) in the postpartum period.

Case Report: A 43-year-old pregnant patient, with a medical history of recurrent miscarriages and borderline criteria for MS, was admitted for labor in 38 week. She had been followed up by the high-risk obstetric and cardiology unit. There were no relevant echocardiographic findings except for a minimal aortic root dilation-37mm-that did not contraindicate vaginal delivery, which went uneventful. Eight hours later the patient developed progressive chest and back pain as well as dyspnea. The x-ray confirms this entity. The multidisciplinary involvement and the presence of thoracic surgeon during the surgery were essential. The cesarean section was performed 4 weeks later after multidisplinary decision.

Discussion: MS is the most frequent cause of aortic dissection during pregnancy. It is caused by a mutation in the fibrillin gene and has got a high variability in its phenotypic expression. Common features include a proximal aortic dilation, the most important risk factor for dissection. Absence of dilatation does not exclude this complication, which tends to take place in third trimester and postpartum period due to the elevated cardiovascular demand. It is essential to perform an individual risk assessment which includes prepregnancy complete aortic imaging. Pregnancy is discouraged and aortic replacement advised if aortic diameters exceed 40-45mm. Patients with coagulation disorders are at risk of developing spinal epidural haematoma, which can lead to permanent neurological damage. The women with inherent coagulation defects are commonly denied epidural analgesia during pregnancy. It is caused by a mutation in the fibrillin gene and has got a high variability in its phenotypic expression. Common features include a proximal aortic dilation, the most important risk factor for dissection. Absence of dilatation does not exclude this complication, which tends to take place in third trimester and postpartum period due to the elevated cardiovascular demand. It is essential to perform an individual risk assessment which includes prepregnancy complete aortic imaging. Pregnancy is discouraged and aortic replacement advised if aortic diameters exceed 40-45mm. Follow-up includes periodic echocardiography and betablockers to delay aortic growth rate. Vaginal delivery is considered a safe option in low-risk patients. Special attention should be paid to the presence of thromboembolic events. Insertion of an IVC may be considered when anticoagulation is contraindicated.

References:

Learning points: SSSH is a very rare complication of preeclampsia that should be managed depending on hemodynamic stability and hematoma integrity. Special attention should be paid to the presence of thromboembolic events.

NOVOSEVEN® in single dose for realization of epidural technique in twin gestant with slight deficit of Factor VII

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Background: Patients with coagulation disorders are at risk of developing spinal or epidural haematoma secondary to neuraxial anaesthesia (NA). This condition can lead to permanent neurological damage. The women with inherited coagulation defects are commonly denied epidural analgesia during labour. However, epidural is the most effective way of managing and allows to carry out caesarean section if needed.

Case Report: A 33 year-old woman, twin pregnant of 38 weeks, with slight deficit of Factor VII levels (24-30%). She presents mild gingival bleeding, menses of 7 days with important bleeding and facial equimosis with minimal trauma. She had an ovarian puncture without incidences. She was followed by hematology. Last Factor VII level was 55%, which was considered in hemostatic range. Hematologist indications were to administrate 0.5 mg of novoseven 30 minutes before epidural analgesia. If needed caesarean section were administrate other 0.5 mg after 4 hours of the first dose.Finally, CS was done by altered fetal pH. Uterine contraction was achieved with syntocinon at usual dosis and misoprostol. No excessive bleeding occurred, and transfusion was not necessary.

Discussion: The use of NA in individuals with coagulation disorders is contentious. The benefits of avoiding general anaesthesia have to be balanced over the risk of epidural haematoma, which can lead to permanent neurological damage, but it has been shown that NA can be safely performed if the coagulation defect is normalized by adequate haemostatic cover. Very few cases in scientific literature have been reported, so a consensus for prophylaxis does not exists. For prophylactic use, it does not exist any clear recommendation about the specific dose and the duration of treatment; in general, it is employed the same dose suggested for haemorrhage...
treatment and the choice to use or not the prophylaxis is at the discretion of the caregivers, considering fIVI level and bleeding tendency. Pregnancy doesn’t requires any specific considerations.

References:

Learning points: The prophylaxis with NOVOSEVEN is effective and safe and should be always considered in obstetric haemostatic. It would be ideal to monitor coagulation with rotational thromboelastometry.

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Sometimes HELLP is not just a HELLP. A case report

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Background: HELLP syndrome is a multisystemic disorder related with preeclampsia which remains an important cause of maternal and perinatal mortality and morbidity!1. We present the management of a patient with HELLP syndrome admitted at our tertiary hospital for the delivery of a twin gestation.

Case Report: This 21-year-old primiparous patient was admitted to the hospital for preeclampsia at 36+4 week of gestation, with high blood pressure associated with epigastralgia, photopsias and edema. Induction of labour was indicated and an epidural catheter was inserted for labour analgesia. Magnesium sulfate perfusion was initiated. The persistence of abdominal pain permitted to diagnose a placental abruption, and a category 1 caesarean section was performed: the foetus was delivered with good vitality signs. The patient presented uterine atony and required the intravenous administration of 10 IU oxytocin, 0.2 mg methylergometrine and 1 mg of intrarectal misoprostol. She needed a transfusion of 2 units of RBC, 1 gr fibrinogen and 1gr tranexamic acid. She was transferred to the ICU. In the ICU, she developed a multiorgan failure associated with acute oliguric renal failure which required renal replacement therapy for 10 days. Slight ventricular dysfunction was diagnosed and hemodynamic lability required a 24 hours infusion of Noradrenaline 0.05-0.1 mcg / kg / min. After haemodynamic stabilization, she developed a refractory hypotension to intravenous labetalol and required the adjunction of intravenous Clevidipine that finally allowed therapeutic progression to oral route. A progressive anemia, associated with a decreased platelets count and prolonged bleeding time, excluded regional anaesthesia; general anaesthesia with sevoflurane and neuromuscular blockade was achieved with vecuronium. Post-operative patient was admitted to ICU for recovery and monitoring as there is high risk for sudden death. Epidural anesthesia used for post-operative analgesia.

Discussion: The main anaesthetic goals are to avoid a fall in the arterial blood pressure by maintaining both cardiac output and SVR, and to prevent elevations in PVR.2] Epidural anaesthesia must be used cautiously as it causes sympathetic blockade and reduce SVR without a concomitant decrease in PVR as the amount of right-to-left shunt depends in part on the PVR:SVR ratio.

References:

Learning points: Pregnancy must be discouraged in women with Eisenmenger’s syndrome, it could be successful. Safe anaesthetic management of these patients requires meticulous preparation. General anaesthetic can be used with maintenance of haemodynamic stability, low VT with low PEEP could be helpful, with adequate pain control and early initiation of thromboprophylaxis for successful management.

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Caesarean section in a parturient with concomitant V-Leiden thrombophilia and HELLP syndrome

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Background: V-Leiden thrombophilia, a common thorbotopic disease, characterized by poor antiocoagulant response to activated protein C, may lead to deep venous thrombosis or pregnancy loss. The preferred treatment during pregnancy is LMWH. On the contrary, HELLP syndrome is a pre-eclamptic state characterized by elevated liver function tests, haemolysis and thrombopenia. HELLP carries a high mortality rate, both for the parturient and the neonate.

Case Report: A 37 y GP3 woman, at the 32nd w of gestation, was admitted for a category 3 caesarean section (CS) due to intrauterine growth restriction. With 2 previous CSs, gestational diabetes and inherited V-Leiden thrombophilia, she was under LMWH & aspirin. HELLP was diagnosed by the end of pregnancy with a decreasing trend in platelet count (185-109 down to 77·109/L) and plasma fibrinogen below 2g L-1. Preoperative VHA with ROTEM® showed poor fibrinogen low clot firmness: A5FIBTEM=10mm, A5EXTEM=28mm, CTFFIBTEM=67sec, CTXETEM=81sec, MCFIBTEM=12mm, MFEXTEM=54mm. Fibrinogen concentrate, 3g, was given, resulting in relative better firmness, i.e.: ASFIBTEM=14mm, ASEXTEM=30mm, CTFIBTEM=51sec, CTXETEM=58sec, MCFIBTEM=17mm, MFEXTEM=55mm. Just before surgical cut, 1 g fibrinogen concentrate was given resulting in: ASFIBTEM=14mm, ASEXTEM=36mm, CTFFIBTEM=51sec, CTXETEM=30sec, MCFIBTEM=17mm, MFEXTEM=62mm. Worsening thrombopenia excluded regional anaesthesia; general anaesthesia with invasive BP monitoring was performed with remifentanil at induction, labeltalab and restricted fluids. The neonate’s Apgar scores was 7 and 7 and no acidosis in cord ABGx. The caesarean was completed with no blood or platelet transfusion. In the following days progressive amelioration of liver tests and platelet count was noted. Discussion: VHA individualized haemostatic approach contributed to safe coagulation disorder management of this case, keeping a delicate balance between thrombophilia and thrombopenia and avoiding unnecessary platelet transfusion and its relative dangers.

References:

Learning points: Apart from PPH, conflicting coagulation disorders may be well managed by VHA with ROTEM.

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Eisenmenger’s syndrome with congenital heart defect in pregnancy

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Background: Pulmonary hypertension is a devastating and refractory disease. It is rarely reported in pregnant women, but it is associated with significant morbidity and mortality of both mother and baby. The maternal mortality rate during pregnancy or puerperium is 30-70%

的学习 pontois: Preeclampsia is an obstetric disease that requires early placed. Milrinone and phenylephrine were considered to avoid elevations in PVR.
We present a 31 year old primigravida, allergic to latex and essential in these cases of polimalformative syndromes. The rarity of this conditions is a fact that must be considered. The anesthesiology team was ready and performed a neurectomy and a Colocystoplasty due to Neurogenic Bladder and a successful caesarean section. During pregnancy she presented with daily abundant epistaxis with haemoglobin dropping and iron infusions were required. After extensive multidisciplinary team discussion, it was decided that vaginal birth would be the most appropriate form of delivery. The parturient was offered an induction of labour and an epidural catheter was used for analgesia. Her delivery was unremarkable and forceps were used to avoid prolonged expulsive efforts. The epidural catheter was removed after delivery. Her post-partum period was uneventful.

**Background:** Hereditary Hemorrhagic Telangiectasia (HHT), also known as Osler-Weber-Rendu Syndrome, is an autosomal dominant disorder with variable penetrance which is characterized by multiple arteriovenous malformations (AVMs) in skin, mucosal surfaces and internal organs. Pulmonary AVMs seem to increase during pregnancy, mostly during the 2nd and 3rd trimester. Pregnancy in patients with HHT is considered high risk since physiologic changes of gestation may cause significant disease progression and life-threatening complications.

**Case Report:** A 27y, G1P0, 37+3d pregnant woman with diagnosis of HHT presented for an anaesthetic consultation prior to delivery. She had positive family history for HHT, diagnosis confirmed by genetic screening and also evidence of pulmonary AVMs on previous computed tomography (CT) chest. A magnetic resonance imaging (MRI) of the brain and spine ruled out any possible cerebral AVMs. During pregnancy she presented with daily abundant epistaxis with haemoglobin dropping and iron infusions were required. After extensive multidisciplinary team discussion, it was decided that vaginal birth would be the most appropriate form of delivery. The parturient was offered an induction of labour and an epidural catheter was used for analgesia. Her delivery was unremarkable and forceps were used to avoid prolonged expulsive efforts. The epidural catheter was removed after delivery. Her post-partum period was uneventful.

**Discussion:** Pregnant woman with HHT should be appropriately counselled and a multidisciplinary approach is crucial. Morbidity and mortality are increased due to potential pulmonary AVM haemorrhage and strokes. Recommendations include prenatal screening of pulmonary and brain AVMs. Exclusion of spinal AVMs by MRI during pregnancy should be done to allow regional anaesthesia.

**Learning points:** Although there are few cases described in literature, prognosis is usually good. However, it is important keep in mind that severe complications such as haemorrhage and emboli, are possibilities. A multidisciplinary approach and anaesthetic consultation prior to delivery are essential to improve outcome. Both regional and general anaesthesia have significant risks associated and the decision to proceed with one or the other will depend on the patient's clinical status.

**References:**

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**Background:** VACTERL Association combines the presence of at least three congenital malformations among the following: vertebral defects, anal atresia, cardiac malformations, tracheoesophageal fistula with esophageal atresia, radial or renal anomalies and limb abnormalities. It can be a manifestation of several disorders rather than a distinct anatomic or etiologic entity. Its incidence it’s 1/10'000-40'000 live-born infants, with 70% male preponderance. This makes it a rarity in the obstetric population. Patients with this condition require a solid anesthetic plan in the OR and delivery room due to their challenging peculiarities.


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**Background:** Eclampsia, a rare hypertensive disorder of pregnancy, is a medical emergency characterized by seizures in association with pre-eclampsia. A caesarean section under general anaesthesia (GA) must be performed to prevent maternal and fetal morbimortality. We describe a case of an emergent caesarean section for eclampsia accompanied by post-operative alteration in mental status.

**Case Report:** A 31 year old, pregnant woman, G1P0, had her pregnancy monitored in the Hospital de la Santa Creu i Sant Pau - Barcelona (Spain). During pregnancy she presented with daily abundant epistaxis with haemoglobin dropping and iron infusions were required. After extensive multidisciplinary team discussion, it was decided that vaginal birth would be the most appropriate form of delivery. The parturient was offered an induction of labour and an epidural catheter was used for analgesia. Her delivery was unremarkable and forceps were used to avoid prolonged expulsive efforts. The epidural catheter was removed after delivery. Her post-partum period was uneventful.

**Discussion:** Subcapsular hepatic haematoma is a rare complication of severe preeclampsia. The clinical symptoms and signs are nonspecific and may vary from epigastic, right upper quadrant abdominal or shoulder pain, to nausea, vomiting and abdominal distension. (1) It represents a life-threatening complication because it may result in hepatic rupture, as shown in this case.

**Learning points:** Physicians should be aware since a high level of suspicion and vigilance is key. Early diagnosis could decrease morbidity and mortality for both the mother and child.

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**Learning points:** Obstetric Anaesthesiology

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**Learning points:** Obstetric Anaesthesiology
Obstetric Anaesthesiology

4330

Icterus in peripartum

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Background and Goal of Study: In peripartum, jaundice is a symptom rarely encountered, it can be dependent on several etiologies of different gravity. The rarity of this condition should not ignore the etiologic diagnosis that remains essential and conditional to the quality of care and maternal and fetal prognosis

Materials and Methods: Retrospective and descriptive work spread over a 3-year period from January 2016 to December 2018, including all patients admitted to the obstetric resuscitation unit who presented mucosal and jaundice jaundice with hyper-bilirubinemia> 15 mg / l, hepatocellular insufficiency, a cytolysis syndrome at admission or after hospitalization* For all these patients, characteristics of pregnancy, medical and obstetric ATCDs, clinical signs of pre-icteric and icteric phases, clinical and biological course, termination of pregnancy, complications and treatment were noted. Established.

Results and Discussion: We collected during these three years 24 cases of severe jaundice occurred in peripartum, the mean age is 33 years (with extremes of 24 - 41 years), no patient had medical background of known liver diseases or taking hepatotoxic drug, the cause of jaundice in 4 patients was PE, h ensemble in 3 patients, viral hepatitis in 2 patients, cholestasis in 4 patients and SHAG in 11 patients.* 6 cases of intra utero deaths are recorded in this series of which 5 during the SHAG and the 3 others during PE. * The complications were multiple represented by the haemorrhage of the delivery (18 cases), the digestive haemorrhage (10 cases) the visceral failures: IRA (22cas), hepatic encephalopathies (4cas), CIVD (11cas).

In this series, there are 5 maternal deaths (4 SHAG and 1 PE)Jaundice occurring in the third trimester may be related to accidental discovery of liver disease, chronic liver disease known before pregnancy, or pregnancy-specific liver disease. SHAG remains the only gravidic pathology responsible for hepatocellular insufficiency, its prognosis is dark especially if diagnosis and management are late.

Conclusion: In our series, 80% of deaths are due to SHAG. Before the 1980s, maternal mortality due to SHAG exceeded 80%; these figures are currently significantly improved by early diagnosis and resuscitation associated with early and adapted obstetric management.

4432

Peripartum anesthetic management in women with inflammatory bowel disease, a retrospective study

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Background and Goal of Study: Inflammatory bowel diseases (IBD) are a group of pathologies associated with an increase rate of cesarean sections and morbidity during the peripartum period. The objective of this retrospective study was to investigate the anesthetic management of the delivery of women with IBD.

Material and Methods: The records of 107 patients with IBD, who delivered at our Center, were obtained for data which included anesthetic and obstetric management as well as neonatal outcome. Five subgroups were defined based on mode of delivery, presence or absence of epidual in normal vaginal delivery (NVD) and urgency of cesarean section, each of which was compared with control groups of healthy patients in the same period. Additionally, the rate of cesarean sections and the use of epidural analgesia for NVD were compared with the general obstetric population of our center in the same period.

Results and Discussion: The rates of cesarean sections and emergency cesarean sections were significantly higher than in the general population. However, the rate of instrumental delivery and the use of epidural analgesia for NVD were similar. Among those who underwent cesarean sections, no significant differences were found in the type of anesthesia, the duration of surgery, the number of complications, the type of monitoring or postoperative management with respect to the control group.

Conclusion: The peripartum anesthetic management of patients with IBD does not differ greatly from that of patients without this pathology. Anesthetists can plan their anesthesia in a similar way as they do in healthy obstetric patients.

4577

Cardiorespiratory arrest in pregnant women: a case report

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Background: Cardiopulmonary arrest (CPA) in pregnant women is a rare and challenging event that requires a complex and multidisciplinary approach to both the pregnant and the fetus. The causes are numerous: anesthetic, hemorrhagic, obstetric, cardiovascular, embolic, infectious or hypertensive. Early recognition and intervention with resuscitation maneuvers is imperative. Although the advanced life support (ALS) algorithm of the pregnant woman is similar to that of the adult, there are specific characteristics associated with pregnancy’s physiological changes. If performed in time, emergent cesarean in the context of maternal CPA is the main intervention to increase maternal and fetal survival.

Case report: 28-year-old pregnant woman, 40-weeks primiparous, smoker, with no previous history and no usual medication, except for pre-pregnancy oral contraceptive. The labour was pharmacologic induced. During induction she experienced general malaise, nausea and abdominal discomfort and posterior evolution to CPA. ALS was promptly started and an emergent cesarean was performed. Spontaneous circulatory return was achieved after 3 cycles. The newborn had an apgar score of 2 but recovered quickly. The case was complicated with uterine atony, hemorrhagic shock and consumptive coagulopathy, and an emerging hysterectomy was required. In the postoperative period she was admitted to the Intensive Care Unit (ICU), and several exams were performed. Transthoracic echocardiography revealed a right intra-atrial thrombus with extension to inferior vena cava and in the angio-TC scan, an extensive venous thromboembolism was found. During the follow-up, the CT brain scan and MRI showed signs of cerebral edema and anoxic encephalopathy. During 42 days in ICU, GCS improved from 3 to a maximum of 10. After 93 days she was discharged to a Continuing Care Unit, maintaining the neurological status. The newborn was discharged, healthy.

Discussion: Despite being a rare situation, all the participants in the obstetric approach should be prepared to act on CPA, especially given the actual increase number of risk pregnancies. The need for early detection and timely establishment of ALS maneuvers in pregnant women are vital to improve morbidity and mortality.

References:

Learning points: Vigilance of high-risk pregnancies, early detection and timely establishment of ALS maneuvers are the main factors for the success of these cases.
4421

Pregnant patient with large AVM of tongue: Anaesthetic challenges and context

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Background: Increased cardiac output during pregnancy increases the propensity of bleeding in Arterio Venous Malformations (AVM).

Case Report: 33 years old pregnant patient with gradual increase in tongue size causing extraoral protrusion and one episode of spontaneous torrential haemorrhage was posted for elective caesarean section. Imaging revealed large AVM causing tongue swelling and stenosed nasotracheal path rendering conventional airway management impossible. The patient was dismisses of being awake during delivery. Thus regional anaesthesia was chosen. Airway securing was necessary to obviate the sudden need to administer general anaesthesia (GA), intratracheal intubation, to surmount stress, hypoxia or during reversal. Nasotracheal path being better tolerated and straighter was chosen inspite of stenosed nasopharynx. After monitor attachment, intubation, nebulization with lignocaine and adrenaline mixture and intranasal oxymetazoline instillation, transtracheal block was administered. Through the suction channel a thin guidewire (Teromor) was passed till it was at the level of fibrescope’s tip. The fibrescope was introduced nasally and passed through glottis till the carina. Guidewire was pushed in the trachea and the scope withdrawn. An Airway Exchange Catheter (AEC) was railroaded over guidewire. Capnographic trace was obtained after an universal connector was attached to its end confirming its intratracheal position. A well lubricated armoured endotracheal tube (ET) was now gently railroaded over AEC into trachea. Fibrescope again confirmed ET’s position. AEC was removed, cuff of ET was inflated and a T piece was connected for spontaneous respiration. Now spinal anaesthesia was administered. Postoperatively, patient was carefully extubated in ICU.

Discussion: Our challenge was to critically balance airway protection and airway instrumentation. Airway risks alerted intubation and allowed the ET to be tolerated by awake patient intraoperatively. Passage of equipments of sequentially larger calibers (guidewire, AEC, fibrescope) allowed subtle serial dilatation of stenosed passage and careful observation of the probability of bleeding.

References:

Learning points: Appropriate airway blocks allowed airway securing in awake parturient with difficult airway and prevented GA exposure to foetus.

4616

Bedside echocardiography in the rapid diagnosis of peripartum cardiomyopathy: a case report

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Background: Peripartum cardiomyopathy (PPCM) is a rare but potentially life-threatening condition. Diagnosis is challenging due to alternative diagnoses and physiological changes during pregnancy. We present a case where anaesthesiologists played a central role in the diagnosis and initial management.

Case Report: 28 year-old female with a history of polyarthritides on prednisone and hydroxychloroquine, and 5 spontaneous abortions. She presents twin pregnancy with an isolated episode of sinus tachycardia at gestational week (GW) 29, normal ECG and a hyperdynamic ventricle by echocardiography. A c-section is performed at GW 35. In the first hours postpartum she presents with preecampsia and sudden dyspnea, desaturation and tachycardia. Magnesium sulphate is initiated and an angio-CT rules out pulmonary embolism (PE). She is admitted to the ICU with acute heart failure (AHF) symptoms. ECG and blood test show sinus tachycardia. NT-proBNP of 4300 pg/ml and hs-Ctln 350 ng/ml with progressive decrease. Point-of-care ultrasound reveals a dilated left ventricle with moderate global hypokinesia, left ventricular outflow tract velocity time integral (VTI) of 13.7cm, estimated ejection fraction (EF) 35%, and signs of pulmonary oedema. PPCM is suspected. Treatment with nitroglycerine and furosemide is initiated with an adequate response. Before hospital release enalapril, bisoprolol, bromocriptine and enoxaparin are introduced. 4 weeks later, late preterm labour is managed with magnesium. Echocardiogram shows slight improvement of ventricular function with an estimated EF of 45%.

Discussion: PPCM presents with heart failure during late pregnancy and up to 6 months postpartum. Our patient presented multiple risk factors such as an autoimmune disease - multifetal pregnancy and preecampsia. Initial suspicion of PE was ruled out, bedside echocardiography showing a decreased VTI was key to suspecting myocardial dysfunction as a cause for AHF. Treatment includes standard HF medication, keeping in mind contraindications in pregnancy. Benefits of bromocriptine have been described as a specific treatment in association with anticoagulation due to increased risk of thrombosis.

4655

General anaesthesia for elective cesarean section in a woman with type IV Ehlers-Danlos syndrome - case report

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Introduction: Vascular Ehlers-Danlos syndrome (EDS), type IV (5-10% of EDS) distinguishes because of its risk of medium/large caliber arterial rupture, rupture of uterine vessels and uterine rupture. Pregnancy exerts greater risks and makes SED IV a contraindication to pregnancy. Regarding anaesthesia, airway hemorrhage, pneumothorax, and epidual haematoma are among complications. Despite the complexity, the scarcity of case reports in obstetrics translates into the absence of standard anaesthetic practices in SED IV.

Case Report: 22 years primigravida, with previous diagnosis of Vascular SED, proposed for elective caesarean section at 35 weeks. No other relevant pathology. Asymptomatic, under bisoprolol, echocardiography without changes. Family history of sudden death from aortic rupture. After discussion with the surgical team and the patient, general anaesthesia was performed: Lidocaine 1.5mg/kg; Propofol 2mg/kg; Succinylcholine 1.5mg/kg. Monitoring: standard and anesthetic depth monitoring (BIS 40-60). Placed 2 16G peripheral venous accesses in the MSD. Deciding not to immediately insert arterial and central venous catheter, being the equipment for its placement properly prepared. Mainenance: propofol; after fetus extraction: sevoflurane, furocormon and fentanyl. Reversal of neuromuscular block: Sugammadex 2mg/kg. Postoperative analgesia: Paracetamol 1g, Tramadol 100mg and Morphine 6mg; antiemetic prophylaxis: 4mg dexamethasone and Ondasetron. Duration of the procedure: 40 minutes no complications reported. At the end, the patient was transferred to the intermediate care unit where she remained 24h. The mother and newborn were discharged from the Obstetrics ward on the 4th day.

Discussion: In SED IV, standard obstetric neuroaxis anaesthesia carries a significant risk of epidural hemotoma and hemodynamic instability in case of hemorrhage, making the choice of anaesthetic technique complex. Vascular fragility limits the degree of monitoring invasiveness and requires a careful airway management plan.

References:

Learning points: The decision between regional and general anaesthesia must be weighted on an individual basis.

5015

Systemic lupus erythematosus, kidney transplant rejection with end stage renal failure, intensive dialysis and c-section. Case Report and Anesthetic considerations

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Background: Successful pregnancy in a patient with lupus nephritis (LN) and on dialysis is an uncommon event. Renal transplant in patients with systemic lupus erythematosus (SLE) do not fare as well as patients with other causes of end-stage renal disease. Intensified hemodialysis (HD) offers improved maternal and neonatal outcomes.1 Pregnancy should be delayed until the disease is in remission for 6 months or more.2 Intensified HD is used in this patient.

Case Report: We present a case of a 32 years old woman at 36+1 weeks gestation, primigesta, ASA IV, scheduled for a c-section. She had a renal transplant in 2011 due to end stage lupus nephritis and she was on intensive dialysis (6 times per week, 4
hours sessions) because of transplant rejection with acute and chronic renal failure. She was receiving prednisone, hydroxychloroquine, labelatol, acetylsalicylic acid (suspended before surgery). She had a dialysis session without heparinization the day before surgery. Spinal anesthesia with 26 g pencil point needle was performed at L3-L4 with hyperbaric bupivacaine (10 mg) and fentanyl (20 mcg). The patient saw target controlled infusion was used to prevent hypotension. A healthy baby was born, Apgar 8/9. Dialysis sessions were resumed on first day postoperatively, along with hydrocortisone stress dosis (50 mg).

Discussion: Regional anesthesia may be preferred in the first place for pregnant women with renal transplantation, unless there is any contraindication. SLE pregnant patients are considered to be high risk and coordinated care with effective communication between anaesthesiologist, nephrologists, obstetricians, haematologists, rheumatologists and clinicians is mandatory.

References:

Learning points: Better outcomes are expected if pregnancy is delayed until a 6 month remission period. Intensified hemodialysis offers improved maternal and neonatal outcomes. Regional anesthesia may be preferred in the first place for pregnant women with renal transplantation.

6006

Rare case of supraventricular tachycardia post administration of sublingual misoprostol in the management of postpartum haemorrhage

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Background: Postpartum haemorrhage is the leading cause of mortality in childbirth (1). Misoprostol can be used in its treatment (1). Misoprostol has adverse effects, which are dose dependent (1). Very little is known about the relation between misoprostol and the development of supraventricular tachycardia (SVT).

Case Report: A 35-year-old woman, 36 weeks of gestational gestation (G1), was admitted for induction. An epidural catheter was placed. In the immediate post-birth six units of packed red blood cells (PRBCs) and one unit of fresh frozen plasma (FFP) were transfused. A 12 lead ECG revealed a supraventricular tachycardia (SVT). The mother was transfused to a level II unit for a day. She was discharged 3 days after delivery.

Discussion: Misoprostol is an alternative for managing postpartum haemorrhage, despite concerns about its side effects profile (1). The most common are shivering and fever, which increase following sublingual administration (1). In this case, we saw a temperature rise associated with a SVT after sublingual misoprostol. We hypothesise that the SVT may also be a side effect. SVT is one of the commonest side effects, which are dose dependent (1). Very little is known about the relation between misoprostol and the development of supraventricular tachycardia (SVT).

References:

Learning points: Dyspnea may mask severe cardiac and pulmonary diseases; hence, accurate differential diagnosis is mandatory. PE in pregnancy is a life-threatening condition. As long as the patient is hemodynamically stable, anticoagulation is the therapeutic milestone. A multidisciplinary birth plan should be discussed, according to the mother’s and fetals’ clinical condition.

5979

Factor V deficiency and pregnancy

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Background: Factor V (FV) is a rare but challenging bleeding disorder. We report a multidisciplinary management of delivery of a parturient presenting a FV deficiency.

Case Report: A 26-year-old woman was diagnosed with constitutional FV deficiency during severe post-partum hemorrhage in her first pregnancy. She was admitted to our hospital for programmed cesarean section at 38 weeks of amenorrhea of her second pregnancy. Her laboratory tests showed a prothrombin time (PT) of 23% and activated partial thromboplastin time (APTT) of 60 seconds representing double of the reference value. The FV level was 4%. We performed a thromboelastometry that showed a prolonged INTEM and EXTEM tests. Our pre-operative management was based on the perfusion of a prophylactic fresh frozen plasma (FFP) 20 ml/kg/12 hours for one day with close monitoring of volemia. The hemostasis tests improved, with normal APTT and PT at 52%. The FV level increased to 22.3%. Thromboelastometry showed normal INTEM and EXTEM tests. The cesarean section was performed and the perioperative course was uneventful. We continued the FFP perfusion at 20 ml/kg for the first day and 5 ml/kg/12 hours for 7 days with close monitoring of hemostasis by thromboelastometry. The patient was discharged home without any complications.

Discussion: For risky situation like cesarean section, the goal of treatment is to maintain FV activity above 20% [1]. No purified FV concentrate exists. FFP represents then the therapy of choice, although the risk of volume-overload. The recommended strating dose before delivery is up to 20 ml/kg of FFP, it should be repeated daily as long as we target hemostatic levels of FV [1]. Other authors advise a perfusion of a lower dose of 5 ml/kg/12 hours of FFP during 7 days in post-partum [2]; we have followed this attitude associated with daily monitoring of hemostasis by thromboelastometry, which allowed adequate management of duration and volume infusion of FFP.
Patient controlled analgesia in labour using remifentanil in trombocytopenic pregnant

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Background: The prevalence of thrombocytopenia during pregnancy is around 10%, in which less than 1% has a platelet count below 100000 μL⁻¹. Immune thrombocytopenia (ITP) represents the most common cause of thrombocytopenia during the first trimester of pregnancy. Although ITP does not affect fetal growth, it must be taken into account for the potential risk of thrombocytopenia (<50000 μL⁻¹) that affects 15% of the cases.

Case report: A 34-year-old woman, at 36 weeks of gestation, affected by ITP. Trombocytopenia is considered a relative contraindication to neuraxial analgesia, being still under debate the optimum platelet count at which accumulation does not occur. It should be noted that remifentanil is an inactive form and to be quickly eliminated from the blood plasma in such a way that accumulation does not occur. It should be noted that remifentanil is a plausible alternative for labour analgesia in patients with thrombocytopenia, in whom neuroaxial analgesia might be inappropriate.

References:

Learning points: Trombocytopenia is considered a relative contraindication to neuraxial anaesthesia, being still under debate the optimum platelet count at which it can be practiced in a safe way. Remifentanil supposes an adequate and safe analgesic technique when neuraxial anaesthesia is contraindicated. More studies in pregnant women with thrombocytopenia are needed.

Audit of Remifentanil Patient Controlled Analgesia (PCA) for Labour analgesia

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Background and Goal of Study: Remifentanil is an ultra-short acting opioid. The role of remifentanil in labour analgesia as an alternative, but not equivalent, to neuraxial analgesia is well documented albeit controversial. The main concern with remifentanil use is risk of apnoea, and significant adverse maternal outcomes reported in the literature pertains to unsupervised or inappropriate use. This audit is to compare how the electronic system (MN-CMS) improved remifentanil prescription, monitoring and safety practice in 2018, with old paper documentation in 2016.

Materials and Methods: This is a retrospective audit for the year 2018 of all patients who received remifentanil PCA for labour analgesia. Patient data for the year 2018 was retrospectively collated to: 1) Review any adverse outcomes (fetal/maternal) associated with remifentanil PCA use. 2) Review anaesthesia prescribing practice. Data regarding compliance with practice and recording of maternal/fetal outcomes was sourced from MN-CMS. Example of indications for remifentanil PCA in this period: Failed epidural, thrombocytopenia, bleeding disorders, clotting factors deficiency, sepsis and brain tumour.

Results and Discussion: Between the beginning of January and the end of December 2018, 32 patients availed of this service, compared to 26 patients in 2016. Adverse outcomes/side effects: Maternal: Five (15.6 %) patients experienced nausea and vomiting during remifentanil PCA use and received anti-emetics, in comparison with only 12.5% in 2016. No patient had a respiratory rate less than 10 / min. No patients had oxygen saturation recorded s93% or received naloxone.

Conclusions: Further education on prescribing practice and documentation by Anaesthesiologist and Midwifery staff is required. Initiate a care plan on MN-CMS for remifentanil documentation for the Anaesthesiologist which includes the indication. Entonox and Oxygen should be prescribed as any other drug given to the patient. A coloured illuminated card attached to all remifentanil PCA pumps with all safety measures to be followed by Midwifery staff. Upgrade Spo2 monitors in the labour ward and to be integrated into the electronic system.
Midnight challenge: labor analgesia in an operated Scoliosis Patient

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Background: Scoliosis is found in nearly 2% of the population.1 That patients or who have history of back surgery are significant challenges and have a higher rate of epidural failure.2,2 Although is controversial the best approach for labor analgesia, some anesthesiologists consider epidural analgesia to be relatively contraindicated.2

Case Report: A 21-year-old nulliparous woman, ASA 2, was admitted at 38 weeks of gestation with abdominal and lower back pain. She had idiopathic scoliosis with surgical correction 3 years before. Her medical records revealed a posterior spinal instrumentation and fusion from T2-L4 vertebrae (fig 1). According to examination she was in 1st stage of labor. Following aseptic preparation and local anesthesia, an 18G Tuohy needle was inserted into L4-L5 epidural space, in the sited position using loss of resistance to saline technique, at first attempt. A 22G epidural catheter was placed 11cm depth from skin. Epidural analgesia was an initial combination of ropivacaine 0.1% 8mg and sufentanil 10mcg followed by programmed intermittent epidural bolus of ropivacaine 0.2%. A healthy baby was born through normal spontaneous delivery 3 hours after. No maternal or fetal complications were reported.

Discussion: The epidural space in patients with corrective scoliosis may be distorted because of instrumentation, bone graft material or scar tissue. This can lead to impossible epidural space finding, misplaced catheter insertion or affect the normal spread of the local anesthetic, resulting in a patchy blockade. There’s also a higher likelihood of unintentional dural puncture.2 Patients with back surgery have a 91% rate of success versus 98.7% of patients not operated.2 A careful pre-operative assessment should be taken and the epidural should be placed early to make eventual adjustments.

References:

Learning points: Patients with history of back surgery have a higher rate of epidural failure. Scoliosis shouldn’t be considered a contraindication to epidural analgesia.

5519

Finding the middle ground: Food in labor practices & perceptions in the labor & delivery unit of Tel-Aviv Medical Center

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Background and Goal of Study: Improvements in labor analgesia and airway management have created conflict regarding restrictive fasting policies during labor. The ACOG/ASA/ISA discourage oral intake, however the WHO recommends “non-interference”. As a result, liberal food policies have become widespread. Our goal was to assess practices and opinions in our labor and delivery unit (L&D) regarding oral intake during labor.

Materials and Methods: Following IRB approval in our 13,000 annual delivery L&D, an anonymous survey on practices and opinions regarding oral intake during labor was sent to anesthetologists, midwives and gynecologists at our tertiary medical institution.

Results and Discussion: 77 respondents - 34 anesthesiologists, 32 midwives, 11 gynecologists. 68% correctly stated there are no institutional guidelines for oral intake. 99% and 95% respectively, reported that women at low risk for cesarean delivery (CD) may eat before and after epidural analgesia, and 62% and 65% respectively agreed with this practice. 50% stated that women at high risk for CD are allowed food, 10% and 15% (all midwives) agreed with this practice, before and after epidural analgesia, respectively. 66% allow light food, 12% impose no restrictions, 13% water only. Reasons to discourage eating include bleeding (65%), complicated obstetric history (61%), pre-eclampsia (57%), dystocia (49%), twins (48%), trial of labor after CD (40%), BMI>40 (35%), fetal weight>4kg (34%), and severe reflux (26%). 93% of anesthesiologists, 90% of gynecologists and 56% of midwives named aspiration as the primary risk associated with oral intake; 9% severe reflux (26%). 93% of anesthesiologists, 90% of gynecologists and 56% (48%), trial of labor after CD (40%), BMI>40 (35%), fetal weight>4kg (34%), and severe reflux (26%). 93% of anesthesiologists, 90% of gynecologists and 56% (48%), trial of labor after CD (40%), BMI>40 (35%), fetal weight>4kg (34%), and severe reflux (26%). 93% of anesthesiologists, 90% of gynecologists and 56% (48%), trial of labor after CD (40%), BMI>40 (35%), fetal weight>4kg (34%), and severe reflux (26%). 93% of anesthesiologists, 90% of gynecologists and 56% (48%), trial of labor after CD (40%), BMI>40 (35%), fetal weight>4kg (34%), and severe reflux (26%).

Conclusion: Oral intake for low and high risk laboring women are required. Permissive eating on food in labor. Despite restrictive Israeli national guidelines, women at high risk for CD or aspiration are not uniformly advised to avoid food. Guidelines regarding oral intake for low and high risk laboring women are required. Permissive eating policies identified in our survey should be addressed in order to find the middle ground between restrictive and permissive policies, and minimize aspiration risk for high risk women.

5520

Patient satisfaction - intravenous patient-controlled analgesia with remifentanil versus intermittent epidural for labor analgesia

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Background and Goal of Study: Epidural analgesia is considered a gold standard in obstetric anesthesia. However, in moments when it is contraindicated, unwanted by the patient or simply unavailable, remifentanil can be an excellent alternative.

Materials and Methods: 155 pregnant women were included in the study and were allocated into 2 groups: a remifentanil group (RG), and an epidural group (EG). Patients in the RG (80 patients) received intravenous PCA with remifentanil, starting with 0.2 μg / kg, gradually increasing the dose by 0.1 μg / kg to maximal dose of 1μg / kg. Patients in the EG (75 patients) received epidural analgesia with programmed intermittent bolus dosing. Our primary outcome was patient satisfaction and efficacy. During labor we analyzed patient pain scores and satisfaction scores through 2 VAS scales in different time points. 8 – 16 hours after delivery patients were asked to score complete satisfaction about labor analgesia on 10-point VAS scale. Patient and neonatal safety was monitored through complete haemodynamic monitoring.

Results and Discussion: VAS pain scores were significantly higher in the remifentanil group at all time points, the average VAS pain score in the RG was 45.9± 8.4, and in EG 29.13 ± 11.9 (p <0.0001). On the other hand, VAS satisfaction scores were all the time almost the same in both groups, the average VAS satisfaction score during the entire monitoring period was 93.4± 9.1 in the RG, and 94.02 ± 9.4 in the EG, without statistically significant difference between the two groups (p = 0.679). Mean VAS score after delivery was 9.73±0.5 in the RG and 9.07±0.5 in the EG (p=0.17).

Conclusion: PCA with remifentanil is less effective for pain relief in patients during labor compared to epidural analgesia, but the satisfaction of patients is equal in both groups. Continuous respiratory monitoring and oxygen supply are mandatory.

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Undiagnosed intracranial tumor in a laboring woman: near misses

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Background: Nowadays, neuroaxial techniques have turned into the gold standard for obstetric analgesia and anesthesia. The existence of prepartum intracranial pathology is not always a contraindication for neuroaxial techniques.1 We report a case of eutocic delivery under epidural analgesia in a pregnant woman with undiagnosed brain tumor.

Case Report: A healthy 24-year-old pregnant woman with occasional migraine was admitted to the delivery room. Lumbar continuous epidural analgesia for labor was uneventfully performed. Two days after delivery, the anesthesiologist on duty was requested to assess the patient for possible postdural puncture headache, which was excluded. The pain was described as similar to her previous migraine, with normal neurological examination. Three hours later, she suffered a sudden vomit and loss of consciousness. Consequently, the neurologist was notified and an urgent cranial computer tomography was performed. It revealed left frontal supratentorial mass with displacement of the midline and hydrocephalus. One week later, the lesion was surgically removed and identified as a pilocytic astrocytoma. Postoperative period proceeded without incidents.

Discussion: In the case reported, a potential progressive tumor growing as well as fractional administration of epidural analgesic dose could have helped the patient to achieve tolerance to the peripartum increase in intracranial pressure. However, if the brain tumor would had been previously diagnosed, a different birth plan would be achieved. The presence of a migraine background made more difficult the recognition of a serious atypical headache. Therefore, accurate diagnosis was delayed until the patient suffered severe neurologic symptoms. Fortunately, the patient did not suffer any damage and had good clinical recovery despite the fact that the result could have been fatal.

References:

Learning points: Intracranial lesions in the absence of increased intracranial pressure may not be a contraindication to obstetric neuroaxial techniques. However, an anticipated birth plan is always mandatory. We should always keep in mind that atypical postpartum headache is a “red flag” symptom that may hide a brain tumor or other serious clinical condition; hence, especial attention must be paid.

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Local anesthetic systemic toxicity in a pregnant woman: case report

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Background: Pregnancy is a clinical setting in which local anesthetic systemic toxicity (LAST) is inclined to occur. It can be reversed by using 20% intravenous lidocaine (ILE) therapy. Limited case reports have been published on the treatment of LAST during pregnancy using ILE 1; safety in this setting is still questioned.

Case Report: A 26-weeks pregnant woman presented for fetal thoracentesis under infiltration anesthesia. Anesthetic team was called for help after the patient developed shortness of breath and dizziness. She presented slurred speech, which evolved into loss of consciousness. Respiratory arrest followed. Considering the total dose of lidocaine administered (lidocaine 2% without epinephrine, 40ml, 800mg), a diagnosis of LAST was suspected. 100 ml of ILE were administered. While preparing for orotracheal intubation the patient developed a tonic-clonic seizure which stopped administering propofol and midazolam. An infusion of ILE was continued in the ICU. After the toxicity event, uterine contractions saturated and a cesarean delivery was decided. After that, the patient was woken up with ad integrum sensorium restitution.

Discussion: As safety of ILE therapy in pregnancy is still questioned and randomised controlled trials are not feasible, we consider that it is important to report all cases in which ILE therapy is used in gravid women. Although performing a fetoscopy increases the risk of preterm delivery 2, it cannot be ruled out that ILE therapy contributes to appearance of uterine dynamics. It may also be of interest to investigate if ILE therapy dosing should be the same during pregnancy than other LAST settings.

References:

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PCA remifentanil – alternative and effective option for labour analgesia

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Background and Goal of Study: The neuronal techniques currently represent the most effective methods for pain control during labour and epidural analgesia is considered the gold standard during delivery with minimal side effects for mother and neonate. PCA (patient-controlled analgesia) remifentanil represent a good and effective alternative to pethidine or morphone for women who cannot receive or refuse epidural. The protocol used in our hospital for PCA Remifentanil is: dedicated intravenous line/giving set/pump, concentration of Remifentanil 32 mcg/ml (parturient weight < 60 kg) 40 mcg/ml (parturient weight > 60 kg), 3 minutes lockout period, continuous monitor vitals. Our aim was to find if PCA remifentanil is a safe and effective option for pain relief during labour.

Materials and Methods: A local retrospective study. We used data from patients who used PCA Remifentanil for labour pain on a proforma sheet from January 2016 to January 2020, after approval from the local committee.

Results and Discussion: A total of twenty-two parturients, who received PCA Remifentanil for labour analgesia during one year. The most common causes were infectious (41%), neurologic causes [disc damage, spina bifida occulta, maternal multiple sclerosis, intracranial HTN] followed by failed epidural and contraindication in infectious (41%), neurologic causes [disc damage, spina bifida occulta, maternal multiple sclerosis, intracranial HTN] followed by failed epidural and contraindication.

Conclusions: PCA Remifentanil represent a safe and effective alternative for labour analgesia with minimal maternal and neonatal side effects.

References:

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WhatsApp group of obstetric anesthesia in Israel

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Background and Goal of Study: The use of social media has been gaining momentum in recent years; one of the most commonly used apps being the WhatsApp professional groups. We present our experience in the WhatsApp group that includes professional discussions between experts in a relatively narrow field such as obstetric anesthesia.

Materials and Methods: A review of all group participants and all the discussions held by the Group since its establishment was carried out. Data were produced on the discussion topic, response time, number of participants in the discussion, number of responses to the discussion and type of discussion. In addition, we passed a questionnaire among the group members.

Results and Discussion: The group was established in March 2017. The group comprised of 31 expert anesthesiologists from 90% of Israeli hospitals. Over two years, 193 discussions occurred; reaction time was 8.25 minutes. Average number of participants per session was 5.6 anesthesiologists. Comments average every discussion was about 9.75 comments. By segmenting the discussions by topic (Some of the discussions included 2 topics), 62 discussions were classified as clinical discussion. 52 dealt with unit organization. 16 discussions were defined as case discussion. 31 dealt with conferences. 67 dealt with articles in obstetric anesthesia. A high level of satisfaction was found in the group member’s questionnaire.

Conclusion: We see that the WhatsApp group in which most of the obstetric anesthesiologists in Israel are partners is a simple, effective tool for improving work and knowledge both at the clinical level and at the organizational and management level.

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New evidence of clinical efficiency of sedoanalgesia with sevoflurane during labor

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Background and Goal of Study: An objective assessment of the severity of pain in labor can demonstrate by biochemical diagnostic markers, among which α-amylase of saliva (AAS) and substance P (SP) are of particular interest. The study of the dynamics of AAS and SP concentrations in parturients for sevoflurane sedoanalgesia during labor, as well as the study of the relationship between the obtained values and pain assessment by visual analogue scale (VAS), will allow to assess the effectiveness of the anesthetic method.

Materials and Methods: A prospective study of the effectiveness of inhalation sedoanalgesia in labor was studied in 18 parturients. Three markers were taken: salivary amylase level (IU/ml), substance P level (pg/ml) and pain score for VAS (scores on a 100-point scale).

Results and Discussion: The duration of inhalation sedoanalgesia was 92.1 ± 28 [60-180] minutes. The average SP level was significantly higher before sedoanalgesia compared with the initial level, however, against the background of sedoanalgesia, it steadily decreased, after 60 minutes it was below the initial level and then in fully dilated cervix, the lowest average value of SP was obtained for almost all parturients. The level of AAS and VAS scores demonstrate a different trend in the dynamics of their average values. Decreasing 60 minutes after sedoanalgesia, the average values of both markers by moment of fully dilated cervix again increase. For AAS, the average values reach the level obtained before sedoanalgesia, and VAS scores even exceed the average value obtained before sedoanalgesia.

Conclusion: Thus, inhalation sedoanalgesia with sevoflurane, stopping the true pain syndrome, does not fully affect the stress component, as evidenced by a temporary decrease in AAS and VAS scores with a repeated increase in values as the childbirth to end.

References:
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Case Report: Battery swallow induced tracheoesophageal fistula in a pediatric patient

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Abstract: Tracheoesophageal fistula (TEF) is an abnormal connection that presents as congenital or acquired. We discuss the diagnosis and management of a button-battery induced TEF in a pediatric patient.

Introduction: Button-battery ingestion forms an electrical circuit that eventually perforates the esophagus forming a TEF. Gas/reflux between respiratory and GI tracts via the TEF, require emergent surgical repair.

Case Report: A 13-month-old patient (8.9 kg) post-removal of a button-battery was transferred to NICU intubated on dopamine-mirlinone-adrenalin infusion. Vasopressors were started and gradually increased. After 5 hour surgery, the patient midazolam-rocuronium continuous infusion and intraoperative fluid therapy was despite FABIAN HFO ventilation. Anesthetic maintenance was based on fentanyl-ventilation. High FiO2 (50-100%) was required to maintain SpO2 between 89-95% one-lung ventilation; after fistula-ligation the ETT was withdrawn to obtain bilateral unuffed ETT was placed successfully on the first attempt and advanced to archived enterocolitis concerns. IV fentanyl-atropine, topical lidocaine 1% and inhalational was transferred to OR. Arterial umbilical catheter was discard owing to necrotizing observed in X-ray. An umbilical venous catheter and 2 IV lines were placed and he.

Discussion: Advances in surgical care and neonatal management have improved survival infant with EA with TEF to 90%. ELBW infants with EA/TEF are rare and result in high morbidity-mortality that is mainly related to complications not associated with EA/TEF1. Repair is delayed in patients with other major anomalies. In our case, TEF repair was considered urgent as intestinal perforation was suspected. Providing anesthetics to premature newborns requires hands of specialist. Multisystem organ immaturity underlies the differences in physiologic response to anesthetics.

References:

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Anesthesia for tracheoesophageal fistula repair in extremely premature newborn

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Background: Providing anesthesia to preterm neonates may be challenging. Prematurity rate has increased over the last years: 10% of Spanish infants are born premature, 90% of those older than 28 weeks survive. This report reviews our experience with a preterm newborn who required emergent anesthesia for battery removal, tracheostomy, abscess drainage and TEF repair. We emphasize on essential communication between the ENT surgeon and anesthesiologist for the care of these critical airways.

References:

4514

Malignant hyperthermia: guilty until proven innocent?

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Background: Malignant hyperthermia (MH) is a genetically determined condition characterized by a potentially lethal response to the exposure to volatile general anesthetics or succinylcholine [1]. It is most common in the pediatric population.

Case Report: We report the case of a 5-month-old child, ASA I, with a cleft lip and cleft palate that was proposed for repair surgery. After an uneventful induction of general anesthesia and tracheal intubation without muscle relaxant, hypnosis was started and an adequate response was achieved after 3 doses of dantrolene. The patient was transferred for the intensive care unit and was discharged home after 3 days. Subsequent genetic testing (NGS panel) was negative for mutations of relevant genes.

Discussion: This case depicts a situation of a presumptive clinical diagnosis of MH that was not confirmed by genetic testing. Definite testing by muscle biopsy was not done due to the age of the patient [2]. It raises the question of how should be the anesthetic approach in a future anesthesia. Should we assume the diagnosis of MH or reject it?

References:

Learning points: It is the authors’ opinion that in situations of a clinical presumption of MH without a definite laboratory exclusion by muscle biopsy, the patient should be treated as having an established diagnosis of MH.
Intraoperative PTH allows patients stratification according to their risk of hypocalcemia. High and medium patients receive intravenous an oral calcitriol and oral calcium. High oral calcium doses are given (up to 150 mg/kg/day). If hypocalcemia, calcium levels should be measured 72 h after discharge.

Learning points:
- Our patient hypocalcemia was early identified by intraoperative PHT measurements. Correct identification of the patient at risk was not accurate enough to prevent hypocalcemia. It is necessary to study the preoperative levels of vitamin D, to implement a hypocalcemia prevention protocol while in hospital, and to discharge - with both vitamin D and high doses of calcium - patients at risk after discharge.

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Intranasal Phenylephrine in the Operating Room - How Many Drops Are Too Much?

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Background: ENT (Ear, Nose and Throat) surgeries commonly use topical vasoconstrictors (TV) to control bleeding in nose, throat or ear. These drugs are used in a variety of concentrations, and the total amount of administered drug often is unmeasured and not documented on the medical record. This case describes an anesthetic complication and its management after topical phenylephrine use in a bilateral turbinectomy surgery.

Case Report: A 13 years old boy, ASA I, was proposed for bilateral turbinectomy. The airway was secured with orotracheal tube and anesthesia was maintained with sevoflurane. Surgery was performed without complications. In the end of the procedure surgeons packed both nostrils with cotton balls soaked in phenylephrine 2.5% and normal saline fluid. 5 minutes later, cardiac frequency decreased for 44 bpm with a BP of 119/68 mmHg (mean 88 mmHg). Atropine 0.5mg was given, resulting in an increase of the CF to 138 bpm and of BP to 220/150 mmHg. At this time, we started vagal maneuvers and labetalol 2.5mg was administered with persistence of tachycardia and high blood pressures. Hemodynamic changes only reverted after nasal packing removing with CF and BP returning to normal ranges. Patient was extubated and was discharged the day after surgery.

Discussion: It is important for all anesthesiologists to be aware of the clinical problems associated with TV. There are some reported cases of severe hypertension with reflex bradycardia, acute pulmonary edema, cardiac arrest and death after topical use of phenylephrine. Phenylephrine overdose preferentially distributes blood to the pulmonary vascular beds. The natural protection of the pulmonary vascular overload is to maintain cardiac output. Since β1 receptor blockade reduces cardiac output, treatment of phenylephrine-induced hypertensive crisis with β-adrenergic blocking is contraindicated. Despite the potential problems caused by use of TV, neither surgeons nor anesthesiologists know the exact quantity of drug administered in each procedure. There are some studies that suggest safe initial doses for children and adults - 20 µg/kg and 0.6µg/kg drops of a 0.25% solution, respectively.

Learning points: Phenylephrine is one of the most commonly used TV and could be an underrecognized source of perioperative complications. Identify the minimal amount of phenylephrine needed to achieve the outcome. The anesthesiologist should be aware of the drug dosage and side effects.

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2y old girl with bidirectional Glenn procedure for transposition of great arteries suffers ileus and pneumoperitoneum

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Background: TGA is rare, but life-threatening congenital malformation lath needs urgent surgical treatment. Bidirectional Glenn procedure connects superior vena cava and pulmonary artery providing temporary improvement of cardiac function. Nevertheless, chronic hypoxemia leads to tissue suffering, organ dysfunction, including state of ileus and gastrointestinal malfunction.

Case Report: 2y old girl with situs inversus and TGA, undergone BDGP at the age of 4m, was presented to the clinic with ileus and pneumoperitoneum - somnolent, reduced tonus and reactivity, capillary refill >5s, T (rectal) 35C, peripheral vasospasm, acrocyanosis, tachypnea 50/min, SaO2 83%, tachycardia 220/min, BP 51/28mm Hg, extremely balloonized abdomen, mimerene, metela. She was immediately intubated, a CVL was inserted in v. jug. int. sin., rehydrated, put on catecholamine support: Dobutamine 15mcg/kg/min, Dopamine 15mcg/min,
Noradrenaline 0.5 mcg/kg/min. Urgent surgery was held: Laparotomy- peritonitis totalis (chemical), perforatio ventriculi (10cm), epiploitis gangrenosa; Revisio. Sutura. Omentectomia. All intestines were livid, pachynea, olio-anuria, hemorrhagic syndrome despite medications. 24h after surgery, exitus letalis was registered.

Discussion: Congenital heart diseases may cause severe chronic hypoxemia and hypoxia, damaging various tissues and organs. It may lead to gastrointestinal malfunction, intestinal congestion, thinning of organs' walls, resulting in spontaneous perforation or rupture.

References:

Learning points: An isolated but significant malformation of one organ or structure may lead to disorders in other. Recurrent pulmonary infections can complicate the clinical course. Typical facial stigmata, micrognathia and a high arched palate can lead to a difficult airway scenario. Altogether, US patients are usually a challenge for the anesthesiologist.

Case Report: We present the case of a 17-year-old female US patient, ASA IV, with acute febrile neutropenia related to chemotherapy for Hodgkin lymphoma, scoliosis, respiratory failure requiring BIPAP therapy during sleep and when laid down, severe malnutrition and wheelchair dependency for locomotion; that was proposed for a central venous catheter (CVC) placement. Considering the patient fixed posture, left lateral decubitus was the only possible positioning with attention to pressure point padding. Conscious sedation was performed with alfentanil and propofol on a bolus regimen, with maintenance of spontaneous ventilation assisted by pressure support at her usual parameters. Ultrasound-guided CVC placement in the right internal jugular vein was executed and the patient completed the postoperative period in the ward uneventfully.

Discussion: US patients typically have generalized muscle weakness and contractures, as well as a debilitated general status. Careful positioning is crucial in order to avoid fractures, pressure ulcers and nerve entrapment syndromes. Airway management and ventilation can be challenging. Proper planning is necessary, and lung function tests and blood gas analyses should be available. The anesthesiologist plays a central role in the perioperative evaluation and optimization of these patients.

References:

Learning points: US patients often present multiple challenges to the anesthesiologist, in relation to positioning, airway management and ventilation support. Careful planning is essential for a safe and successful perioperative care of these patients.

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Immediate resuscitation & management of anaesthesia for the newborn with laryngotracheoesophageal cleft associated with laryngeal web

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Background: A laryngo-tracheo-esophageal cleft (LCE) is an congenital malformation characterized by an abnormal, posterior, sagittal communication between the larynx and the pharynx, possibly extending downward between the trachea and the esophagus. We report the case of a Laryngotracheoesophageal cleft in a preterm newborn associated with laryngeal web.

Case Report: Newborn presented with respiratory distress immediately after birth. In attempt to intubate found to have type IV congenital laryngeal web. Initially emergency tracheostomy was done with LMA under sevoflurane and local infiltrate and later diagnosis of laryngo-tracheo-esophageal cleft type IV was made via oesophagoscopy. As saturation was not maintained even after tracheostomy intubation laryngo-tracheo-esophageal cleft repair was done. The patient's family reviewed the case report and gave written permission for the authors to present / publish the report.

Discussion: Though, a not so common finding, this shows the importance of thorough clinical examination of newborns, especially preterm, keeping in mind congenital abnormalities. Early diagnosis and proper repair of laryngeal cleft are essential to prevent pulmonary damage and associated morbidity. Child should be assessed properly, and the surgical approach should be individualized based on the symptoms, other associated findings on airway endoscopy, and type of cleft.

References:

Learning points: Good Clinical Examination. Use of Supraglottic airway device. Opioid free regional anesthesia.

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Anesthesia for rhinoseptoplasty in patient with Friedreich's ataxia

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Background: Friedreich's ataxia (FA) is an autosomal recessive genetic disease affecting 1 in 50,000 people with symptoms starting on the first or second decade of life. It develops with progressive ataxia, dystrophy, muscle weakness, areflexia, hypotonia, and proprioception alteration, in addition to non-neurological signs such as hypertrophic cardiomyopathy, diabetes mellitus and changes in ventilation. People with FA are also susceptible to malignant hyperthermia[1] and show increased sensitivity to neuromuscular blockers (NMB)[2]. The case presented is relevant and challenging since it is due to the scarcity of similar case reports in literature and the anesthetic risks inherent to the characteristics of the disease.


Discussion: An isolated but significant malformation of one organ or structure may lead to disorders in other. Recurrent pulmonary infections can complicate the clinical course. Typical facial stigmata, micrognathia and a high arched palate can lead to a difficult airway scenario. Altogether, US patients are usually a challenge for the anesthesiologist.

References:
2. FALCONE, Anaesthesia in enfermedades mitocondriales.

Learning points: Degenerative and progressive diseases that are subject to having their development affected by drugs used during anesthesia constitute a great challenge, making the choice for the best anesthetic technique even more delicate.
Airway management (laryngeal mask airway vs. endotracheal intubation) may influence the need of postoperative respiratory support for laser coagulation treatment of retinopathy of prematurity

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Background and Goal of Study: Laser coagulation for retinopathy of prematurity (ROP) is performed on multimorbid premature babies, where anesthesia with endotracheal intubation (ETI) may result in prolonged postoperative mechanical ventilation (MV). We studied if airway management with laryngeal mask airway (LMA) vs. use of ETI may influence the need of postoperative respiratory support.

Materials and Methods: In this retrospective audit data from 128 consecutive patient were reviewed who undergone ROP laser coagulation between 07.2014 and 12.2017. After anesthesia induction with sevoflurane inhalation airway management was performed with either LMA 1 or ETI at the discretion of the anesthesiologist. Following laser coagulation patient were observed at perinatal intensive care unit and received respiratory support (supplemental O2, non-invasive respiratory support with CPAP/BiPAP/HPVC or ETI and MV) as needed at the discretion of the neonatologist. Data are presented as mean±SD and Hest or chi square test were used as indicated. P<0.05 was regarded as significant.

Results and Discussion: Airway management was performed with ETI (ETI group) in 44, and LMA (LMA group) in 84 cases, respectively: Gestation age (ETI 25.8±1.8 weeks; LMA 26.3±1.3 weeks; p<0.03), birth weight (ETI 1867±432 g; LMA 2231±538 g; p<0.01) at the time of intervention. In case of endotracheal intubation duration of anesthesia (ETI 147±45 min; LMA 102±37 min; p<0.01), and surgery (ETI 100±40 min; LMA 67±29 min; p<0.01) were longer. Use of LMA was associated with significantly less frequent (LMA 30%; ETI 72%; p<0.01) and shorter use (LMA 0.6±1.5 days; ETI 4.5±8.5 days; p<0.01) of any kind of postoperative respiratory support. None in the LMA group but 21 patients in the ETI group needed postoperative MV (p<0.01). Fewer patient in the LMA group developed complications (incl. apneas/desaturations/liqcardia, sepsis, necrotizing enteroceosis) during postoperative observation period (LMA 12%; ETI 30%; p<0.01).

Conclusion: During ROP laser coagulation of premature babies the use of LMA for airway management (compared to ETI) was associated with fewer cases and shorter duration of postoperative respiratory support.

Endotracheal intubation using a printed 3-dimensional airway model in a patient with Pierre Robin Sequence who has history of tracheostomy

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Background: The Pierre Robin Sequence (PRS), called Pierre Robin Syndrome, is defined as the clinical triad of micrognathia (small mandible), glossoptosis (backward, downward displacement of the base of the tongue) and airway obstruction. Patients with PRS may require general anesthesia and endotracheal intubation for various reasons. The clinical triad of PRS can present significant challenges for the anesthesia provider including airway obstruction and difficult intubation.

Case Report: A 6.5-year-old boy with PRS required anesthesia for closure of leakage site after percutaneous endoscopic gastrostomy (PEG) removal. The pediatric patient had history of tracheostomy and subglottic fibrosis. These suspected predictors indicated two problems: the difficult intubation, and the issue related to the size of endotracheal tube. We prepared for difficult intubation, and estimated suitable size of endotracheal tube using a printed three-dimensional (3D) airway model from computed tomography (CT) 3-Dimension Chest Airway in the pre-anesthetic planning of PRS patients with history of tracheostomy.

Discussion: Difficult intubation should always be considered because of the clinical features of PRS. Fiberoptic intubation is the gold standard, but other equipments have been used successfully including video laryngoscopes and intubating LMA. When difficult intubation is expected due to anatomical abnormalities of face and airway as in this patient, simulation of intubation with a printed 3-dimensional airway model before the anesthesia helps in safe airway management, can reduce the risk of airway irritation, injury and edema by reducing the number of endotracheal intubation attempts.

References:

Midazolam vs the game ‘HospAvontuur’ to reduce preoperative anxiety in children undergoing surgery. A randomized clinical trial

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Background and Goal of Study: Midazolam premedication is widely used to decrease preoperative anxiety in children. However, premedication may be associated with undesirable effects. Preoperative anxiety may also be reduced by information provision about an upcoming hospital admission, anesthesia and surgery to child and parents with a serious computer game. We aimed to assess if information provision with a serious computer game, the HospiaVontuur, is equally effective in the reduction of preoperative anxiety compared with midazolam premedication in children undergoing ENT surgery.

Materials and Methods: In this observer-blinded randomized clinical trial, children aged between 4 and 7 years scheduled for elective ENT surgery were randomized into an intervention group, i.e. children who played HospiaVontuur at home before surgery, and a control group, i.e. children who didn’t play the game at home but received oral midazolam (0.5mg/kg) 30 min before surgery. Preoperative anxiety level was measured with the mYPas-SF (modified Yale Preoperative Anxiety Score – Short Form) first in the holding area (T1) and a second time in the OR when the anesthesia mask was introduced (T2). Emergence delirium was assessed with the PAED (Pediatric Anesthesia Emergence Delirium Scale) at the postoperative care unit (PACU) after 5’, 10’ and 15’.

Results and Discussion: From November 2017 to June 2019, 31 children were randomized into the HospiaVontuur group (46%) and 36 children into the control group (54%). No significant difference in preoperative anxiety in the intervention group versus the control group was observed at T1 (28.2 ± 6.2 vs 28.6 ± 10.4, p=0.06) or T2 (43.2 ± 25.9 vs 35.5 ± 14.2, p=0.08). Postoperative delirium was significantly lower in the control group compared to the HospiaVontuur group (8.2 ± 5.8 vs 10.8 ± 5.1, p<0.04) at PACU arrival. This difference disappeared during the following measurements at 5, 10 and 15 minutes.

Conclusion: Information provision with the HospiaVontuur game prior to surgery seems to be equally effective in the reduction of preoperative anxiety compared to the administration of midazolam premedication in children undergoing surgery.

Learning points:
- Evaluation of airway in anesthesia of pediatric patients with congenital syndrome is important, and the model is very helpful better understanding of airway structures and may have wider application in anesthesia.
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Anesthesia approach for bronchogenic cyst in an infant causing pneumothorax

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Background: Bronchogenic cyst in infants is congenital, benign lesion of lung or mediastinum. Although congenital bronchogenic cyst can often be asymptomatic rarely in infants and small children it can cause severe and life-threatening symptoms.

Case Report: A one month and six days old infant was hospitalized to Pediatric Intensive Care Unit due to respiratory failure. X-ray showed complete right pneumothorax with a diaphragm suppressed caudally and a heart pushed to the left. The right chest was drained and placed on continuous suction. Next five days the baby breathes spontaneously with no signs of respiratory insufficiency. But pneumothorax with a diaphragm suppressed caudally and a heart pushed to the left are still in the lungs. Pneumothorax was on continuous suction. Atraumatic intubation was performed on spontaneous breathing. The infant was scheduled for bronchoscopy and excision of the cyst. Induction was with sevoflurane, fentanyl and propofol. During the induction of anesthesia until thoracotomy the right chest was on continuous suction. Atraumatic intubation was performed on spontaneous breathing with a 2.5 diametar cuffed endotracheal tube. Intraoperatively saturation decreased several times, surgeons were requested to stop and saturation improved spontaneously. Postoperative course was uneventful.

Discussion: Treatment of bronchogenic cyst with or without symptoms requires surgical treatment. Considering advantages and disadvantages of one lung ventilation in infants we decided to proceed with two lung ventilation. Due to potential risk for development of tension pneumothorax an inhalation induction with sevoflurane was performed. Endotracheal intubation, on spontaneous breathing, was facilitated with fentanyl and propofol. To avoid complications a multidisciplinary approach is essential in pre and perioperative management.

References:

5314

Positive end-expiratory pressure titration during general anesthesia improves lung function in preschool children: a randomized open label clinical trial

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Background and Goal of Study: There are no outcome data to recommend which RM is best for pediatric population, weather is sustained inflation or positive end expiratory pressure (PEEP) titration. As experimenta data showed 2.5 fold increase in transpulmonary pressure is needed to slow derecruitment. In humans, transpulmonary pressure at FRC is 5 cmH2O and 2.5 times increase would be 11-13 cmH2O. Based on this observation we hypothesized that in clinical setting, stepwise increase and decrease of PEEP form 5 to 11 cmH2O could improve lung function in healthy children undergoing general anesthesia.

Materials and Methods: Single tertiary center open label randomized controlled clinical trial that included 70 preschool children- I group n=35, C group n=35. Inclusion criteria: age 3-7, ASA I/II, elective noncardiothoracic surgery. Exclusion criteria: cardiovascular and respiratory comorbidity, current respiratory infection and contraindications to chosen anesthetics. Consenting children were randomly allocated either to receive intraoperative PEEP titration 5-11 cmH2O 20 minutes before to the end of anesthesia (I group) or to be ventilated conventionally with PEEP 3 cmH2O (C group). Blood samples were collected 20 minutes before the end of anesthesia (TI) and before extubation (TII). Primary outcome was change in PaO2/FiO2, secondary outcomes were changes in PaCO2, dynamic compliance (Cdyn) and frequency of postoperative desaturation. Delta value (Δ) was used to evaluate effect of PEEP titration. Independent sample t test was used to test size effect differences between groups and Fishers exact test was used to test the differences in frequency of postoperative desaturation between groups.

Results and Discussion: PEEP titration improved oxygenation (ΔTI-TII PaO2/Cdyn: I group 150.9 vs C group 67.4; p<0.001) and lung compliance (ΔTI-TII Cdyn: I group -3.2 vs C group 0.63; p<0.05). There was no difference in frequency of postoperative desaturation. No complications were reported. 

Acknowledgements: Design and write up assisted by dr Chulandana Goonasekara via ESA 2018 mentorship scheme.

5875

Anesthetic management of neonate with polymalformative syndrome

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Background: Polymalformative Syndromes cluster a large number of syndromes characterized by multiple congenital malformations. Many of them require surgery in the first few days or weeks of life. The anesthetic management of this patients is a challenge both by age and by associated malformations.

Case report: We present a case of a 4 day old female patient (weight: 2160g) with the following diagnosis: aberrant origin of the right subclavian artery, congenital diaphragmatic hernia, cystic mass in left hemidiaphragm of undetermined origin. She required respiratory support, finally proceeding to endotracheal intubation due to respiratory failure. A percutaneous central venous catheter was inserted on the...
great saphenous vein at the right ankle. The patient arrived to the operating room intubated, sedated with a intravenous fentanyl infusion, hemodynamically stable. Routine monitoring of non-invasive blood pressure, ECG, oxygen saturation and continuous temperature monitoring (rectal probe) were stabilised. Intraoperative patient temperature was regulated with an air warming device and a regulated room temperature (26°C). We used a lung protective ventilation strategy (PCV: PIP 12, FR 33, I:E 1:1.5, PEEP 5). Anesthetic induction was performed with sevoflurane, fentanyl (5mcg) and rocuronium (1mg). We exchanged the uncuffed endotracheal tube to avoid air leak (Cormack 1). For anesthesia maintenance we used sevoflurane, intravenous fentanyl infusion and rocuronium. The surgical procedure: repair of the diaphragmatic hernia, pancreatic mass resection, appendectomy and retroperitoneal cholangiography was performed with no complications. The patient remained hemodynamically stable with a dopamine infusion ≤5 mcg/kg/min, with minimal blood loss. After the surgery the patient was transferred to the intensive care unit, the dopamine infusion was tapered 48 hours after the surgical procedure and the extubation went uneventful on the second post-operative day.

Discussion: Providing anesthesia for neonates has peculiarities that differentiate it from the rest of the age groups. Therefore, this type of surgical interventions should be performed by anesthesiologist with specific training in neonatal anesthesia. In recent decades, the improvement in perioperative critical care management of this patients have led to an increase in survival.

5816

Anesthesia management of patient with frontonasal dysplasia undergone craniofacial surgery

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Background: Frontonasal dysplasia (FND), or median facial cleft syndrome, is a rare type of facial cleft which is usually caused by the deletion of a genetic region that is present in all humans. Infants with this condition can be ventilated without problems, but they are at risk of respiratory distress, feeding difficulties and sleep apnea due to upper airway malformation. These patients often require surgery to correct these issues. The goal of anesthesia in these cases is to provide adequate airway management, hemodynamic stability, and pain control while minimizing the risk of hypoxemia or hypercarbia.

Case Report: A 1-month-old boy with type 3 FND was admitted to our hospital for craniofacial surgery. The patient was referred to our facility for repair of the diaphragmatic hernia, pancreatic mass resection, appendectomy and retroperitoneal cholangiography. The patient was intubated, sedated with a intravenous fentanyl infusion, hemodynamically stable. Routine monitoring of non-invasive blood pressure, ECG, oxygen saturation and continuous temperature monitoring (rectal probe) were stabilised. Intraoperative patient temperature was regulated with an air warming device and a regulated room temperature (26°C). We used a lung protective ventilation strategy (PCV: PIP 12, FR 33, I:E 1:1.5, PEEP 5). Anesthetic induction was performed with sevoflurane, fentanyl (5mcg) and rocuronium (1mg). The patient remained hemodynamically stable with a dopamine infusion ≤5 mcg/kg/min, with minimal blood loss. After the surgery the patient was transferred to the intensive care unit, the dopamine infusion was tapered 48 hours after the surgical procedure and the extubation went uneventful on the second post-operative day.

Discussion: Providing anesthesia for neonates has peculiarities that differentiate it from the rest of the age groups. Therefore, this type of surgical interventions should be performed by anesthesiologist with specific training in neonatal anesthesia. In recent decades, the improvement in perioperative critical care management of this patients have led to an increase in survival.

6168

Anesthetic management of a child with Apert’s Syndrome: A case report with good outcome

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Background: Apert’s syndrome is due to a rare autosomal dominant defect on a fibrillogen growth factor receptor gene. This leads to craniosynostosis, midface hypoplasia and symmetrical syndactyly besides cardiac, renal and gastrointestinal alterations which can be very challenging for the anaesthesiologist.

Case Report: A 9-year-old male child with Apert’s syndrome was referred to dental extraction under general anesthesia on day surgery. Pre-operative evaluation with history of tracheostomy since his first month until 4y, craniosynostosis correction at 4 months, syndactyly release and cleft palate repair at 18 months and multiple myringotomies before 4y without anaesthetic complications. Physical examination with pectus arcuatum and scoliosis, followed on paediatric surgery, cardiology and orthopaedics consultations, without signs/symptoms of cardiopulmonary disease. Airway evaluation with midfacial hypoplasia involving maxillary and zygomatic bones with orbital proptosis, and good open mouth. Laboratory studies, electrocardiogram and echocardiogram without alterations. Intraoperatively, ASA standard monitoring was achieved. General anesthesia was performed with inhalatory induction with O2, air and sevoflurane, followed by an intravenous (iv) access, lidocaine iv (1mg/kg) and tracheal intubation with Macintosh laryngoscope under spontaneous breathing. Maintenance with fentanyl (1ug/Kg) and sevoflurane under spontaneous breathing, and paracetamol (15mg/Kg) and ketorolac (1 mg/ Kg) for post-operative analgesia. Surgery lasts 1.5 and an early extubation was performed as the patient emerged uneventfully without complications. Postoperative follow-up occurred in level one recover unit during 3h, with discharge after that.

Discussion: Anesthetic management of Apert’s syndrome can be very challenging due to airway dysmorphism and the possibility of difficult intravenous access due to limb deformity. This case highlights that with exhaustive preparation and planned actions to deal with eventual difficulties, general anesthesia can be performed with safety standards.

References:
2. Learning points: Knowledge of the specificities of the disease, anticipation of difficulties and performance of an action plan will lead to a good management of these patients reducing complications intra and post-operatively.

6299

Airway approach to an unexpected giant valvular cyst in an infant

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Background: Valvular cysts are a rare cause of upper airway obstruction in children and have high incidence of recurrence. They present with respiratory or feeding complications at a small age. Depending on size and airway obstruction they can be life threatening, complicating ventilation, airway visualization and intubation. This case report describes the airway approach of a large asymptomatic valvular cyst diagnosed in an infant during induction of general anaesthesia for an elective ENT procedure.

Case Report: A 9-year-old male, 37 kg, ASA I, Mallampati I, with no airway symptoms besides roncopathy, proposed for elective amigdallectomy. We performed IV induction and there was difficulty ventilating with face and laryngeal mask. Direct laryngoscopy revealed a large mobile valvular cyst obstructing the airway. We were able to insert a 5.5 cuffed tube by distalising the cyst laterally with the laryngoscope blade. The surgeon drained the cyst and surgery was postponed. Two months later the patient was rescheduled and he presented recurrence as seen in the preoperative MRI. Intubation was similar to the previous one and the surgical team removed the cyst. There were no complications postoperatively and the patient is still followed by the ENT surgeons since it has high recurrence rate.

Discussion: Stridor, increase work in breathing, chest wall retraction, cyanosis, apnoea or failure to thrive are frequent symptoms in large obstructing airway cysts. The patient presented with respiratory or feeding complications at a small age. Depending on size and airway obstruction they can be life threatening, complicating ventilation, airway visualization and intubation. This case report describes the airway approach of a large asymptomatic valvular cyst diagnosed in an infant during induction of general anaesthesia for an elective ENT procedure.

References:
3. Learning points: Anaesthesiologists are responsible for airway management. This
We consider that the use of the ESP block catheter was placed between erector spinae muscle and Th5 transverse process. Prior to manipulation, the patient was given 35mcg of dexmedetomidine i.v. acetaminophen and ketorolac was observed. We also couldn’t prescribe any opioid because of the lack of significant pain relief after prescription of standard doses of intravenous opioids. 7/10), that was intensifying (VAS 8-9/10) during deep breathing or cough. A catheter technique opens wide prospects for a patient (nurse/parent) controlled analgesia for those children who are contraindicated in opioids or those who need an early rehabilitation but refuse it because of its soreness.

**Background:**
The use of epidural catheters for intraoperative and postoperative pain relief in children is growing each year. Because the insertion of the epidural catheter in the pediatric population is done under general anesthesia and the anatomical structures are smaller it represents a challenge to the anesthesiologist. The use of ultrasound guidance enables visibility of the ligamentum flavum, dural structures and depth of the epidural space (1).

**Case Report:**
A five year old child, weighing 22kg, was scheduled for a fifth redo genital hypoplasia surgery. Because of the estimated long duration of surgery and postoperative analgesia, we decided to insert an epidural catheter using ultrasound assistance for intraoperative and postoperative analgesia under balanced general anesthesia using sevoflurane induction and maintenance, opioids and rocuronium. After the induction to general anesthesia, the child was placed in a lateral position for epidural catheter placement. Ultrasound imaging was performed with a linear 5-10Hz probe which was applied to obtain a paramedian/longitudinal view of neuroaxial structures. The sonographic measurements included distance from skin to dura and skin to epidural space. The epidural puncture was performed at the level of L3-L4 lumbar vertebrae, using a 19G Tuohy 50mm needle and 24G catheter. Discussion: The measurements of the distance from skin to epidural space using ultrasound and the palpation loss of resistance technique were used and compared. The incomplete ossification of the vertebra allowed ultrasound visualisation and location of the depth of epidural space (1). The difference between the palpation technique and ultrasound assisted technique in obtaining depth of epidural space was 2 mm.

**References:**

**Learning points:** Epidural anesthesia in children can provide safe and effective analgesia if the right approach is chosen. Ultrasound imaging can be helpful for localising the right puncture site, needle trajectory and measure the depth of the epidural space from the skin.

4826

**Erector spinae block for thoracic pain relief in a paediatric patient. Case report**

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**Background:**
Erector spinae plane block was described by Forero at all. in 2016 as a new analgesic technique in adult patients with thoracic neuropathic pain. This approach has been considered as a reasonable alternative to invasive neuroaxial techniques. Further publications have opened a wide discussion on its mechanism of action, efficacy and safety profiles. However, there are only a few case reports about the use of ESPB as a method of choice of prolonged perioperative analgesia in children. Our experience shows that this novel technique can be used as an alternative to neuraxial blocks for pain management of posterior thoracic wall pain in a daily practice of paediatric anaesthetist.

**Case Report:**
A 12-year-old boy, weight 36 kg with a history of fall from a jet ski. After admission to Emergency Unit, he was diagnosed with multiple fractures of 7-8th right ribs and closed pneumothorax, that was drained. Without any other injuries and vital signs alteration, the patient suffered from severe pain (VAS 7/10), that was intensifying (VAS 8-9/10) during deep breathing or cough. A lack of significant pain relief after prescription of standard doses of intravenous acetaminophen and ketorolac was observed. We also couldn’t prescribe any opioid medication because of parental dissent. Finally, the decision to provide ESPB was taken. Prior to manipulation, the patient was given 35mcg of dexmedetomidine i.v. The block was performed under ultrasound in-plane control, inserting the needle tip to contact with Th5 transverse process. For continuous infusion 20G epidural catheter was placed between erector spinae muscle and Th5 transverse process.

Immediately after a bolus of 10ml of bupivacaine 0.25%, the patient was indicated a significant decrease of pain, 2/10 according to VAS. Further continuous infusion of 0,125% bupivacaine with a basal rate of 6ml/h and boluses for 2ml every 3 hours was started. During the next 3 days of bupivacaine infusion, no additional drugs other than acetaminophen were necessary for VAS 1-3 maintenance.

**Discussion:**
This clinical case might be an illustration of a simple and safe alternative for children with severe thoracic wall pain. Catheter technique opens wide prospects for a patient (nurse/parent) controlled analgesia for those children who are contraindicated in opioids or those who need an early rehabilitation but refuse it because of its soreness.

4867

**Bilateral ultrasound guided erector spine plane block as a complementary regional technique for postoperative multimodal analgesia in neuromuscular scoliosis surgery in pediatric patient, a case report**

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**Background:**
Postoperative pain in scoliosis surgery is frequent, given the complexity, extent and duration of the procedure. Multiple techniques have been described to diminish pain, but recently it has been proposed that administration of local anesthetic at the deep plane of the spinal erector muscle in the thoracolumbar region can provide adequate pain relief in this procedure due to its multimodal dispersion. In pediatric population there are few literatures found of this innovative technique and even less in patients with previous instrumentation of the spine like this case we present.

**Case Report:**
We describe the case of a 12-year old female patient who has a neuromuscular thoracolumbar scoliosis with Cobb’s Angle of 76. The spirometry shows a moderate restrictive pattern, an echocardiogram with normal ventricular function and patient presents a history of myelomeningocele surgically corrected previously, with sequelae of neurogenic bladder and four previous surgeries for placement of the Veptcr lengthening system. TIVA (total intravenous anesthesia) was given throughout the surgery, and the intraoperative analgesia administered was ketamine at the beginning and at the end, dipryone, lidocaine and magnesium sulfate infusion with morphine before waking up. The patient did not report pain in the first two hours of the postoperative period, only 3 mg of morphine were used in the first day and 2 mg in the second day with maximal pain score of 3,5/10, the patient only reported nasal pruritus as a side effect.

**Discussion and learning points:** We consider that the use of the ESP block is effective as a complementary technique to an intraoperative opioid-saving regimen, postoperative multimodal analgesia with diminishing opioid consumption, reducing pain scores and adverse effects observed in this pediatric population for the first 48 postoperative hours, even in patients with previous scoliosis surgery instrumentation. We think in the future anesthesiologist can consider protocolizing this strategy for the management of the pediatric patient that will be taken to spinal fusion surgery.

**References:**
3. Izquierdo V, Parada M, Reyes Escobar B. Universidad de la Sabana - Bogota (Colombia).
4. Nueva Granada - Bogota (Colombia), Universidad de la Sabana - Bogota (Colombia), Instituto Ortopedia Infantil Roosevelt - Bogotá (Colombia), Instituto Ortopedia Infantil Roosevelt - Bogota (Bogota, Colombia), Universidad Militar Nueva Granada - Bogota (Colombia), Instituto Ortopedia Infantil Roosevelt - Bogotá (Bogota, Colombia).
Effect of Rocuronium and Sugammadex Under Sevoflurane and Desflurane Anaesthesia in Children

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Background and Goal of Study: This prospective and randomized study investigated the efficacy of sugammadex changes in peak inspiratory pressure (PIP) in reversing the block of rocuronium in children in sevoflurane/desflurane anaesthesia. The effects of rocuronium on hemodynamic parameters after sugammadex and the differences in both groups were aimed to be observed.

Materials and Methods: After the Ethical Committee has approved the study (no:34/25), it was conducted in 148 patients between 2-18 years of age. The patients were divided into two groups as Group S (sevoflurane, n=73), Group D (desflurane, n=75) and 2 subgroups as 2-4, 5-10 years. Hemodynamic parameters and PIP were recorded during the procedure. Acceloromyography monitoring was performed. After anesthesia induction, the TOF device was calibrated. Sevoflurane/desflurane was set 1 MAC. Rocuronium was given 0.6 mg / kg. The time of TOF value from 100% to 0 was recorded as T1 and otrorachial intubation was performed. TOF measurements were continued throughout the operation. When TOF was 25%, it was recorded as T2 and sugammadex 2 mg/kg was administered. The time from TOF 25% to TOF 90% was recorded as T3. At the same time, systolic, diastolic blood pressures, heart rate and PIP and side effects were recorded for both groups after sugammadex injection.

Results and Discussion: Time to reach TOF 0 to 25% was significantly higher in Group S. T2 duration after induction in Group S was significantly higher and T3 duration in Group D was significantly longer in Group S for 5-10 years. PIP measurements were higher at 2, 5 and 10 minutes after sugammadex injection in Group D compared to 0 minutes.

Conclusion: The duration of rocuronium was longer in Group S. Time to reach TOF 90% with Sugammadex was shorter in Group S. PIP was significantly higher in the desflurane group after sugammadex but it was insignificant in clinical terms. No side effects of sugammadex were observed, and a rapid and effective recovery was achieved from a single dose of 0.6 mg/kg rocuronium.

Are our paediatric airway complications comparable to other large paediatric centres? A retrospective audit of all paediatric cases in a large, Australian metropolitan teaching hospital over 12 months

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Background and Goal of Study: Serious paediatric airway complications are relatively rare in modern anaesthesia practice, but the paediatric airway can be precarious for any occasional paediatric anaesthetist. Minor airway and respiratory events are common, resulting in respiratory compromise. The most common complication is as a result of laryngospasm, other aetiologies include bronchospasm, airway obstruction, unrecognized oesophageal intubation and aspiration. APRICOT (the Anaesthesia PRactice in Children Observational Trial) found an incidence of 3.1% of all paediatric anaesthetics having a respiratory complication, laryngospasm in 0.57%, bronchospasm in 1.2%, post-operative stridor in 0.7% and aspiration in 0.1%.

Results and Discussion: During a 12-month period, we specifically wanted to establish our rate of laryngospasm, bronchospasm and airway complications, and ensure that we were as comparable (1). Unexpected airway complications, and desaturations, and other airway complications, and ensure that we were comparable (1).

Materials and Methods: We conducted an audit of all paediatric anaesthetics over a 12-month period. We specifically wanted to establish our rate of laryngospasm, bronchospasm and airway complications, and ensure that we were comparable (1).

Results and Discussion: A total of 523 paediatric cases were performed on our centre throughout 2018. The ages ranged from 6 months - 16 years old. The cases were predominately ASA 1 and 2, needing ENT, orthopedic, plastic surgery, radiological procedures or general surgery. There were 6 documented desaturations in our paediatric population (1.14%). There were 8 cases of laryngospasm (1.53%), there was no documentation of a difficult paediatric airway, and there were 3 cases of bronchospasm needing intervention with bronchodilators (0.57%). There were a number of other airway complications such as a vomit on extubation (1 case), an endotracheal tube was too large for the trachea (1 case, ETT changed) and a case of an anaesthetic machine failure during the case, with no clinical consequences to the patient.

Conclusion: We can conclude that our paediatric anaesthetic practice is as safe as other centres. There will always be some laryngospasm and desaturation in the paediatric population, which should resolve quickly in the right hands.

References:

Anesthesia management of pediatric patient with Bardet Biedi syndrome and Congenital methemoglobinemia

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Background: Bardet Biedi syndrome (BBS) is characterized by polydactyly, retinal dystrophy, renal and cardiac anomalies, trigonal obesity, hypogonadism and mental retardation. Difficult intubation is manifested frequently in BBS (1). Methemoglobinemia (MH) is a serious medical condition associated with cyanosis and respiratory failure. MH is more common as an acquired form caused by toxic exposure. MH might also be appeared as congenital methemoglobinemia (CMH). We report present the anesthesia management of a patient with BBS and CMH undergoing polydactyly and pes equinovarus surgery.

Case Report: A 3-year-old male patient with BBS and CMH was consulted for polydactyly and pes equinovarus surgery. He had phenotypic features of congenital MH. He was examined and consulted to Hematology Clinic due to an increased methemoglobin level (22%). He was approved the operation when his methemoglobin level decreased to 1.7% after vitamin C and methylene blue factors affect standard monitoring and preoperative difficult airway management, anaesthesia was induced with 3 mg/kg propofol and 0.6 mg/kg rocuronium. There was no difficulty in mask ventilation. Videolaryngoscopy was used for intubation with a 5.5mm sized endotracheal tube. Anaesthesia was maintained with 50 % O2, 1.5% air, 1% sevoflurane in group S and 1% sevoflurane in group D. Desaturations and other airway complications, and ensure that we were comparable (1).

Conclusion: The duration of rocuronium was longer in Group S. Time to reach TOF 90% with Sugammadex was shorter in Group S. PIP was significantly higher in the desflurane group after sugammadex but it was insignificant in clinical terms. A rapid and effective recovery was achieved from a single dose of 0.6 mg/kg rocuronium.

Anaesthesia for patient with Friedreich's ataxia and cardiomyopathy: a case report

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Background: Friedreich ataxia (FA) is a rare autosomal recessive disease which is characterized by ataxia which is marked in the lower limbs and may be accompanied by dysarthria, nystagmus and skeletal muscle weakness. The disease may also cause cardiomyopathy, diabetes and restrictive lung disease. Since these factors affect anaesthetic management, special care is required.

Case Report: Twelve year old male patient who was diagnosed with FA, hypertrophic cardiomyopathy, scoliosis was scheduled for posterior spinal fusion. The patient was transferred to the operating room after 8h of fasting. After standard monitoring and sedation with intravenous (IV) midazolam 0.025 mg/kg, train-of-four (TOF) monitor for neuromuscular monitoring with 5 min intervals was placed on the left forearm. Anaesthesia was induced with IV propofol 2 mg/kg, fentanyl 1 µg/kg and rocuronium 0.6 mg/kg. The patient was intubated with a 6.5 Fr cuffed reinforced endotracheal tube approximately 150 sec after the administration of neuromuscular blocking agent (NMBMA). Propofol and remifentanil infusion were used for anaesthesia maintenance. Additional 0.1 mg/kg rocuronium was administered 115 min after the first dose. TOF was observed from the moment of first NMBA administration until the full recovery. The total duration of the operation was 5h and 15min. No complications occurred and the patient was stable hemodynamically during the operation. After the first hour of the operation patient presented with bradycardia, treatment with salbutamol 0.6 mg bolus. An uneventful extubation was achieved without administration of reversal agents and patient was discharged after a successful postoperative period.

Discussion: The main challenges in the anaesthetic management of FA are myoccardial problems and neuromuscular blockade. Limited number of studies have been conducted and there is no consensus on anaesthetic management of these patients. We show that safe anaesthesia is possible in patients with FA, even in the
presence of cardiomyopathy, with careful monitoring and close follow-up.

References:

Learning points: The patients with Friedreich’s ataxia presenting for surgery should be screened for accompanying pathologies. It should also be kept in mind that although it is safe to use non-depolarizing NMBAs, proper neuromuscular monitoring is mandatory in patients with FA.

6234

Tube or no tube? A subglottic challenge
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Background: Around 85% of cases of glottic stenosis in children are acquired, mostly related to prolonged tracheal intubation. Endoscopy is an essential diagnostic and therapeutic technique, and endoscopic dilation of airway stenosis is expanding as a treatment option due to its minimal invasiveness and good outcomes. A multidisciplinary approach involving Anesthesiologists, Intervventional Pneumologists and ENT surgeons is needed to avoid possible serious consequences.

Case Report: Male infant, 22 months old, with a diagnosis of sickle cell anemia and previous history of prolonged intubation and subsequent need for tracheotomy due to severe respiratory infection on September of 2018. On February of 2019, tracheostomy was closed after an ENT evaluation, without immediate complications. Nonetheless, on first post operative day, stridor was observed and a diagnostic bronchoscopy revealed a 70% subglottic stenosis (Grade II) and an upper tracheal granuloma. After 2 weeks of failed conservative management, an endoscopic therapeutic approach was decided. A 3,5 rigid bronchoscope was used to dilate the subglottic stenosis under total intravenous anesthesia and high frequency jet ventilation. However, on anesthetic emergence, severe stridor and respiratory failure were noted. This clinical scenario was ascribed to airway edema related to the procedure and the patient was immediately sedated, intubated and transferred to the Pediatric ICU. 5 days after the procedure, another failed extubation attempt, a new tracheotomy was performed in order to prevent a prolonged oral intubation. The infant was discharged 23 days later with no respiratory symptoms.

An endoscopic tracheal dilations program was to be scheduled after hospital discharge.

Discussion: Prolonged intubation is associated with several complications, namely, most cases of acquired subglottic stenosis in children. Removal of the tracheostomy in infants must be done after a thorough multidisciplinary evaluation in order to prevent an emergent airway approach. Evidence is lacking on the best anesthesia conduct for endoscopic dilation of tracheal stenosis in infants in order to address challenges related to airway and anesthesia maintenance, ventilation and risk of subsequent airway edema and immediate respiratory failure.

Learning points: Subglottic stenosis is a frequent complication of prolonged tracheal intubation. Tracheal dilations can cause airway edema and an invasive airway approach might be necessary.

6061

Perioperative management of a 3-years-old infant with Pompe disease
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Background: Pompe disease is a rare autosomal recessive disease due to acid alpha-glucosidase deficiency. Clinical features develop due to lysosomal accumulation of glycogen, especially in cardiac and skeletal muscle, leading to cardiomyopathy and respiratory muscle weakness.1,2

Case Report: A 3-year-old female was proposed to adenoidectomy, partial female patient, 1 year and 9 months, with Hardikar Syndrome, targeting BIS® 40-60. Muscle relaxants were not used. Surgery lasted for 2 hours and she remained haemodynamically stable, without periods of oxygen desaturation. Intravascular volume status was maintained. Emergence from anesthesia occurred without complications. Full resuscitation equipment was always available. Postoperative period occurred in a paediatric intensive care unit without complications, with hospital discharge after 48 hours.

Discussion: Pompe disease has an incidence of 1:40000. Literature concerning perioperative period is poor with most demonstrating serious complications.2 Besides the high anesthetic risk, this case highlights that with exhaustive preparation and proper measures, general anesthesia can be performed with safety standards. With the introduction of enzyme replacement therapy, patient survival has increased as well as the need for surgical intervention under general anesthesia.

References:

Learning points: Proper knowledge of the disease and extensive preparation will lead to a better management of these patients with minimum complications and a good recovery.

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Anesthetic Management in child with the Hardikar Syndrome
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Background: Hardikar syndrome is a multiple congenital anomaly syndrome, first characterized in 1992 by Hardikar et al. described two individuals with cholestasis, cleft lip / palate, retinal pigmentation, intestinal abnormalities and genitourinary abnormalities.1 There are very few publications in the literature on this pathology and no information on the anesthetic management of these patients. The relevance of the case of a potentially serious patient undergoing surgery due to the syndrome is evident.

Case report: Female patient, 1 year and 9 months, with Hardikar Syndrome, submitted to anesthetic intervention for esophagastroduodenoscopy (EGD): research of esophageal varices. Previously performed pre-anesthetic and a “latex free” environment can be considered. As the syndrome progresses and no information on the anesthetic management of these patients. The relevance of the case of a potentially serious patient undergoing surgery due to the syndrome is evident.

Discussion: Hardikar syndrome is extremely rare: between 1992 and 2002, 4 people were reported in the literature.1 Given the severity and rarity of the disease, studies are needed for better anesthetic management of these patients. Due to the presence of cleft lip and previous surgery, airway management can be challenging and the presence of difficult airway material should be left in the operating room. In addition, as the patient underwent various surgical procedures (mainly abdominal or genitourinary surgeries), she became part of the high risk group for latex allergy and a “latex free” environment can be considered. As the syndrome progresses with the evolution of liver dysfunction, it is prudent for the anesthesiologist to request evidence of liver function, as liver failure would cause several anesthetic implications, such as reduced drug metabolism and coagulation disorders.

References:

Learning points: Patients with rare syndromes have a large challenge for doctors. The Hardikar patient demands extreme caution and reiterates that planning and previous studies can improve postoperative outcomes.
Challenges of the anesthetic management on a newborn with giant encephalocele due to Amniotic Band Syndrome

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Background: Encephalocele is a protrusion of the skull content beyond its normal limits, through associated congenital bone malformation or, more rarely, through normal cranial foramen or fissures. The anatomical location of this anomaly together with other factors: such as hernial sac content, extent of malformation, associated CNS anomalies and the presence of other anomalies were performed uneventfully under medium difficulty. During the surgical procedure, the patient presented massive bleeding accompanied by hemodynamic instability, requiring volume replacement guided by blood gas analysis and vasopressor (norepinephrine 0.15 mcg/kg/min). After 72 hours in the neonatal intensive care unit, the patient was extubated, without the use of vasoactive drugs, stable and with no neurological changes.

Discussion: Patients with encephalocele demands a lot from the anesthetic-surgical point of view. In anesthetic management, airway care stands out as a critical point, and therefore, being prepared for a more invasive intervention is one of the possibilities to be considered. Other challenges related to venous access, imminent risk of bleeding and an uncertain prognosis make the approach of these patients complex and multidisciplinary.

References:

Learning points: Patients with encephalocele demands a lot from the anesthetic-surgical point of view. The uncertain prognosis makes the approach of these patients complex and multidisciplinary. Airway care stands out as a critical point, so the anesthetist must be prepared for a more invasive intervention.

General anesthesia without venous access in pediatric oncological patients for external beam radiation: retrospective analysis of complications in 214 cases

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Background and Goal of Study: For very young patients, anesthesia is often required for radiotherapy. While the procedure itself is painless, immobilization is essential for radiation therapy. General anesthesia utilizing inhalational agents without intravenous (IV) access for minor procedures is controversial and provokes strong opinions among pediatric anesthetists. However, only limited data are available to support either side arguments. A rapid turnover system based on strong opinions among pediatric anesthetists. However, only limited data are available to support either side arguments. A rapid turnover system based on

Discussion: A recent systematic review regarding the perioperative management of CCHS was published1 and awareness must be raised for a successful outcome. Pharmacological agents with short duration of action should be used throughout the perioperative period to allow rapid awakening. Bradycardia after induction because of autonomic dysregulation has been reported before3. Adequate postoperative monitoring is crucial to avoid cardiopulmonary complications.

References:

Learning points: Anesthetic management in CCHS requires anesthetist’s profound knowledge about pathophysiological considerations to avoid any complication.

Hemoadsorption: a promising rescue therapy in the treatment of critical ill paediatric patients

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Background and Goal of Study: Extracorporeal blood purification therapies are increasingly applied in the field of intensive care medicine. Compared to filtration-based methods mainly used for renal replacement therapy, newest adsorptive approaches have shown to specifically target the inflammatory cascade by the effective removal of relevant mediators. In the neonatal and pediatric setting however, the application of these methods brings with it various challenges but also profound technical difficulties. Recently, a promising extracorporeal device for cytokine adsorption (CytoSorb) was introduced. However, data for its application in critically ill pediatric patients remains sparse. We describe the use of CytoSorb in combination with standard therapy, in pediatric patients with multiple organ failures of various etiologies. The aim was to assess the effects on the inflammatory status, hemodynamics, and clinically relevant outcome parameters as well as the feasibility and safety of CytoSorb pediatric application.

Materials and Methods: The study comprised 16 critically ill pediatric patients admitted from May 2010 to October 2019 and treated in our neonatal and pediatric general intensive care unit. They underwent combined treatment with continuous renal replacement therapy (CRRT), plasmapheresis and CytoSorb as rescue choice.
We observed a marked decrease in inflammatory mediators, a reduction in catecholamine dosages and an improvement in organ functions, which was particularly pronounced in patients who survived. An early onset of treatment (at best within 24-48 hours after diagnosis of sepsis) seemed to be beneficial for eventual survival.

Conclusions: This case series is the first documentation of a set of pediatric/neonatal patients in which a combined therapeutic approach of hemadsorption and CRRT showed promising results with regard to hemodynamic stabilization, control of the inflammatory response, improvement in organ functions as well as safety and feasibility. Further prospective randomized controlled studies in the pediatric field are necessary to elucidate the full potential of hemadsorption in this set of patients.

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Anaesthetic Management of a Child with Limb-Girdle Muscular Dystrophy type 2C

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Background: Limb-girdle muscular dystrophies are a heterogenous group of genetic muscular diseases, characterized by a dysregulation between lesions and muscular repair responses. Its incidence is estimated to be 1:15.000 with either autosomal dominant transmission (type 1) or recessive one (type 2), various subtypes being described according to the mutation (1). Most prevalent worldwide is subtype 2A (2). Manifestations can arise in childhood or adult life. Clinically, manifests as muscle weakness at pelvic/scapular areas. Anaesthetic implications are described such as malignant hyperthermia susceptibility, anaesthetic hypersensitivity, cardiac disrrythmias and difficult airway. As such, regional anaesthesia remains a valid and preferable option in many cases. Given the low prevalence, few cases of anaesthetic management are described in the literature, especially regarding the rarest subtypes. In this abstract, we report the anaesthetic management of a 13-year old child, diagnosed with limb-girdle muscular dystrophy type 2C, proposed for open repair of distal femur fracture.

Case Report: The child presented without focal deficits and a risk of difficult airway on our preoperative evaluation. Regional anaesthesia, with sequential spinal epidural anaesthesia was administered with 12.5 mg of intrathecal bupivacaine and, afterwards, 12mg of 0.2% epidural ropivacaine initiated 30 minutes before the end of surgery. However, due to intraoperative anxiety and agitation, sedation with propofol 6 mg/kg/h and ketamine 2 mg/kg/h was needed, preserving spontaneous ventilation. Besides this, no other complications were noted. Motor block reversal occurred 130 minutes after the sequential anaesthetic technique. The postoperative analgesic regimen comprised epidural ropivacaine 0.2% for 38h and 1g paracetamol iv BID.

Discussion: To our best knowledge, anaesthetic management of this condition is not reported in the literature. Regarding our clinical case, regional neuraxial anaesthesia was a suitable technique, without complications. However, intraoperative sedation required elevated doses of both propofol and ketamine, without the reported hypersensitivity to these drugs described in the literature.

References:
2. Chávez E. et al: General anaesthesia in two patients with Limb-Girdle muscular dystrophy; Anestesiologia i Rat 2013; (7):397-400.

6076

Anesthetic technique in a child with pallister-killian syndrome. A case report

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Background: The Pallister-Killian syndrome is a genetic affection with very low prevalence in the world. It consists of a short arm tetrasomy of chromosome 12p, characterized by mental retardation and various dysmorphic features, including craniofacial ones.

Case Report: This report presents the case of a 6-month-old baby, with a history of Pallister-Killian syndrome who is operated on electively for a placement of bilateral tympanic drainage due to bilateral serous otitis. Among the different pathologies that children with this type of tetrasomy may present, this child presented a persistent arterial ductus with slight overload of the right ventricle, with preserved diastolic function and pulmonary pressure within a normal range, muscular hypotonia, mild development delay, hearing loss, uvala bifida, ogival palate, facial dysmorphism with wide forehead, flat nasal bridge and ocular hypertelorism and a non-operated left hip dysplasia. The anesthesia technique used was a moderate sedation started with inhaled anesthetics (sevofoflan), and continuing with propofol (boluses up to 22 mg) because de increase of temperature, maintaining spontaneous breathing throughout the intervention. At the end of the procedure the child woke up without any complications and was transferred to the pediatric ICU for postoperative surveillance.

Discussion: Tetrasomy of chromosome 12 is syndrome with a low incidence nowadays, so there is very little literature on the anaesthetic management of these children. We must be familiar with this type of syndromes because they can be an anesthetic challenge, since they involve craniofacial, cervical alterations, a marked hypotonia that can pose a risk for the development of malignant hyperthermia, in addition to cardiac malformations and involvement of other organs. In the existing literature in young children, an inhalation anesthesia was performed without complications, although monitoring is recommended throughout the intervention and the immediate postoperative period, in addition to having devices for difficult intubation.

References:

Learning points: The Pallister-Killian syndrome is a rare disease nowadays but with which we should be familiar, since it can become an anesthetic challenge.

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Anaesthesia and Spinal Muscular Atrophy type I under new drug treatment

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Background: Spinal muscle atrophy (SMA) is an autosomal recessive neuromuscular disease, characterized by progressive symmetric muscle weakness. At SMA type I (a category of the disease in which) symptoms manifest before 6 months of age. Recently 2 new treatments have been approved. Onasemnogene abeparvovec-xioi (Zolgensma®), not yet approved by EMA, is given intravenously, requires concomitant corticotherapy and is associated with elevated liver enzymes and thrombocytopenia. Nusinersen is administered intrathecally by lumbar puncture and has been linked to reports of communicating hydrocephalus.

Case Report: A 5mo female diagnosed with SMA type I had already received 3 treatment sessions of Nusinersen and 1 of Zolgensma®. She presented with nystagmus and ocular inversion. Blood tests revealed transaminases elevation. CT scan suggested exuberant tetraventricular hydrocephalus in relation with Blake's Pouch Cyst (BPC), later confirmed by MRI. She was proposed for a ventriculostomy under general anaesthesia. Surgery went without complications and extubation was possible. Patient was transferred to the pediatric intensive care unit, clinically stable. Since the hydrocephalus didn’t resolve, she returned a week later for a ventriculoperitoneal shunt.

Discussion: BPC is linked to noncommunicating hydrocephalus but there are reports that factors that cause a change in CSF dynamic may trigger re-expansion of Blakes Pouch and associated hydrocephalus. The administration of nusinersen has been linked to at least 4 cases of communicating hydrocephalus in children with SMA I. We hypothesize that intrathecal administration may have triggered the hydrocephalus. In contrast, there’s only one case report associating SMA I and BPC, not related to this treatment or any trigger. Additionally, anesthetic concerns of Zolgensma® are yet to be clarified.
SMA type I is a common cause of infant mortality. Treatment
Exposure to general anesthesia has been
anaesthesia; three of them also received a nerve block (one patient an external
Materials and Methods:
evaluated the abilities of the NoL index to discriminate between noxious and
conductance, skin conductance fluctuations, and their time derivatives. The authors
Background and Goal of Study:
Intraoperative evaluation of the nociception
level index in paediatric patients under general
anaesthesia

References:
1. Drug Safety Update volume 12, issue 2; September 2018: 4.
Learning points: SMA type I is a common cause of infant mortality. Treatment options have serious side effects and anesthetic related safety profile is not yet well established.
Effect of nutritional status on induction and awakening during Sevoflurane anaesthesia in children

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Background and Goal of Study: Malnutrition is a major problem in developing countries like India. 43% of children under 5 years of age are underweight and 48% are stunted. Modern inhalational agents like Sevoflurane provide a safe and pleasant way to induce anaesthesia in children who would not otherwise allow placement of an intravenous cannula. There are no studies till date elucidating the relationship between anthropometric measures of nutrition status and inhalational agent induction and awakening times.

Materials and Methods: 71 children between the ages of 1 to 9 years were recruited into the study between November 2017 and November 2018 at the All India Institute of Medical Sciences, New Delhi, India. Anthropometric data (height, weight, mid-arm circumference, waist circumference, hip circumference) and demographic data was noted for every child before the anaesthetic. Anaesthesia was induced using the study protocol and time to achieve various study parameters was noted. The volume of Sevoflurane was calculated using Dion's method. The primary outcome was correlation of anthropometric measurements to awakening times. Secondary outcomes were correlation between anthropometric measurements and induction time and total sevoflurane requirement.

Results and Discussion: 82 patients were recruited in the study. Median (IQR) age of patients was 4 (2-6) and 36 of them were female. Multiple linear regression analysis revealed that total sevoflurane consumption was dependent upon age [coefficient (SE) 0.02 (0.006); p=0.01], weight [coefficient (SE) 0.10 (0.04); p=0.01], mid-arm circumference [coefficient (SE) 0.26 (0.1); p=0.007] and waist circumference [coefficient (SE) 0.08 (0.03); p=0.01] of the patients after adjustment of total duration of anaesthesia. However, BMI (p=0.23), height (p=0.07), head circumference (p=0.09) and waist-hip ratio (p=0.67) were not significantly correlated with total sevoflurane consumption.

Conclusion: Induction time was correlated with mid-arm circumference (p=0.02) and awakening time was not correlated with any of the anthropometric parameters after adjustment for the total duration of anaesthesia.
congenital etiology therefore basal values had to be considered bearing in mind that abnormal starting point. The evident improvement in NIRS values upon VM ligation made us expect a subsequent clinical improvement which did happen, making NIRS a helpful tool with prognostic implications.

Conclusion: Brain and somatic NIRS in pediatric patients is a non-invasive, safe and very useful tool to detect haemodynamic variations even before they have clinical significance. NIRS may also have a prognosis value.

References:

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Postoperative behavioral changes in pediatrics: an observational study

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Background and Goal of Study: postoperative behavioral disturbance is common in children, although the etiology remains unclear. The incidence is wide ranging in the literature from 10% to 80% (1). It is usually a self-limited phenomenon, but can be severe. The aim of this study was to determine the incidence of behavioral changes within our institution and identify which children are at increased risk.

Materials and Methods: a prospective observational study of 198 children aged 1 to 12 undergoing elective major surgery under general anesthesia. Data collected: sociodemographic, type of procedure, anesthesiatic technique, and child anxiety. The presence of preoperative anxiety was assessed in the PACU using the m-VPAS (modified-Yale Preoperative Anxiety Scale), and the presence of negative postoperative behavioral changes (NPOBC) were assessed using the PHBQ (Post-Hospital Behavior Questionnaire), completed by parents 7-28 days postoperatively. Data were analyzed using logistic regression, with P<0.05 considered statistically significant.

Results and Discussion: 60.1% of children the exhibited preoperative anxiety. The incidence of NPOBC was 38.8% (77/198) on day 7 and 21.7% (43/198) on day 28. Multiple logistic regression identified the following risk factors: age, child anxiety and previous hospitalizations. There were no association between type of surgery, duration of surgery, sex and behavior changes.

Conclusion: Postoperative negative behavioral changes, such as nightmares and separation anxiety, may occur in up to 30% of all children undergoing general anesthesia and surgery. Of the children, 21.7% continued to demonstrate NPOBC 28 days after surgery. We found that preoperative anxiety, age and previous hospitalization is associated with increased occurrence of postoperative negative behavioral changes. Negative behavioral changes occur more frequently with decreasing age, previous hospitalizations and preoperative anxiety.

References:

5528
What is in a name? – Revisiting the syndromic appearing child (SAC) for surgery, post-diagnosis

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Background: Walker-Warburg syndrome (WWS) is a rare entity (~1:100,000[1,2]) and is a marginalia of this case report. Professional and ethical dilemmas arise in anesthetizing a premature neonate pre- and post- his disorder’s diagnosis. We surface the original concerns of dealing with an SAC [3] and the problems of repeat anesthetics to a recently defined pathology.

Case Report: MRR suffered prenatally from a macrocephy, corpus callosum agenesis and retinal detachment. Genetic testing was equivocal for WWS. He was delivered by emergent Cesarean section due to bradycardias in a breech fetus with hydrocephalus. He weighed 2,200g and head circumference was 42.8cm. Apgars were 6/8 and he was admitted to the NICU apathetic and in mild RDS (on CXR). The macrocephy, low set ears and hairline, axial hypotonia and poor sucking defined an SAC. Echocardiography showed mild TR, small PFO and MRI demonstrated bilateral supratentorial severe communicating hydrocephalus with dysplastic optic nerve, cerebellar hypoplasia and z-shaped midbrain (Fig. 1).

A VP-shunt was inserted on day three. We anesthetized him as per hydrocephalus, brain-stem insufficiency and hypotonia percausions on volitales. He convulused on day 7 and was put on antiepileptics, albeit negative EEG. Definitive WWS diagnosis arrived on day 29. We were scheduled to anesthetize him on day 53, for a gastrostomy insertion and were grappling with the new percausions WWS entails. We skipped possible MH triggers by TIVA, despite the 1st surgery. On day 118, MRR was sent to community nursing care.

Discussion: As we show above – what flew the first time can mean possible harm a second one. Previous case reports of WWS were uninformative as to a ‘second hit’ effect, post-diagnosis.

References:

Learning points: SAC genetic status must be verified ad hoc preop.
Parental anxiety for the surgical operation and anesthesia of their children and the need of informational programs

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Background and Goal of Study: Preoperative anxiety in children and their parents may lead to negative postoperative responses, which may cause long-term behavioral problems. The aim of this study was to assess the effect of specific demographic characteristics in parent’s and children’s preoperative anxiety and to investigate the desirable ways to control it.

Materials and Methods: A retrospective study sample was 286 Greek speaking children (1-14 years of age) who underwent routine surgery in our hospital. Before surgical operation the Spielberger State-Trait Anxiety Inventory questionnaire was completed by the parents. Children’s preoperative anxiety was evaluated using the Modified Yale Preoperative Anxiety Scale.

Results and Discussion: Independent predictors of increased anxiety levels in parents were child’s age (p=0.024) and gender (girls p=0.008), living in rural areas (parents: p<0.001; children: p=0.009), being a mother (p=0.046), high or low education level (p=0.031), a no premedicated child (p=0.007) and high baseline parental anxiety (p=0.003). Previous hospitalization (p=0.019), high situational parental anxiety (p=0.001), no premedication (p=0.048) and being the only child in the family (p=0.045) are found to be the main determinants of preoperative anxiety control in children. 74.2% of parents would like to be present at induction in anesthesia of their child. Mothers, younger parents (≤35 years) with younger children (≤5 years) and higher anxiety level, as well as parents whom third or older child is going to be operated express a greater desire to be present at induction in anesthesia. Other strategies that could help parents control their anxiety, according to their opinion, include a more detailed preoperative interview and informational program (89.5%), behavioral and psycho educational interventions (35.2%), clowns, toys and distraction activities (32.8%) and alternative medicine strategies like hypnosis, acupuncture and music therapy (10.2%).

Conclusion: Targeted policies of reducing preoperative anxiety should include parent’s presence during induction of anesthesia, a detailed preoperative interview and informational programs, behavioral and psycho educational interventions and various distraction activities. It is needless to point out that National European Societies of Anaesthesiology should take care of creating national guidelines on how to manage this situation, regarding the presence of parents during anesthesia induction.

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Intranasal dexmedetomidine versus oral midazolam premedication for emergence delirium in children undergoing strabismus surgery: A randomized controlled trial

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Background and Goal of Study: Dexmedetomidine is increasing popular used as a premedication in the pediatric population. We examined the hypothesis that the prevalence of emergence delirium would be lower with intranasal dexmedetomidine compared with oral midazolam premedication in children following strabismus surgery.

Materials and Methods: One hundred and fifty-six participants scheduled for unilateral strabismus surgery were enrolled. Participants were randomized in a 1:1:1 ratio to receive premedication with intranasal dexmedetomidine 2 μg/kg (the dexmedetomidine group), oral midazolam 0.5 mg/kg (the midazolam group), or 0.9% saline (the saline group). The primary outcome was the incidence of emergence delirium by the Paediatric Anesthesia Emergence Delirium (PAED) scale. Secondary outcomes included inhalational induction quality, emergence time, postoperative pain intensity, length of post-anaesthesia care unit (PACU) stay, the incidence of postoperative nausea or vomiting (PONV), and parents’ satisfaction.

Results and Discussion: The peak PAED scores (median, IQR) were (6, 5 to 7) in the dexmedetomidine group, (8, 5 to 12) in the midazolam group, and (9, 8 to 12) in the saline group (Figure 1). The incidence of emergence delirium was lower in patients given dexmedetomidine (6 of 52, 11.5%) compared with that in patients given midazolam (22 of 50, 44%; P=0.001) or saline (25 of 51, 49%; P<0.001). Likewise, the incidence of PONV was lower in the dexmedetomidine group (2 of 52, 3.8%) than that in the midazolam (11 of 50, 22%; P=0.006) or saline (15 of 51, 29.4%; P<0.001) groups. However, there was no difference between groups concerning postoperative pain scores and length of PACU stay.

Conclusion: Among patients undergoing strabismus surgery, intranasal dexmedetomidine 2 μg/kg premedication decreases the incidence of emergence delirium and PONV, and enhances inhalational induction quality and parents’ satisfaction compared to oral midazolam 0.5 mg/kg.

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Neonatal lengthy sevoflurane exposure causes long-term deficits in microglial morphology

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Background and Goal of Study: Lengthy exposure of general anesthetics causes neurobehavioral disorders in developing brain. However, the molecular and cellular mechanisms remain largely unknown. Microglia are resident macrophages in the central nervous system which play important roles in brain development. A hallmark of microglia is their highly ramified morphology and highly dynamic nature. General anesthetics could influence microglial morphology and surveillance. These studies aim to explore the long-term effect of neonatal lengthy sevoflurane exposure on microglial morphology.

Materials and Methods: Seven-day-old C57BL/6 mice were randomly assigned to 2 groups. In the Sevo group, mice were exposed to 2.5% sevoflurane for 4 h. In the control group, mice were exposed to carrier gas (30% O2/70% N2) for 4 h. Fixed brain slices from P14 mice were immunolabeled for IBA-1 to visualize microglia. Images were acquired under confocal microscope and morphological analysis was performed using ImageJ and Imaris software. Serial block face scanning electron microscopy (SBF-SEM) was performed to examine the ultrastructure of microglia and synapse in P21 mice.

Results and Discussion: Confocal images showed that microglia display altered morphology after length sevoflurane exposure. Microglia in the Sevo group displayed reduced total branches length and reduced arborization area compared to the control group. Morphological 3D reconstructions of microglia further showed that microglia in the Sevo group had larger soma volume. Consistently, SBF-SEM results showed that the Sevo group mice had lower microglia volume fraction and reduced microglia processed number. Subtle morphological changes of microglia may affect microglia–neuron interactions. The SBF-SEM results showed that the number of microglia contacted synapse number and synapse surface were decreased in the Sevo group.

Conclusions: The light and electron microscopic data together demonstrate that lengthy sevoflurane exposure disrupts microglia morphology. Microglia–neuron interactions were also altered with decreased synapses contacted by microglia after lengthy sevoflurane exposure.

References:
Position of the largest cross-sectional area of the heart in pediatric patients with pectus excavatum: Implication of cardiac compression during cardiopulmonary resuscitation

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Materials and Methods: This retrospective study investigated the position of the largest cross-sectional area of the ventricles to determine the optimal location and depth for chest compressions in pediatric patients with pectus excavatum (PE). Chest computed tomography images of 94 pediatric PE patients before and after correction surgery were compared with normal patients. The transverse level of the largest cross-sectional area of the ventricles (Vmax) was considered the optimal cardiac compression level. To evaluate cardiac displacement, the length from the suprasternal notch (SSN) to Vmax (SSN-Vmax) was divided by the sternal length (SL) from the suprasternal notch to the xiphisternal joint (SSN-Vmax/SL). At Vmax, the proportional leftward deviation of the center of the ventricles from the midline versus transverse diameter of the thorax (LiDev) was calculated. The remaining internal thickness was calculated assuming the recommended chest compression depth (one-third of the anterior to posterior diameter).

Results and Discussion: Compared with the normal population (SSN-Vmax/SL, mean [1SD] = 10.3%), LiDev, 6.92(7%), pediatric PE patients showed significant caudal displacement of Vmax (SSN-Vmax/SL, 98.2[15.1]% before correction, P < 0.001; 100.4[13.5]% after correction, P < 0.001) and LiDev (16.2[5.3]% before correction, P < 0.001; 13.3[4.8]% after correction, P < 0.001). The remaining internal thickness assuming cardiac compression was < 10 mm in 57.4% and 19.1% of pediatric patients with PE before and after correction, respectively.

Conclusion: Pediatric PE patients showed significant caudal and leftward deviation of the ventricles compared with the normal population despite correction surgery. In addition, the currently recommended compression depth would injure intrathoracic structures of pediatric PE patients during cardiopulmonary resuscitation.

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The impact of colloid loading on renal function for craniofacial reconstruction surgery in children: 6% Hydroxyethyl starch (HES) 130/0.4 vs. HES 70/0.5

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Background and Goal of Study: Craniofacial reconstruction is a significant challenge for the pediatric anesthesiologist. Primary concerns include blood loss and fluid management. Maintenance of normovolemia is critical during craniofacial surgery in the pediatric population, owing to the children’s circulating blood volume. Third generation hydroxyethyl starches (HES) have been developed. However, only a few studies evaluated the efficacy and safety of 6% HES 130/0.4 and HES70/0.5 in children. Our analysis aimed to assess the effects of HES as the intraoperative volume expansion does not impair renal function at least in the short term.

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Efficacy of ultrasound-guided Transmuscular Quadratus Lumborum Block in paediatric abdominal surgery. A randomized controlled trial

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Background and Goal of Study: Transmuscular quadratus lumborum block (TQLB) is a novel regional anaesthesia technique that has proven to be effective for postoperative pain reduction in different abdominal surgical procedures. The aim of this study was to evaluate the efficacy and analgesic consumption in children undergoing low abdominal surgery.

Materials and Methods: The study included forty patients, aged 1 to 6 years, ASA I-II, scheduled for low abdominal surgery (hernia repair or orchioectomy) under general anaesthesia. They were enrolled in two groups: TQLB block plus systemic analgesia (group 1; n=20) versus wound infiltration done by the surgeon plus systemic analgesia (Group 2; n=20). Informed consent was obtained from within 7days after surgery. Data are presented as mean ± SD. Overall comparisons between groups were made by two-factor ANOVA for repeated measures. On the other hand, overall comparisons within a group were made by one-factor ANOVA for repeated measures. Any other necessary comparisons were made by Student’s t-test. A level of P<0.05 was considered significant.

Results and Discussion: The patients' demographic data did not differ between the group [2.0 ± 1.9 yrs. (HES130/0.4) vs. 1.4 ± 1.1 yrs(HES70/0.5)]. Serum creatinine and BUN after administration of HES 130/0.4 or HES 70/0.5 were within the normal range on postoperative days 1 to 3. Both BUN and serum creatinine did not significantly differ between groups on postoperative days 1 to 3 (P>0.05).

Conclusion: In this retrospective analysis of children undergoing craniofacial reconstruction, we conclude that the use of HES 130/0.4 or HES 70/0.5 based volume expansion does not impair renal function at least in the short term.
the parents' patients. Randomization was achieved using the closed envelope technique. Exclusion criteria included known allergies to local anesthetics, infection or redness at the injection site, anatomic anomalies or coagulation disorders, liver diseases, or unwillingness to participate in the study. All blocks were performed by the same anesthesiologist after placement of a ProSeal laryngeal mask airway before surgery. Wound infiltration was done by the surgeon at the same time. Analgesic consumption (ibuprofen) within the first 24 postoperative hours, pain intensity scores (FLACC scale) at 60 minutes, 2, 8 and 24 hours after surgery, time in which the first analgesia was required, satisfaction levels of the parents (0-10), adverse events related to systemic analgesia and time to hospital discharge were evaluated and registered.

Results and Discussion: We found differences between both groups in ibuprofen consumption (80mg vs 185mg; p<0.01) and pain scores (FLACC) within the first 24 postoperative hours at each interval (p<0.02 for every point in time analyzed). Time in which the first analgesia was required was longer for the TQLB group (18 vs 10 hours; p<0.05). Satisfaction levels of the parents were also higher in the first group (p<0.05). Adverse events related to medication and time to hospital discharge showed similar results.

Conclusion: The results of this study showed that in paediatric patients undergoing unilateral inguinal hernia or orchiopexy the TQLB provided longer and more effective postoperative analgesia compared with wound infiltration and systemic analgesia, which has been in use for many years.

5284
The effect of recruitment maneuver on ventilation volume for children after anesthetic induction
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Background and Goal of study: Atelectasis occurs in the majority of children during induction of general anesthesia. In clinical practice, the recruitment maneuver (RM) might be useful to prevent atelectasis. It has been shown to improve oxygenation and restore lung volume, and may improve ventilation perfusion ratio. Recently, a new procedure of RM was suggested; positive end-expiratory pressure (PEEP) is increased step by step to target pressure. Therefore, we assessed the effects on total volume (TV) and hemodynamics change before and after this RM in pediatric patients.

Materials and Methods: The pediatric patients (ASA-PS I-III, aged 3 months to 6 years) underwent general anesthesia for elective dental or oral surgery. They were divided into three groups; Infant group (0-12 months), preschool children group (1-6 years) and school children group (7-10 years). Following tracheal intubation, mechanical ventilation was commenced in pressure-controlled manner with 15 cmH2O and a PEEP of 4 cmH2O. RM was performed progressively in steps by 5 cmH2O every four breaths up to 35 cmH2O. Before and after RM, TV, heart rate (HR), blood pressure (BP) and SpO2 were recorded. The difference of these parameters before and after RM were analyzed statistically by Mann-whitney U test.

Results and Discussion: A total of 60 patients were included; 20 in each group. TV and HR (before vs after RM) were 60.7±9.9 vs 78.8±14.0 mL (p<0.001) and 142.3±13.0 vs 144.5±12.7 bpm (p<0.01) in Infant group, 140.1±30.4 vs 168.2±37.7 mL (p<0.001) and 124.5±15.3 bpm (p<0.001) in preschool children group, 225.8±56.7 vs 255.6±57.0 mL (p<0.001) and 113.4±19.1 vs 117.0±18.4 bpm (p<0.001) in school children group. BP decreased by 5-10% after RM.

5320
Dexmedetomidine provides neuroprotection against hypoxia-induced neurotoxicity via the inhibition of microglial NOX2 activation in the hippocampus of neonatal rats
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Background and Goal of Study: Perinatal hypoxia remains a major cause of death and neurodevelopmental disability. Microglial activation contributes to hypoxic injuries in the developing brain. NOX2 (also known as gp91phox), a key isoforms of NADPH oxidase, is a predominant source of reactive oxygen species (ROS) overproduction in microglia. Dexmedetomidine (Dex) exhibits potent neuroprotection in brain injury models. However, the mechanisms of Dex for hippocampal neuroprotection remain elusive. The aim of this study was to investigate the neuroprotective effects of Dex after neonatal hypoxic brain injury and examine in vivo and in vitro whether such actions reflected modulation of microglial NOX2 activation.

Materials and Methods: Postnatal day 3 (P3) rats were subjected to hypoxia exposure (5% O2, 2 h). The effect of Dex (25μg/kg) on hippocampal microglial activation and cognitive function was evaluated up to 28 days after hypoxic injury. By using a rat hippocampal neuronal-microglial in vitro co-culture model, we further assessed Dex modulation of hypoxia (1% O2 for 12 h) - induced microglial reactivity and neurotoxicity.

Results and Discussion: Dex significantly improved spatial learning and memory ability after neonatal hypoxia. The functional improvement with Dex was associated with suppressed microglial activation, reduced pyramidal neurons loss and improved synaptic plasticity in the hippocampus. Importantly, Dex attenuated hypoxia-induced oxidative stress, as evidenced by downregulated NOX2 protein expression.
Central venous catheter (CVC) insertion in Ninety Six patients were identified, 41 were neonates. In recent years, the use of ultrasound (US) to facilitate intravenous access in children has increased. In addition to placement, US can also be used to confirm whether the IV cannula is properly positioned in the vascular tree and activity, as well as decreased malondialdehyde and 4-Hydroxynonenal in the hippocampal neurons. The heart rate variability derived Newborn Infant Parasympathetic Evaluation (NIPETM) Index for monitoring intraoperative analgesia in children aged 0-2 years under general anaesthesia – an observational pilot study

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Background and Goal of Study: Depth of anaesthesia measurement via processed EEG has become clinical standard in anaesthesiology, whereas the aim of this pilot study was judged by indirect surrogate parameters such as heart rate or blood pressure increase. Intraoperative pain therapy may be improved by continuous measurement of the parasympathetic tone. Recent studies have shown that monitors that derive an index through variations in respiratory sinus arrhythmia have diagnostic value for detecting surgical stimuli in children 2 years and older1, but so far only few measurement data are available in neonates and infants <2 years. With the presented trial, we would like to investigate the feasibility and reliability of intraoperative nociception measurement with this new approach.

Materials and Methods: After approval by the local ethics committee, 54 children with a total of 63 surgical procedures were analysed (weight 6.5 ± 3.3 [mean ± SD] kg). The derivation for the NIPE monitor (MDMS, Germany) was non-invasive via the routinely derived ECG signal and data were recorded during general anaesthesia. A NIPE value between 50 and 70 is considered to be optimal, whereas values below 50 indicate a lack of analgesia and a sign of a hemodynamic reaction. Values above 70 indicate an overdose of analgesics. We considered the following as painful events to correlate with the NIPE value: venous access, skin incision, intubation and administration of propofol. The relative decrease of the NIPE-Index was analysed in dependence of the different nocuous stimuli and correlated with an increase of the heart rate. The binomial test was used for statistical evaluation.

Results and Discussion: We could show a significant decrease of the NIPE-Index following the painful events, 19.2% after venous access, 16.5% after skin incision, 29.2% after intubation and 17.4% after propofol bolus, respectively (p<0.05). Analysis of heart rate variation was significantly less reliable than NIPE measurement in detecting painful stimuli.

Conclusion: The NIPE-Index reacts adequately – and more precisely than HR - to nocuous stimuli of children under two years of age and might be a feasible tool for optimizing intraoperative pain management.

References:

Acknowledgements: This abstract contains part of the doctoral thesis of T. Babasiz.

5426 Confirmation of an intravenous catheter placement by normal saline flush test with color doppler imaging in pediatrics

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Background and Goal of Study: In recent years, the use of ultrasound (US) to facilitate intravenous (IV) access in children has increased. In addition to placement, US can also be used to confirm whether the IV cannula is properly positioned in the vein. One of the techniques used for this purpose is observation of a change of the color doppler imaging (CDI) at the proximal site when normal saline is injected. However, no previous study in adult or pediatric patients has determined the volume of normal saline that is needed for this technique. The current study evaluates the volume of normal saline for detecting the change of CDI when IV cannula is placed properly in pediatric patients.

Materials and Methods: After IRB approval, we conducted a prospective observational diagnostic study. Inclusion criteria included age < 6 years with ASA PS 1-2 presenting for general anesthesia. After inhalational induction, a 22 gauge IV cannula was placed in the forearm with US guidance. Vascular sonography was performed in the axilla at the level of the axillary artery and vein. Normal saline was injected at a speed of 1 mL/second using a 5 mL syringe while observing the vessels with CDI. We noted the amount of normal saline injected when the CDI changed around the axillary artery and vein. This was performed twice and the average was calculated. The distance from the IV puncture site at the skin to the axilla and the depth of the vessel from the skin at puncture site were also recorded.

Results and Discussion: The study cohort included 30 patients ranging in age from 0.3 to 5.5 (2.6 ± 1.6) years and ranging in weight from 4.2 to 20.5 (12.2 ± 3.7)
kg. All patients had an IV cannula placed with US. First attempt cannulation success in this cohort was 28/30 (93%). A change of CDI was noted in all the patients with injection of normal saline. The average volume of normal saline needed to detect the change was 1.4 ± 0.4 mL (range: 0.8 – 2.1 mL). The length from the puncture site to axilla and the depth of the vein at puncture site were 16.4 ± 3.2 cm and 0.5 ± 0.2 cm, respectively.

Conclusion: Confirmation of successful IV cannula placement by normal saline flush with CDI is simple and easy to perform with minimal cost. A volume of approximately 2 mL of normal saline provided an easy to read CDI signal.

5607
Comparison between tablet computer and nitrous oxide for decreasing anxiety related to intravenous catheterization in children: a single-center randomized controlled trial
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Background and Goal of Study: Nitrous oxide (N2O) in an equimolar mixture of 50% oxygen (O2) is commonly used for sedation for painful procedures. However, recent concerns on the potential deleterious effect of N2O on health providers in addition to the environmental impact encourage the implementation of new tools for alleviating anxiety and pain in children. Thus, we aimed at comparing the efficacy of “active” distraction with 50% O2-N2O-O3 in reduction of anxiety during insertion on an intravenous line (IV) on anxiety (assessed by the Modified-Yale Preoperative Scale (m-YPAS), pain and parental and health care satisfaction. Ethical approval of the study (CER-2017-0157).

Materials and Methods: Children aged 3 to 9 years who needed an IV-line were included following parental consent. We excluded children with cognitive disorders, epilepsy or a contra-indication for the use N2O. All children had EMLA® cream 5% (Lidocaïne-Prilocaïne 25mg), applied at the puncture site and baseline m-YPAS (3.2-6.5). Inactive distraction with placebo was used for the following periods after the first and second attempt: 1 hour, 2 minutes, and 2 minutes, respectively. Anxiety and pain scores were assessed during the iv placement, and 1 hour afterwards. Data are presented as mean and [95% CI].

Results: Primary outcome: Significant difference (P < 0.01) between 3.2 ± 0.9 [2.9-6.4] vs 2.3 ± 0.6 [2.0-4.0]). No difference was noted in the parental and health care satisfaction scores.

Conclusions: Preliminary results failed to demonstrate the superiority of active distraction over inhalation of 50% N2O in a mixture of 50% O2 to alleviate anxiety and pain induced by iv-line insertion in children.

5657
Right Ventricular Myocardial Performance Index as a marker of right ventricular suffering in children with Respiratory Distress Syndrome
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Background: As a noninvasive Doppler measurement of global ventricular function the right myocardial performance index (RVPMI) incorporates both systolic and diastolic function of the right ventricle (RV). RVPMI is defined as ratio of the sum of the isovolumic contraction time (IVCT) and isovolumic relaxation time (IVRT) divided by the systolic ejection time (ET) (1).

Case Report: We report a 6 months old male child admitted in our surgical PICU because of ileus and respiratory insufficiency due to pulmonary infection. At the 3rd day since PICU admission the child developed ARDS. During the PICU stay we’ve made a few bedside echocardiographic examinations in which we found continuously progressive rise of the RVPMI followed with right ventricular dilatation and poor gas exchange with elevated pCO2 levels and low pO2.

Discussion: RVPMI values provide comprehensive information regarding systolic and diastolic right ventricular function in real time (2). RVPMI was found to be elevated in pediatric patients with either idiopathic or secondary PAH. Development of secondary PAH in children with ARDS leads to right ventricular suffering and dysfunction. Because RVPMI measurements and trends correlated with invasive measurements of mean pulmonary arterial pressure (MPAP) it can be considered as a marker of PAH. Studies in children with RV volume and pressure overload have demonstrated the feasibility of measuring this index in the pediatric age group (1). As we’ve found in our case, RVPMI was increased in patients with combined pressure and volume overload according to Kubr et al. With repetitive measurements we found progressive rise of the RVPMI values which correlated with the clinical presentation, severity and progression of the disease.

References:

Learning points: Repeated RVPMI bedside measurement could be considered as an effective dynamic marker due to following the evolution of the right ventricular dysfunction and developing PAH in children with ARDS.

5762
Clonidine for Tourniquet-related Pain in Children (CLOTCH) - Study: a pilot study protocol
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Background: Surgical tourniquets are used in pediatric limb surgery to facilitate fine tissue handling in a bloodless field. Severe post-procedural pain due to ischemia-reperfusion-injury (IRI) is a known complication. As a consequence, infants and children are likely to require supplementary opioid analgesics and prolonged stays in recovery, delaying mobilization and feeding. Clonidine, an alpha-2-adrenoceptor agonist reducing sympathetic outflow, might alleviate IRI-induced vasoconstriction and reduce pain and opioid use. We hypothesize that administration of clonidine to pediatric patients undergoing limb surgery with the use of inflatable tourniquets will reduce post-procedural pain.

Materials and Methods: In this randomized, double-blinded clinical study we will associate a single dose of clonidine (3mcg/kg) or placebo (isotonic saline) prior to tourniquet inflation and to amount of opioid administered from anesthesia induction to 24 hours postoperatively (T24). Further, time spent at recovery, pain during recovery and occurrence of emergence delirium (ED) will be assessed. Twenty children <15 years classified as ASA I+II and scheduled for limb surgery with tourniquet in general anesthesia (GA) will be included. On these pilot results we will base the sample size for a future trial. The study outline is illustrated in figure 1.

Results: Primary outcome: morphine (mg/kg) administered from end-of-incision (T0) through T24. Secondary outcomes: total amount of morphine administered (mg/kg) from end-of-incision (T0) to transferal to the pediatric ward (TREC-END) and from TREC-END until T24. Further, duration of recovery (TREC-total), pain at Recovery by FLACC and VAS score and occurrence of ED by PAED scale will be assessed.

Conclusion: This randomized, double-blind, clinical pilot trial will be the first study to investigate the effect of single-dose administration of clonidine on opioid use and severity of pain in infants and children undergoing limb surgery with tourniquet use in GA. A positive association between clonidine and reduction of opioid use would suggest IRI as the pathophysiological mechanism inducing tourniquet-related pain in children.
Complication of Hickman catheter placement in a pediatric patient. Case report

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Background: The complication of a central venous catheter is an invasive technique, with an incidence of mechanical complications of 2% to 15%, and occasionally may become life-threatening. One of the most common mechanical complications is accidental arterial puncture.

Case report: We present the case of a 11 year old child, diagnosed with Ewing costal sarcoma. He’s scheduled to channel the left subclavian vein with a Hickman for anatomical references. There was no incidence. Six hours after the procedure, the child begins with hypotension, tachycardia, breathing difficulty and anemia. A concentrate of blood is transfused, and we did a thorax radiography, where we observed a massive pleural effusion and collapse of the lung. We transfer the patient to the intervention radiology room to do an arteriography identifying occlusion of the internal mammary artery. The findings suggest the possibility that venous catheterization occurred with an arterial puncture. The artery was embebllized with microcoils, proximal and distal to the area of contact with the venous catheter, and subsequently a chest tube is placed in the left hemithorax. The patient remains stable during the procedure. After that, he's moved to intensive care unit for surveillance.

Discussion: Central venous catheter insertion is an essential procedure in critically ill children. In the paediatric population it is a more difficult technique due to the lower caliber of the vessels and the proximity of other structures, so the most effective and safest techniques need to be used in them. The channeling of the subclavian vein by anatomical references is associated with a higher rate of complications. Using ultrasound to channel the subclavian vein can help to decrease the complications associated with puncture by allowing direct visualization of the vascular structures, needle and pleura during the procedure.

References:

Learning points: Central venous catheter insertion in small infants is a challenging and high risk procedure. Ultrasound guided cannulation increases the success rate and reduces procedural-related complications.
Incidence of coagulation disorders in children undergoing surgery in an university pediatric hospital

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Background and Goal of Study: There is controversy surrounding coagulations tests in the preoperative study. We aimed to determine the incidence of disorders in coagulation test in patients undergoing surgery and find out the incidence of altered partial thromboplastin time ratio, prothrombin time, platelets and fibrinogen in children without previously known coagulation disorders.

Materials and Methods: This retrospective observational study included children that were studied before a surgery from January to April of 2018 in the Pediatric Hospital Vall d’Hebron. We collected demographic data, previously diagnosed coagulation disorders, altered partial thromboplastin time ratio (aPTT), Prothrombin time (PT), platelets and fibrinogen. Collected data is reported in quartiles, median and mean. Mann-Whitney U test was used to analyse the statistical significance.

Results and Discussion: 1,087 cases were reported, the mean age was 5.89 years, 43.21% were women and 56.78% were men. 2.57% (28 patients) had previously known coagulations disorders. In this group, 8 patients (28.57%; 0.73% out of all the cases) had altered Prothrombin time, 13 patients (46.42%; 1.19% out of all the cases) had an alteration of aPTT ratio, altered fibrinogen was reported in 2 cases (7.14%; 0.19% out of all the cases) and 2 patients had altered platelets (7.14%; 0.19% out of all the cases). 1,059 cases out of 1,087 had no previously known coagulation disorders. In this group the following disorders were reported: PT in 75 patients (6.9%; 6.8% out of all the cases), aPTT ratio in 133 cases (12.60%; 12.23% out of all the cases), fibrinogen in 8 cases (0.75%; 0.73% out of all the cases) and platelets in 2 patients (0.75%; 0.73% out of all the cases). There is a statistically significant higher incidence of altered aPTT (p < 0.05) and PT (p < 0.05) in patients with known coagulation disorders than in not previously diagnosed coagulation diseases. There is no statistically significant difference in altered fibrinogen or platelets between patients with or without coagulation disorders.

Conclusion: Patients with coagulation disorders have more frequently altered coagulation test than patients without coagulation related diseases. TTPA is the most frequently altered value in coagulation tests in patients without known coagulation disease.

5900

Kids are tiny, blades are mighty: Size at age blades of videolaryngoscope may be a life-saver in an unexpected difficult intubation

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Background: Difficult intubation is more prevalent in premature/low birth weight newborns and infants and cause for mortality (1). Difficult airway equipment is still not adequate to manage newborn and low weight infants. Videolaryngoscope (VL) should always be ready for pediatric anesthesia. We present our intubation experience with mismatch VL equipment in three pediatric patients, one of them in emergency situation with CPR and the other one we used adult angulated blade of VL.

Case Report: Informed consents were obtained from all parents' parents. Patients characteristics and prognosis was summarized at Table 1. Induction and intubation conditions and characteristics was summarized at Table 2.

Discussion: More than two direct laryngoscopy attempts in children is associated with higher complication rates (2). There is no consensus on difficult intubation that which is a better option for infants. DL or VL. Difficult airway trolley should be ready for newborn and infants in OR even if there is no expectation of difficult intubation. If appropriate VL blade size is not accessible there, size at age blades and/or adult-sized angled VL blades in hand should be employed.

5711

Practical and Cost-Effective Vascular Detection in Neonate by Transillumination: Can Flashlight of a Smart Phone be Used?

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Background: Peripheral vascular cannulation includes several difficulties for newborns and infants. In this case report, evaluation of efficiency and practicality of smartphone integrated flashlight for visualisation of peripheral veins by transillumination on a newborn with difficult vascular access is aimed.

Case Report: A two-day old, 2380 gr, term (38. gestational week) newborn with low birth weight was taken to operation theatre by Paediatric Surgery for elective colostomy opening surgery due to anal atresia. Although careful inspection of all four extremities, an apparent venous structure could not be observed (Figure 1). Upon this, flashlight of the smartphone was activated and the phone was placed from the opposite angle adjacently to the skin of the inspected extremity for venous access. Below the latero malleolus of the right foot, an atypical area for peripheral venous access, normally an unapparent and unpalpable vessel was highlighted horizontally via transillumination. After visualisation of the venous structure via transillumination, a 24G branule was placed to the vessel at the first attempt (Figure 2).

Discussion: Newborns and infants have extremely few peripheric venous structures available for venous access. Thus, requirement to devices that provide assistance and guidance for difficult venous access cases is gradually increasing. In conclusion; due to absence of randomized controlled trials on usage of phones flashlight for transillumination and possible technical characteristic variations between flashlights of different phone brands, it seems difficult to standardize the usage. But due its efficiency, cheapness and practicality; we believe that further studies can be helpful and provide great convenience to the operators.
Learning points: Smart phone flashes can make peripheral veins visible in newborn infants.

5763

Prevailing practices in airway management in an University Paediatric Hospital
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Background and Goal of Study: Airway management during anaesthesia has potential difficulties and risks. We aimed to investigate the current practice of the different techniques of airway management between the anaesthesiologists in a children's hospital and determine the incidence of difficult intubation.

Materials and Methods: This is a single-centre retrospective observational study. All patients less than 16 years old undergoing elective and urgent surgery in 2018 in Vall d’Hebron University Hospital at the surgical area of the Children’s Hospital were included. Demographic data, difficult intubation (more than two attempts to intubate) and technique anaesthetic were collected and analysed. The incidences were represented as 95% confidence intervals (CI), categorical variables were represented as percentages.

Results and Discussion: A total of 3,435 patients were included, of which 61% were male. The median age was 6.38 years (IQR 2.46 – 11.17). Six per cent of the patients were transferred from other units with endobronchial tube or tracheostomy in situ. Sedation technique without instrumentation was performed in 8% of patients. Laryngeal Mask was used as the first equipment of choice for 46% of patients compared to tracheal intubation in 40%. We recorded 1,395 encounters that underwent intubation in operating theatre. The incidence of difficult intubation was 4.66% (95% CI: 3.64 - 5.94). Incidence of difficult intubation by age group (95% CI): - Neonate: 7.31% (1.91 - 21.00); - < 1 year: 5.08% (2.50 - 9.73); - > 8 years: 3.84% (95%CI: 3.64 - 5.94). Incidence of difficult intubation by age group (95% CI): - Neonate: 7.31% (1.91 - 21.00); - < 1 year: 5.08% (2.50 - 9.73); - > 8 years: 3.84% (95%CI: 3.64 - 5.94). Incidence of difficult intubation by age group (95% CI): - Neonate: 7.31% (1.91 - 21.00); - < 1 year: 5.08% (2.50 - 9.73); - > 8 years: 3.84%

4530

Multimodal anesthesia in a patient with congenital insensitivity to pain with anhidrosis (CIPA): case report
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Background: Congenital insensitivity to pain with anhidrosis (CIPA) is an infrequent (1/125,000,000 patients) autosomal recessive disorder characterized by insensitivity to pain, anhidrosis and recurrent episodes of hyperpyrexia. Patients with this disorder are more likely to develop perioperative complications, such as hyperthermia, hypotension or bradycardia, so the anesthetic management must be adequately planned.

Case Report: A 15-year-old woman was scheduled for a surgical drainage of a L5-S1 spondylodiscitis secondary to a systemic dissemination of a chronic foot infection. She was diagnosed of CIPA at the age of 6 months, and, during her childhood, she presented various infections secondary to non-treated injuries. The drainage was performed under general anesthesia, using a multimodal analgesic protocol to control the hemodynamic response to surgical trauma that included fentanyl, ketamine, lidocaine and paracetamol. Apart from a mild and transient hemodynamic response observed during tracheal intubation, the intervention ran uneventfully. Once awake, the patient was transferred to the post anesthetic care unit, where she stayed for 18 hours with no pain or complications.

Discussion: Most perioperative complications in patients with CIPA are due to autonomic nervous system dysfunction, which should be prevented. An intraoperative multimodal analgesia titration could control the surgical stress response and promote hemodynamic and temperature stability. The low incidence of this disease limits the performance of randomized controlled studies to establish the most appropriate anesthetic management.

References:

5832

What is a paediatric anaesthetic fellowship and what are the key components of an advanced paediatric anaesthetic training program?
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Background and Goal of Study: Advanced paediatric anaesthetic training or ‘fellowships’ may vary widely. The term ‘fellowship’ is a particularly heterogeneous term. There is a paucity of guidance regarding the key components of fellowship training programs in paediatric anaesthesia. With no formal definition of a paediatric anaesthetic fellowship or the specific components or goals of training, it is difficult to design, evaluate or improve paediatric anaesthetic training programs. The aim of this qualitative research was to identify the key components of an effective advanced paediatric anaesthetic training program.

Materials and Methods: Focus groups and questionnaires were used to collect data from paediatric anaesthetic fellowship trainees and specialists in various Australasian tertiary paediatric centres. Deidentified data underwent rigorous thematic analysis to explore the opinions of paediatric anaesthetic advanced trainees and specialists to identify and determine the relative value of key components of an ideal paediatric anaesthetic training program. Educational methods, training goals and training expectations were discussed and evaluated. Trainees and specialists evaluated their local fellowship training program.

Results and Discussion: Trainees and specialists defined key components of a paediatric anaesthetic fellowship, with relatively similar results between groups. Trainees and supervisors identified that ideal training covered core types of surgeries, patients and procedures, with a minimum volumes and observed practice. Trainees and supervisors thought that learning by various methods was important but that effective feedback, supervised practice and increasing autonomy were most important in developing clinical skills. Trainees and specialists differed in their evaluation of their local training program.

Conclusions: A paediatric anaesthetic fellowship has widely variable definitions and components. Advanced paediatric anaesthetic training programs should ideally include clearly defined core components but also be individualised to accommodate widely heterogeneous training requirements by trainees. Training goals should be regularly their achievement re-evaluated during training. Regular, appropriate feedback, supervised practice and increasing clinical autonomy were considered effective educational approaches.
The neurotoxicity of JM-1232(−): a novel isoidoline derivative

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Background and Goal of Study: In animal models, neonatal exposure to general anesthetics significantly increases apoptosis in the brain with persistent behavioral deficits in adulthood. Consequently, there is growing concern about the use of general anesthetics in obstetric and pediatric patients. JM-1232(−) is an isoidoline derivative being developed as a potential intravenous anesthetic agent, which acts through γ-aminobutyric acid (GABA) receptor. The current study sought to investigate the effects of JM-1232(−) on the developing brain in the mice.

Materials and Methods: Animals: C57BL/6 mice at postnatal day 6 (P6). Anesthesia: Mice were intraperitoneally administered (IP) as follows: 0 mg/kg (vehicle), 5 mg/kg, 10 mg/kg or 20 mg/kg of JM-1232(−), 1 mg/kg, 3 mg/kg, or 9 mg/kg of midazolam, and 1%, 2%, and 3% of propofol. Loss of righting reflex was used as a measure of sedative effect of drugs. Twenty minutes after the administration, the mouse was placed in the supine position and the time taken to correct its posture was evaluated. Apoptosis analysis: Apoptosis was evaluated by western blot analysis using anti-cleaved PARP antibody. Statistical analysis: Statistical analysis was performed using R (version 3.3.1) and GraphPad Prism 8. Comparisons of the means of each group were performed using a one-way ANOVA followed by Bonferroni post hoc test.

Results and Discussion: Similar sedative effects were demonstrated by 10 mg/kg of JM-1232(−), 9 mg/kg of midazolam, and 2% of propofol. The administration of JM-1232(−), midazolam, and propofol induced significantly more expression of cleaved PARP compared with vehicle controls with dose-dependent effects (one-way ANOVA. JM-1232(−): F=10.1, P=0.002, midazolam: F=21.8, P<0.001, propofol: F=94.9, P<0.001). At the dose of the same sedative effects, JM-1232(−), midazolam, and propofol induced a 2.1, 3.2, and 2.9-fold increase in the expression of cleaved PARP over the vehicle group. The PARP expression by JM-1232(−) was significantly less than the other two anesthetics (multiple t test, vs. midazolam: t=7.49, P<0.05, vs. propofol: t=6.25, P<0.001). Our results show that JM-1232(−) has a significantly less apoptotic effect on the developing brain compared with other intravenous anesthetics.

Conclusion: JM-1232(−) is less neurotoxic than other intravenous anesthetics.
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Neuroprotective effect of oleuropein on Alzheimer disease transgenic mice

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Background and Goal of Study: Oleuropein (OLE) is a polyphenolic compound present abundantly in extra virgin olive oil and believed to be the factor behind the health benefits of olive oil consumption. Several in vitro and in vivo studies reported the broad spectrum of pharmacological properties of oleuropein such as anti-inflammatory, anti-diabetic, anti-oxidant, and neuroprotective. OLE supplementation improved cognitive performance through facilitating autophagy and reduced β-amyloid deposition. Also, it has been shown that the administration of oleuropein counteracted cognitive dysfunction induced by colchicine in the hippocampal. Tau protein expression is becoming highlight in recently years. The effect of oleuropein in AD mice is under unknown.

Materials and Methods: Nine month of 5XFAD mice were grouped into three, 5XFAD control, oleuropein 5ug, oleuropein 10ug. Animals were anesthetized with sevoflurane and positioned in a stereotaxic frame. We performed the cannula injection (15 mg/kg), intraperitoneal KBA administration (10 or 50 mg/kg) 30 min before KA injection (2.5 μl) of oleuropein were injected at a rate of 0.5 μl/min during 5 min. Control and three groups were subjected to 24 hours in ischemia chamber. Western blot analysis was performed for MAPKs (Raf, Mek, JNK and ERK) and for mitochondria and apoptosis (Bax, Bc2, Caspase 3, Cytochrome c, Parp-1). AT180 expression was significantly suppressed after oleuropein treatment compared with control group.

Conclusion: Oleuropein reduced the p-Tau and Tau5 expression on 5XFAD mice.

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Neuroprotective effect of Retinoic acid on SH-SYSY cells under ischemic condition

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Background and Goal of Study: Retinoic acid (RA) is a morphogen derived from retinol (vitamin A) that plays important roles in cell growth, differentiation, and organogenesis. It is an essential biomolecule for embryonic development and adult body homeostasis. Retinoic acid, has a neurogenesis function on SY5Y cells which can make SYSY cells differentiation into normal human neurons, and express a variety different makers. The aim of this study was to investigate the protection of Retinoic acid on neuronal cell line and the potential therapy mechanism under ischemia.

Materials and Methods: SH-SYSY cells were subcultured into four groups: Sham (normal condition), Control and two Retinoic acid group (under ischemia), and three groups were subjected to 24 hours in ischemia chamber. Cells were prepared and collected after 24 hours ischemia. Western blot analysis was performed for MAPKs (Raf, Mek, JNK and ERK) and for mitochondria and apoptosis (Bax, Bc2, Caspase 3, Cytochrome c, Parp-1). Results and Discussion: MTT results showed retinoic acid treated cells have no toxic effect under 10μM and data showed high concentration of Retinoic acid contrary effect on cells under ischemia. Appropriative concentration of Retinoic acid improved cells viability after 24hours ischemia. Ischemia decreased the expression of p-raf, p-Mek, p-JNK and p-ERK, Retinoic acid reversed these effects. Similar mechanism of Retinoic acid inhibited apoptotic protein expression (Bax, Cytochrome C, and cleaved PARP-1) and increased anti-apoptotic protein expression Bc2 protein expression after ischemia.

Conclusion: Retinoic acid improved neuronal cells viability under ischemia, but high concentration of Retinoic acid was adverse. Appropriative concentration increased MAPKs protein expression and inhibited apoptotic protein expression.

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Divalent metal transporter 1 in gliomas: Association with the effects of propofol on oxidative stress and growth in vivo and in vitro

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Background and Goal of Study: Oxidative stress enhances tumor invasion and metastasis in brain cancer. The activation of divalent metal transporter 1 (DMT1), which is regulated by glutamate receptors, can result in the increase of oxidative stress and cancer risk. Propofol, an anesthetic with antioxidant capacity, has been shown to reduce oxidative stress in several cancers. However, the underlying mechanism is unclear. Therefore, we aimed to elucidate the mechanism underlying the suppression of oxidative stress in glioma cells by propofol. DMT1 is an iron importer protein responsible for ferrous iron influx. It is regulated by NMDA receptors in neurons. However, NMDA receptor expression in glioma cells is low. AMPA receptors are vital glutamate receptors that are Ca2+-permeable (CPARs). We hypothesized that propofol may inhibit oxidative stress in gliomas via suppressing CPARs-DMT1 signaling.

Materials and Methods: Male Wistar rats with C6 gliomas, which were established by intracranial injection of C6 glioma cells, were untreated or treated with propofol. After 30 days ischemia induction, the levels of AMPA receptor subunit GluR2 and DMT1 protein expression were assessed using western blotting, respectively. The relationship between CPARs and DMT1 was confirmed in vitro using the AMPA receptor activator (R, S)-AMPA. Glutathione and reactive oxygen species assay kits were used to evaluate tumor oxidative stress.

Results and Discussion: Propofol infusion at either 20 or 40 mg kg-1 h-1 increased GluR2 levels and downregulated DMT1 expression as well as glutathione content markedly in the periphery compared with that in the glioma core. In vitro results revealed that (R, S)-AMPA increased DMT1 expression and reactive oxygen species levels, which were partly reversed by propofol treatment.
Postoperative cognitive dysfunction (POCD) is a serious peripatent neurological complications in which attention, concentration, visual memory, language comprehension and social skills are mainly impaired after surgery. Now POCD has become more and more common in elderly people all over the world. Recently, increasing researches have shown that Toll-like receptor 7 (TLR7) takes part in the process of POCD. The present study provides evidence for optimizing the selection of anesthetic drugs in perioperative management and prognosis of patients with glioma.

**Materials and Methods:** We established the model of POCD through anesthesia and unilateral nephrectomy using 20-22g 18 months wild-type male mice (WT) (n=6). After 3 days mice’s cognition was tested through fear conditioning. To determine the role of TLR7 in POCD, mice were divided into six groups (n=4): PBS, scrambled morpholinos (Scr), vivo-morpholinos against IL-6, CGP37157, or the protein kinase A inhibitor (PKA) H89 to affect the action of silymarin.材料和方法: 我们通过腹腔插管和肾摘除术建立了POCD模型，将小鼠分为六组(n=4): PBS, scrambled morpholinos (Scr), TLR7 morpholinos against IL-6, CGP37157, or the protein kinase A inhibitor (PKA) H89 to affect the action of silymarin.

**Results and Discussion:** We found that the TLR7 of POCD model mice increased concentration, visual memory, language comprehension and social skills, resulting in the inhibition of tumor oxidative stress and excessive metabolism. The present study provides evidence for optimizing the selection of anesthetic drugs in perioperative management and prognosis of patients with glioma.

**Conclusion:** We found that the TLR7 of POCD model mice increased concentration, visual memory, language comprehension and social skills, resulting in the inhibition of tumor oxidative stress and excessive metabolism. The present study provides evidence for optimizing the selection of anesthetic drugs in perioperative management and prognosis of patients with glioma.

**References:**
1. Lu Z., Yao Z., Chen C., Rui G., Hui C., Jin L.
2. *West China Hospital of Sichuan University - Chengdu (China), West China Hospital - Chengdu (China)*

**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) refers to the serious perioperative neurological complications in which attention, concentration, visual memory, language comprehension and social skills are mainly impaired after surgery. Now POCD has become more and more common in elderly people all over the world. Recently, increasing researches have shown that Toll-like receptor 7 (TLR7) takes part in the process of POCD. The goal of this study is to assess whether Toll like receptor 7(TLR7) takes part in the process of POCD.

**Materials and Methods:** We established the model of POCD through anesthesia and unilateral nephrectomy using 20-22g 18 months wild-type male mice (WT) (n=6). After 3 days mice’s cognition was tested through fear conditioning. TLR7 in hippocampus was tested using Western-blot and inflammatory factor was tested by qRT-PCR. To determine the role of TLR7 in POCD, mice were divided into six groups (n=4): PBS, scrambled morpholinos (Scr), vivo-morpholinos against TLR7 (MO), PBS+Surgey, Scr+Surgey and MO+Surgey. For mice belonging to MO+Surgey, they were injected MO into the hippocampus for knocking down TLR7 and subsequently underwent anesthesia and unilateral nephrectomy. Mice of PBS+Surgey and Scr+Surgey were treated the same way. Mice of MO only received hippocampal injection of MO and mice of PBS, Scr received the same dosage. The cognition of these mice were tested 3 days later.

**Results and Discussion:** We found that the TLR7 of POCD model mice increased concentration, visual memory, language comprehension and social skills, resulting in the inhibition of tumor oxidative stress and excessive metabolism. The present study provides evidence for optimizing the selection of anesthetic drugs in perioperative management and prognosis of patients with glioma.

**Conclusion:** We found that the TLR7 of POCD model mice increased concentration, visual memory, language comprehension and social skills, resulting in the inhibition of tumor oxidative stress and excessive metabolism. The present study provides evidence for optimizing the selection of anesthetic drugs in perioperative management and prognosis of patients with glioma.

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**Background and Goal of Study:** Postoperative cognitive dysfunction (POCD) refers to the serious perioperative neurological complications in which attention, concentration, visual memory, language comprehension and social skills are mainly impaired after surgery. Now POCD has become more and more common in elderly people all over the world. Recently, increasing researches have shown that Toll-like receptor 7 (TLR7) takes part in the process of POCD. The goal of this study is to assess whether Toll like receptor 7(TLR7) takes part in the process of POCD.
Conclusion: SA is less costly than GA when used in patients undergoing lumbar microdiscectomy, in addition, it contributes to the reduction of other non-anesthesia related costs and overall cost of treatment.

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Major spinal surgery without pain. This is a myph?

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Background: Major spinal surgeries are associated with intense pain in the postoperative period (1). Adequate pain management in this period has been seen to correlate with improved outcome, early discharge and decrease rate of the complications. It is critically that pain treatment is effective with a minimum of side effects and reduce postoperative morbidity.

Case Report: 28-year-old woman with the diagnosis: idiopathic thoracolumbar scoliosis was undergoing surgical scoliosis correction (Th4-L2). Anaesthesia was performed with propofol induction and maintained with sevoflurane. Fentanyl boluses, NSAIDs were used for intraoperative analgesia. Postoperative analgesia was decided to perform with prolonged IV infusions of dexmedetomidine, morphine hydrochloride1% and paracetamol 3000 mg/day. Dexmedetomidine (0.3 mcg/kg/h) has been started 30 min before the end of the surgery without a loading dose. Morphine infusion has been started 10 minutes after extubation in the initial dose of 0.0014 mg/kg/h. Patient pain assessment (VAS) has been performed every 2h during the first 24h after surgery and every 6h during next 48h after surgery.

Analgesia has been stopped 68h after surgery and the patient has been discharged 4 days after surgery. It showed that pain level has not been more than 3 even during activation. Analgesia has been stopped 68h after surgery and the patient has been discharged 4 days after surgery.

Discussion: This postoperative analgesia strategy allowed our patient to be active, alert and felt no pain. It did not have any side effects or instability. VAS scale score was maximum 3 during the first 24h and 1-2 during 2days after surgery.

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Learning points: Combination of dexmedetomidine,opioids analgetics and paracetamol could be a new approach of postoperative analgesia for patients after major spinal surgeries.

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The effects of blood pressure elevation on transcranial electrical stimulation motor evoked potential (Tc-MEPs) amplitudes during spinal surgery. Preliminary results of a prospective observational study

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Background and Goal of Study: Tc-MEPs are widely used to monitor the motor pathways during spinal surgery. Tc-MEP amplitude decreases can be caused by surgical or by non-surgical factors. The latter include the effects of anesthetic drugs, body temperature and blood pressure. The exact influence of blood pressure has never been rigorously investigated. The aim of this study is to investigate the effects of pharmacological blood pressure elevation on Tc-MEP amplitudes.

Materials and Methods: After informed consent, 13 patients (age range 14 – 46 years) without neurological motor deficits scheduled for elective spinal surgery were included. Anesthesia was induced and maintained with propofol and remifentanil (target bispectral index 50; nomoracaria), and an arterial line inserted for invasive blood pressure monitoring. After prone positioning noradrenaline infusion was used to gradually increase the mean arterial pressure (MAP) to 100 mmHg. Every two minutes Tc-MEP measurements were performed, stimulating with supramaximal voltage. The measured amplitudes were log-transformed. A linear mixed model was used to investigate the relationship between Tc-MEP amplitude and MAP, for the left and right tibialis anterior (TA), and abductor hallucis (AH) muscles.
Results and Discussion: A significant positive correlation between MAP and MEP amplitude was found for all four muscles (TA left p<0.016, TA right p<0.028, AH left p=0.002, AH right p<0.002) (see figure 1). There were however, large inter-individual differences in magnitude of the increase in amplitude during blood pressure elevation. The cause of these inter-individual differences may be explained by differences in efficiency of cerebral autoregulation. The use of a cerebral near-infrared spectroscope monitor could help to better explain the influence of autoregulation on the effect of noradrenaline on Tc-MEP amplitudes. 

Conclusion: These preliminary results suggest that pharmacological blood pressure elevation from ±50 mmHg to 100 mmHg, significantly increases Tc-MEP amplitudes of the TA and AH muscles. The causes of the large inter-individual variability in the response to noradrenaline should be further explored.

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Effects of desflurane and propofol anesthesia on cerebral oxygenation during spinal surgery in prone position

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Background and Goal of Study: Postural change during anesthesia has a complex effect on the systemic and cerebral circulations. The goal of this study was to evaluate the effects of desflurane and propofol on cerebral oxygenation during spinal surgery in prone position.

Materials and Methods: Study was approved by Scientific and Ethics committee of Pappanikolaou Hospital (EU PAS 16641). Fifty two patients scheduled for spinal surgery were randomly allocated to propofol (n=25) and desflurane (n=27) groups. Anesthetic agents were maintained to obtain bispectral index of 50-55. SAP,DAP,HR,SpO2,ETCO2 and right and left rSO2 were assessed at seven-time points: supine position without oxygen administration (T1), supine position with oxygen administration (T2-baseline), intubation in supine position (T3), just after prone positioning (T4), 10 minutes after prone positioning (T5), at the end of surgery in prone position (T6) and at the end of surgery in prone position (T7). Partial pressure of carbon dioxide, partial pressure of oxygen and hemoglobin were also recorded at T3 and T7. Statistical analysis was performed with t-test, Mann Whitney, chi-Square and two-way mixed Anova tests. P value < 0.05 was considered significant.

Results and Discussion: Demographic pre-oxygenation hemodynamic variables and rSO2 were comparable between groups. There was a significant difference between groups in SAP,DAP,HR,SpO2, and ETCO2 (p=0.095, p=0.061, p=0.357, p=0.088, p=0.328 respectively). PCO2, PO2 and Hb were no significant different between groups (p=0.542, p=0.394, p=0.768 respectively). rSO2 values were not significantly different between groups (rSO2: p=0.958 (T2), p=0.954 (T3), p=0.646 (T4), p=0.397 (T5), p=0.709 (T6), p=0.689 (T7)). In propofol group right rSO2 was significant higher at T3 (68.7 ± 9.41 vs 66 ± 8.87, p=0.017) and significant lower at T5 (62.2 ± 6.33 vs 66 ± 8.87, p=0.019) and at T6 (63.07 ± 5 vs 66 ± 8.87, p=0.028) compared to baseline. Left rSO2 decreased significantly from baseline at T5 (63.19 ± 7.56 vs 66 ± 8.93, p=0.026) in propofol group. Left and right rSO2 in desflurane group decreased significantly from baseline at T5 (60.92 ± 11.32 vs 66.08 ± 10.21, p=0.0004 and 60.96 ± 11.02 vs 63.68 ± 9.14, p=0.0115).

Conclusion: In prone position desflurane and propofol were associated with significant decrease in rSO2 without differences between these anesthetics.

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Effects of balanced anesthesia with sevofluorane and dexmedetomidine on somatosensory and motor evoked potentials during spinal surgery in a patient allergic to peanut, a case report

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Background: Inhalational anesthetics drug preferred to find an alternative to propofol. Various anesthesia adjuncts which preserve evoked potentials (EP) where used while reducing doses of echangee. For induction, thiopental, fentanyl, ketamina and rocuronium were administered without further doses of neuromuscular blocking agent. General anesthesia was maintained with desmedetomidine (Dex 0.6ug/kg/h), without loading dose, lidocaine (1.5mg/kg), sevofluorane 0.4 minimum alveolar concentration (MAC) and intermittent injections of fentanyl. Depth of anesthesia, hemodynamic and inotropism was preserved. The amplitude variability of the SSEP and MEP responses were assessed as well as EMG. SSEP and MEP were obtained during all the surgery without pathological changes. Increase of MEP variability were observed so stimulus intensity and number of trains adjustment was needed.

Discussion: Inhaled anesthetics dose-dependently increase latency of EP and reduce amplitude by depressing the pyramidal activation of spinal motor neurons or

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The use of SpHb in pediatric patients undergoing major surgery associated with reduced morbidity

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Background and Goal of Study: To date, perioperative blood transfusion management has traditionally based on estimated blood loss and measuring hemoglobin (Hb) values by conventional methods. However, this method is time consuming and causes a delay in decision of transfusion. Hemodynamic instability can be prevented by detecting sudden decreases in Hb concentration by continuous Hb monitoring and pH, BE, HCO3, lactate and glucose values of the patients in both groups were recorded hourly using arterial blood gas analysis during the perioperative period. In the SpHb group, Hb values were recorded by SpHb measurement and simultaneous blood gas sampling was also performed in sudden decreases. Perioperative blood and fluid transfusion, the duration of surgery and anesthesia, urine output, vasopressor requirement, the length of intensive care unit (ICU) stay, postoperative drainage, transfusion rate, Hb values and vital signs were recorded.

Results and Discussion: The duration of ICU stay was significantly higher in Group 1 (p <0.05). Lactate levels at the beginning of the operation were higher in the case group, but higher in Group 1 at the end of the operation (p <0.05). Postoperative drainage, red blood cell and fresh frozen plasma (FFP) transfusion in ICU were significantly higher in the control group (p <0.05). There was a positive correlation between ICU stay, FFP transfusion and postoperative drainage (p <0.05).

Conclusion: Noninvasive continuous hemoglobin monitoring in major hemorrhagic surgeries in pediatric patients might be effective in reducing morbidity not only by reducing the amount of transfusion and but also leading to less metabolic and hemodynamic instability.

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the synaptic transmission in the cerebral cortex. Dex is a d2-agonist that produces analgesia, sedation and sympatholysis. It changes EP amplitude at clinically nonsignificant levels and may be used in IONM at up to 1.2μg/kg/h. Lidocaine preserves EP while reducing doses of other anesthetics. Ketamine increases EP and promotes analgesia. IONM requires the maintenance of physiological variables, steady-state alveolar and serum concentrations of the agents employed.

References:

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Acute Hemorrhage of Spinal Arteriovenous Malformation in a child with Congenital muscular dystrophy: Case Report
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Background: Congenital muscular dystrophies (CMDs) are a group of early onset muscle disorders with histologic evidence of dystrophy. The merosin-deficient CMD subtype accounts for 30%. Patients present with severe muscle weakness, contractures, lung disease and cardiac disorders.1 They present a challenge to anesthesiologists when in need of surgery. Spinal arteriovenous malformations (sAVMs) are vascular lesions located within the spinal canal that in case of rupture can cause sudden-onset pain accompanied by myelopathy or radiculopathy.2

Case Report: 1. 7yo, 15kg, with merosin-deficient CMD, previously capable of ambulation, presented to the emergency department with spontaneous intense pain in both legs and back which evolved into numbness and paraplegia within 15min. Diagnosed with complete spinal syndrome below D5. The MRI showed an extensive intra-spinal hematoma. Urgent surgical intervention ensued. In the OR, severe contractures of all limbs and skin flabby mandated tailored ventral positioning and padding. Total intravenous anesthesia was used with propofol and sufentanil guided by processed EEG, rocuronium with neuromuscular monitoring and ketamine. Sugammadex was used at emergence. Characterization and excision of intradural sAVM was successful under 7 hours. The child was extubated prior to ICU transfer. Pain was controlled with paracetamol and gabapentine. Gradual partial recovery of sensation and mobility of the lower limbs was observed within 23 days.

Discussion: Overall prevalence of CMD is 0.99 per 100,000, 80% are children. Spinal AVMs are uncommon, and even rarer in children.1 The latter present with acute hemorrhage in 70% against 45% in adults.2 Intraoperative management was particularly interesting due to: tailored positioning; the use of propofol, avoiding volatile agents (risk of rhabdomyolysis and hyperkalemia); the use of sugammadex, avoiding neostigmine induced side effects. Low dose ketamine is safe and together with gabapentine provided optimal pain management. Due to the rarity of both findings mentioned, no reports were find about CMD children operated on sAVM with acute hemorrhage.

References:

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Anesthetic considerations in the syringopleural shunt: case report
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Background: Syringomyelia represents a pathology of the spinal cord that consists of the formation of a cavity filled with fluid within the spinal cord. It appears more commonly associated with the malformation of Chiari type I, although it may also be due to congenital malformations, secondary to an infection or inflammation. Syringomyelia can be asymptomatic, being discovered incidentally on an MRI or presenting with pain, progressive neurological deficits and other symptoms secondary to the compression the spinal cord. Decompression of the foramen magnum remains the recommended surgical treatment. The recurrence of syringomyelia after decompressive treatment has been described in up to 66% (1). In this situation, syringopleural shunt is one recommended therapeutic option.

Case Report: We present the case of a 54-year-old woman who underwent surgery for syringopleural shunt placement. The patient was operated in 2012, performing haemilaminectomy and syringopleural shunt after detection of the syringomyelic cavity that extended from T5 to T9. Seven years later, the patient consulted again for worsening neurological symptoms. The intervention was performed under general anesthesia and in prone position. Once the old catheter was located after the opening of the dura, obstruction was observed in its proximal end, so it was removed, placing a new one. Once the pleura was exposed, after thoracotomy on a previous scar, we caused a 4-second apnea to facilitate pulmonary descent during the opening of the pleural space and the placement of the distal end of the new catheter, thus avoiding complications derived from puncture of the pulmonary parenchyma.

Discussion: The literature on anesthetic management in syringopleural shunt is nil. This procedure requires important anesthetic considerations, such as airway management in patients with possible abnormalities, complications caused from prone position, intra and postoperative neurological control and adequacy of ventilation when accessing the pleural cavity to prevent lung complications. In our knowledge this is the first time that a case of syringopleural shunt is presented from the anesthetic point of view.

References:
Does Preoperative Bispectral Index monitoring predict postoperative delirium?
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Background and Goal of Study: Delirium is recognized as a significant contributor to postoperative morbidity and mortality in intensive care unit (ICU). The early detection and appropriate intervention are indispensable; however, the diagnostic tools are limited (1). We have hypothesized Electroencephalography (EEG) obtained by Bispectral Index (BIS) system could detect the onset of delirium and already reported that EEG showed the significant decrease in the relative power of theta wave in the delirious patients on Post-Operative Day (POD) 1 and POD 2 compared to non-delirium patients (2). If we could predict a risk of delirium before surgery using practical BIS analysis in the preoperative visit, the prognosis of the patient will be improved. So, we have analysed EEG obtained by BIS to same patients at the day before surgery retrospectively.

Materials and Methods: This study was approved by the Institutional Review Board. Informed consent was obtained from patients scheduled for esophageal cancer surgery. EEG data was obtained by BIS system during 6 minutes on the day before surgery as the patient data. Their preoperative cognitive function was evaluated with Mini-Mental State Examination. The patients were induced general anesthesia with epidural anesthesia. The patients of trachea were extubated in the morning on POD1 and subsequent management was continued in ICU. Based on medical interview, the psychiatrists diagnosed delirium.

Results and Discussion: Twenty-five patients completed the study schedule and were analysed. Seven of them experienced delirium and 18 of them did not. The average age and the percentage of male patients were significantly higher in delirium group in the relative power of the alpha, beta, theta and delta waves were not significantly different between delirium group and non-delirium group. Although we have reported that delirious patients showed significant EEG change, preoperative EEG data obtained by BIS were not significantly different from delirious and non-delirious patients. This result suggested that postoperative delirium and EEG changes might be occurred by surgery and anesthesia. Conclusion(s): Before surgery in patients who did not receive anesthetics and surgery yet, the prediction of development of delirium using EEG in the current bed-side practical analysis has a room for discussion.

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Scalp Block is Associated with Favourable Progression-Free Survival in Patients with High-Grade Glioma
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Background and Goal of Study: High-grade glioma is notorious for high recurrence rate. High-grade glioma is highly related to the genetic profile of tumour, including isocitrate dehydrogenase (IDH) mutation and Ki-67 index. Regional anaesthesia can reduce opioid consumption and stress responses, thereby improving the preservation of intraoperative immune function. We have shown that scalp block (SB) is associated with favourable recurrence profile for glioma, but the influence of genetic profile has not yet been investigated.

Materials and Methods: Patients undergoing resection craniotomy between 1 January 2014, and 30 September 2016 for World Health Organization (WHO) grade III and IV glioma with complete reports of IDH and Ki-67 index were included in analyses. Exclusion criteria comprised 1) recurrent tumour, 2) awake craniotomy, 3) stereotactic biopsy, 4) presurgery radiotherapy or chemotherapy, 5) current pregnancy, and 6) age of less than 20 years. SB was performed using 10 mL of ropivacaine in the preoperative visit. Patients were divided into impaired group (n=61) and non-impaired group (n=183). The early postoperative outcome was measured. Kaplan-Meier analysis was used to compare the survival curves between groups. Cox regression analysis was used to determine the effect of risk factors on survival outcomes.

Results and Discussion: Total 108 patients were included, 56 of whom received SB. The characteristics of the groups are comparable. SB was associated with improved progression-free survival (PFS) (median PFS:15.17 [95% confidence interval: 8.63–37.37] vs. 11.9 [95% CI:7.53–59.53] months, P=0.0301). Cox analysis revealed that SB (hazard ratio [HR]:0.115, 95% CI:0.020–0.675, P=0.0186), total gross resection (HR:0.143, 95% CI:0.023–0.897, P=0.0379), adjuvant chemotherapy (HR:0.001, 95% CI:0.001–0.261, P=0.0152), and IDH mutation (HR:0.003, 95% CI:0.001–0.203, P=0.0070) were associated with better PFS. WHO grade IV instead of III (HR:10.305, 95% CI:1.062–100.353, P=0.0443), infratentorial tumour (HR:16.707, 95% CI:1.151–250.300, P=0.0415), and Ki-67 index (HR:8.363, 95% CI:1.013–11.16, P=0.0134) were risk factors for worse PFS.

Conclusion: The application of SB is associated with favourable PFS in high-grade glioma.

References:
benzodiazepine anxiolytic for the 3 group. The score of effective premedication according IAT results and demonstrated vegetative stability in all investigated patient groups was mathematically reliable (p<0.05 compared of two stages of assessment - before the operative day and in the morning of the operative day).

Conclusion: The intracranial hypertension, functional ANS and emotional state of the patients with intracranial neoplasm determine the personly premedication before neurosurgical operation.

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Frequency of Postoperative Shivering in Patients After Craniotomy Under General Anesthesia by Sevoflurane and Desflurane: A Single-center Randomized Trial

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Background and Goal of Study: Shivering in the process of recovery is one of the adverse side effects of general anesthesia (GA). The incidence of postoperative shivering ranges from 5% to 86%. To assess the incidence of shivering during recovery of GA based on Sevoflurane and Desflurane in patients after removal of brain tumors of supratentorial localization.

Materials and Methods: We conducted an observational study of 30 patients who were operated on for brain tumors supratentorial localization under GA (group 1 - 15 patients, where the main anesthetic was sevoflurane, group 2 - desflurane). Patients in groups 1 and 2 had no statistically significant differences in age (52.4±7.3 and 51.4±10.7), level of consciousness assessed on the GCS (15 and 15), anesthetic risk assessed on the ASA scale (3 and 3), duration of the GA (320±21 min and 318±22 min) respectively. Routine methods were used during surgery to maintain normothermy in operated patients: thermoblanks, warming infusion solutions. The temperature in the operating room was controlled by a wall thermometer and maintained at the range of 22-23°C. Assessment of the presence and severity of postoperative shivering was assessed on a scale Crossley and Mahajan.

Results and Discussion: Shivering during recovery after GA were absent in 12 patients and in Desflurane group - in 3 (20%) patients. Shivering of the 1st degree in form of involuntary movements at the body and face was observed in 3 (20%) patients and in Desflurane group - in 11 (73.3%) of Desflurane group. In the group of patients with basic anesthesia Sevoflurane 6.7% marked less development (80%) patients of Sevoflurane group and in 11 (73.3%) of Desflurane group. In the patients of the group Desflurane, shivering of the 2nd degree was observed in 1 (6.7%) patient.

Conclusion: When Desflurane was used as the main anesthetic, a higher incidence of postoperative shivering was observed than with Sevoflurane by 6.7%, but without statistically significant differences. Routine methods for the prevention of postoperative shivering are reasonably effective and frequency of postoperative shivering in patients after removal of brain tumors of supratentorial localization does not exceed 26.7% with GA by inhalation anesthetics.

4830

Short-term complications in adult patients submitted to elective craniotomy surgery: a Retrospective Audit in a Portuguese Tertiary Center

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Background and Goal of Study: Major postoperative complications after craniotomy surgery have great impact in patient outcome. Post-operative hemorrhage, cerebral oedema and convulsions are severe but less frequent, many times preceded by the more common ones, PONV and pain. The aim of this audit was to determine the incidence of postoperative complications during the first 24h after craniotomy surgery and evaluate the characteristics of the studied population.

Materials and Methods: Retrospective audit using clinical records of patients submitted to elective craniotomy from January to July 2018. Clinical and demographic data included age, gender, ASA Classification, preoperative neurologic exam, tumor type and location, peritumoral oedema and anaesthetic technique. Complications in the first 24h included reintervention, convulsions, haemorrhage on scan control, decrease in GCS >3 points, new motor deficits, venous thromboembolism, PONV, pain, diabetes insipidus and death.

Results and Discussion: 35 patients analysed, 20 excluded (urgent craniotomy and incorrect surgical classification). 5% female, medium age 57.1 years old (113.3, min 23, max 82), 9% ASA I, 32% ASA II, 32% ASA III. 17% were cases of tumor relapse. 35.9% presented with headaches, 27.7% motor deficit, 21.5% convulsions, 16.5% cranial nerve deficit and 16.3% consciousness depression. 9% had a normal exam. 40% meningiomas, 30.7% gliomas and 10.7% brain metastases. 49% were frontal location and 22% temporal. 51% had peritumoral oedema. All were submitted to TIVA, two awake craniotomies. 33.8% of the cases had complication. 14 presented de novo motor deficits, one had haemorrhage on CT scan control. There were two cases of reintervention, two of convulsions and two of with deterioration of consciousness. Minor complications: three cases of PONV, four of postoperative pain and one case of Diabetes Insipidus. There were no reports of death or thromboembolism. There were no correlations between the preoperative features and complications in the postoperative period.

Conclusion: Craniotomy implies significant morbidity. The incidence of complications overlapped with the literature. We found a lower relative incidence of PONV and pain, which may be explained by the anaesthetic technique. In a centre with this kind of surgery, it is advisable that the immediate postoperative period should take place in a unit dedicated to neurocritical patients.

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Early discharge to the neurosurgical ward after elective supratentorial brain tumor resection

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Background and Goal of Study: Postsurgical care after craniotomy at an intensive care unit, where is associated with utilization of limited resources and high costs while it may not always be necessary. The benefit of routine postoperative monitoring at the ICU compared to early discharge to the neurosurgical ward is unknown. Patients at risk for adverse events need to be monitored closely, however, we hypothesize that carefully selected patients following craniotomy may be discharged to the neurosurgical ward. In this study we explore the number of adverse events within 72 hours after brain tumor resections when selected patients are discharged to the neurosurgical ward from the post anesthetic care unit (PACU) after six hours.

Materials and Methods: This pilot study is a prospective single center observational cohort study. All adult patients who had an elective resection for a supratentorial brain tumor who met the early discharge criteria were included. These discharge criteria were: cognitive status and language skills must allow clear communication and cooperation, stable neurological status, mild focal deficit concordant with pre-surgical examination findings, stable or improving pulmonary status on nasal cannula oxygen, no new cardiac dysrhythmia or symptoms, systolic blood pressure below 150mmHg without intravenous drugs. The patients were followed for 72 hours post-operatively to assess adverse advents that needed PACU or ICU care.

Results and Discussion: Between December 2017 and March 2018, 20 patients (14 men and 6 women) with a mean age of 55 ± 14 years were included. The patients were classified as ASA 2 in 90% and as ASA 3 in 10%. The type of tumor was glioblastoma in 50% of the cases, 15% were meningioma and 5% astrocytoma. Mean length of hospital stay was 5.2 ± 1.9 days. No complications requiring re-admission at the PACU or ICU or re-craniotomy were observed. One patient had a seizure at the ward which was complicated by a shoulder luxation.

Conclusion: Our preliminary results are in support of a very low incidence of serious adverse events for which postsurgical care at the ICU or PACU is required. Early discharge to the neurosurgical ward after 6 hours seems feasible in patients meeting early discharge criteria.
Use of high oxygen concentration in pediatric patients is associated with increased morbidity

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Background and Goal of Study: Pulse oximetry is a frequently used device in our daily routine practice as a marker of hypoxemia. However, the most important limitations of the hypoxemia precursors are either 100% of peripheral oxygen saturation until the arterial oxygen level falls below 80 mmHg, or no value about the presence of hypoxemia. The oxygen reserve index (ORI) forms an index based on the pulse oximeter. This index serves as a clinically important stimulant both in the detection of hypoxemia and hypoxemia. Our primary goal in this prospective randomized study is to evaluate the effects of inhalation induction with different concentrations of inspiratory oxygen (FiO2) on ORI value and morbidity rate.

Materials and Methods: This study was planned as an observational and cohort study following. The Ethics Committee approval and parental consents, 30 patients who were at risk of airway obstruction were randomized into two groups: 80% inspiratory oxygen concentration + air (Group 1, n=15) and 60% inspiratory oxygen concentration + air (Group 2, n=15) during volatile induction after routine monitoring. At the time of induction, arterial blood gas and ORI hemodynamic follow-ups were recorded at 60, 120, 180 and 240 min after tracheal intubation. Postoperative complications, length of hospital and intensive care unit (ICU) stay were recorded. Statistical analyses were performed using IBM SPSS Statistics 22. The results were evaluated at 95% confidence interval and a p value of less than 0.05 was accepted as significant.

Results and Discussion: Since two patients were excluded from the study, the data of 28 patients were evaluated. Demographics were similar in groups (p>0.05). The duration of surgery, hospital and ICU stay were significantly higher in Group 1 (p<0.05). There was no statistically significant difference between the ORI values of patients at all times (p>0.05). It was found that the duration of surgery, ORI value at 6th min and FiO2 in induction were statistically significant (p<0.05).

Conclusion: The high oxygen concentration used in volatile induction in pediatric patients increases the length of hospital and ICU stay. New oxygen monitoring methods have been found to be more effective in preventing the use of high concentrations of oxygen than traditionally used methods.

Effect of Desflurane vs Propofol on electrocorticographic spikes in ECoG guided intractable Epilepsy Surgery- Prospective randomized controlled study

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Background and Goal of Study: General anaesthesia, routinely used in Electrocorticography (ECoG) guided resection of epileptic foci, requires more vigilance as intermittent period of lightened anaesthesia is needed to elicit good ECoG waveforms. This is novel research to evaluate the efficacy of Desflurane vs Propofol in low sedating dose, having least interference with ECoG waveforms and outcome.

Materials and Methods: This is randomized controlled study conducted with ethical permission and informed consent. 32 patients with intractable epilepsy between 7-65 years and good neuropsychological assessment (IQ > 70) were included. Plane of anaesthesia is lightened to facilitate ECoG recording with target MAC 0.3-0.4 in Desflurane(D) group and propofol to 25-75 microgm/kg/min in Propofol(P) group with Bispectral index(BIS) of 50-70. ECoG recording is assessed by its onset and total duration. Withdrawal criteria were intraoperative seizures or no spikes with rescue being Propofol bolus.

Results and Discussion: Demographic data were comparable. ECoG onset was significantly early in P group being 3.25 mins vs 7.67 mins in D group (P<0.0001). ECoG was satisfactory in all patients in P group while 2 patients in D group were withdrawn due to no spike. Average total ECoG duration was higher in D group with 17.19 mins vs 11.88 mins in P group (p<0.001). BIS was comparable in both groups (p>0.05). Mean emergence time in P group was almost double that of D group (16mins). No postoperative recall was detected in any group when assessed by Modified Brice Questionnaire.

Conclusion: Optimal and early ECoG recording was better elicited with Propofol as compared to Desflurane.

References:

Effect of equiosmolar solutions of hypertonic saline and mannitol on cerebral oxygenation and brain debulking during elective supratentorial craniotomy surgery

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Background and Goal of Study: Hypersmolar therapy is the mainstay for brain volume reduction and thus surgical exposure optimization. This study aims to elucidate the impact of equiosmolar solutions of mannitol (M) or hypertonic saline (HTS) on brain relaxation, cerebral oxygenation and intracranial pressure, during supratentorial craniotomy surgery.

Materials and Methods: Fifty-two adult patients scheduled for elective supratentorial craniotomy were randomized to receive either 20% M (4.16mKg) or 7.5% HTS (2.62mKg) 30 min before dura opening. Hemodynamic variables were monitored by ClearSight System at following time points: before hypertonic agent infusion (T0), 15 (T15), 30 (T30), 60 (T60), 90 (T90), 120 (T120), 180 (T180), and 240 (T240) min after infusion conclusion. Blood samples from the jugular
bulb for cerebral oxygenation determination (SjO₂) were collected concomitantly. Furthermore, subdural pressure (SDp) and cerebral perfusion pressure (CPP) were measured before opening the dura, while brain relaxation score (BRS) was evaluated after opening the dura.

**Results and Discussion:** A notable increase (p<0.001) of SjO₂ between T0 and T15 was recorded in both groups (60±10 to 65±11mmHg for M and 58±9 to 70±4±9mmHg for HTS; p<0.001), which persisted up to T30 (64±10 mmHg for M and 67±11mmHg for HTS; p<0.001). Thereafter, SjO₂ augmentation remained valid only in HTS group up to T120 (p>0.05). Cardiac output presented a profound elevation up to T30 (±5±9 to 5±7.1±1 L/min for M and 4.7±0.9 to 5.2±1.2 L/min for HTS; p<0.001), which was then attenuated but remained important until the study completion (p<0.05) in both groups, while central venous pressure increased only at T15 (p<0.001). On the contrary, stroke volume variation declined at T15 compared to T0 (p<0.001) in both groups and though it was gradually restored, the last measured value was lower in HTS group (p<0.05). SDp and CPP were marginally improved in HTS compared to M group (5.9±3.4mmHg and 72±7.6mmHg vs 7.9±4 and 65±7mmHg, respectively; p<0.05 only for SDp). HTS favoured BRS over M (70% vs 52%; perfectly relaxed), yet this effect was not significant.

**Conclusion:** Our results indicate that 7.5% HTS exerts a more positive impact on cerebral oxygenation than equimolar dose of 20% mannitol during supratentorial craniotomy, but no clear superiority of either solution on brain debunking could be demonstrated.

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**Low-dose droperidol reduces the amplitude of transcranial electrical motor-evoked potential: a randomised, double-blind, placebo-controlled trial**

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**Background and Goal of Study:** Although low-dose droperidol (15–20 µg/kg) is a widely used antiemetic, it suppresses the amplitude of transcranial electrical motor-evoked potential (TCE-MEP), as reported in a recent case report. However, there are no randomised controlled trials to demonstrate the effects of low-dose droperidol on the TCE-MEP amplitude. The present study was to test our hypothesis that low-dose droperidol reduced the TCE-MEP amplitude.

**Materials and Methods:** Twenty female patients with adolescent idiopathic scoliosis, aged 12–20 years, and scheduled to undergo corrective surgery were randomly allocated to receive droperidol (20 µg/kg) or saline. General anaesthesia was maintained with continuous infusions of propofol and remifentanil. After recording the baseline TCE-MEP, the test drug was administered, followed by TCE-MEP recording every 2 min up to 10 min. The baseline amplitude and onset latencies were defined as 100%. The primary outcome was the minimum relative TCE-MEP amplitude (peak-to-peak amplitude, percentage of baseline value) recorded in the left tibialis anterior muscle. The secondary outcomes were the minimum relative TCE-MEP amplitudes (percentage of baseline values) recorded from the other 11 muscles and the relative onset latencies of TCE-MEP (percentage of baseline values). Statistical analyses were performed using the Mann-Whitney U test. A p-value of <0.05 was considered statistically significant.

**Results and Discussion:** Two patients from the saline group were excluded from the analysis. The data are expressed as the median [interquartile range]. The TCE-MEP amplitude of the left tibialis anterior muscle was significantly reduced in the droperidol group as compared to that in the saline group (57% [30–55%] and 76% [58–93%], respectively; p<0.01). In the other muscles, the amplitudes were reduced in the droperidol group except for the bilateral abductor pollicis brevis and the left vastus lateralis by 17% [10–26%] and 32% [20–46%] (p<0.05 for both). In the droperidol group as compared to that in the saline group (37% [30–55%] and 76% [58–93%], respectively, p<0.01). In the other muscles, the amplitudes were reduced in the droperidol group except for the bilateral abductor pollicis brevis and the left vastus lateralis by 17% [10–26%] and 32% [20–46%] (p<0.05 for both). In the droperidol group as compared to that in the saline group (37% [30–55%] and 76% [58–93%], respectively, p<0.01). In the other muscles, the amplitudes were reduced in the droperidol group except for the bilateral abductor pollicis brevis and the left vastus lateralis by 17% [10–26%] and 32% [20–46%] (p<0.05 for both).

**Conclusion:** Low-dose droperidol reduced the TCE-MEP amplitude.
Intraoperative seizures in anesthetized and curarized patient recorded on spectrogram

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Background: Anesthetic management of an epileptic patient is challenge for the anesthesiologist. Induction of general anesthesia is often associated with the administration of drugs that lower the epileptogenic threshold, so in these patients we question the need for more adequate brain function monitoring and drug management.

Case Report: We report the case of a 57-year-old man with a history of controlled epilepsy (without seizures for more than 5 years), who presented two episodes of seizures in two consecutive peripheral vascular surgeries (15 min after endotracheal intubation, about 5 min duration), captured by the spectrogram of two different monitoring devices. We used balanced general anesthesia in the first surgery and intravenous general anesthesia in the second (induction Fentanyl 2 mcg/kg, Propofol 1mcg/kg, Rocuronium 0.6mg/kg, maintenance respectively with Sevoflurane and Propofol). The convulsive episode stopped after phenytoin 500 mg IV administration in the first surgery and 10 mg IV in the second surgery.

Discussion: Literature regarding intraoperative seizure activity in neurosurgical patients is abundant, but there’s less evidence in the other surgical patients. Although there are still conflicting positions on this subject, monitoring of anesthetic depth and intraoperative EEG are now part of good anesthetic conduct. Identifying a seizure in the commonly used raw EEG in an anesthetized patient may be difficult, but this was facilitated by the use of the spectrogram in this case. Propofol may have mycogenic activity that simulates a seizure, but this is unlikely as both seizures occurred with the curarized patient and with neuromuscular block monitoring. The patient apparently had no metabolic, mechanical or electrical triggers that could explain this episode, which points in the direction of drug-induced seizures (could be Fentanyl but it has been described for other drugs too).

Learning points: This case highlights the need of brain activity monitoring that is of the utmost importance in patients with epilepsy – where spectrogram may offer tools that raw EEG lacks – given that, with our drugs, we may be lowering the seizure threshold of the patient.

The five P’s and an often forgotten A(ngio) - a case report of massive venous bleeding during scalp dissection caused by intracranial venous congestion

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"Proper Preparation Prevents Poor Performance" is a military saying but is equally relevant to neuro-anesthesia. This case report demonstrates that a preoperative case discussion with the surgeon and a review of radiological imaging are critical parts of preoperative anesthesia planning.

Case report: A 77-year-old female presented with a headache and a “whooshing” sound behind the left ear caused by a dural arteriovenous fistula (dAVF) with the nidus connecting the occipital artery to the transverse sinus. She had undergone skin gel dressings. It was impossible arterial catheterization for continuous monitoring during surgery. During surgery, she required careful mobilization of the skin, covering the airway. During surgery, she required careful mobilization of the skin, covering the airway. During surgery, she required careful mobilization of the skin, covering the airway. During surgery, she required careful mobilization of the skin, covering the airway.

Discussion: Providing safe anesthesia for dAVF resection requires optimal case preparation and close cooperation of the surgical and the anesthesia team. Fistulae alter the blood flow dynamics in the brain thereby increasing the venous pressure and decreasing the arterial pressure. In the current case, a preop overview of the images with the surgeon showed that the dAVF had induced intracranial venous congestions causing the scalp veins to “arterialize.” This by a “minor” act of skull opening, normally accompanied with minimal blood loss, lead to extensive bleeding.

Learning points: Preoperative radiological image evaluation is a critical part of preparing for a neuro-anesthesia case.

Influence of Cerebral Desaturation on the Spectral Entropy of the Electroencephalogram (EEG)

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Background: Perioperative neurological complications may be reduced by neuromonitoring. Concerning cardiac anesthesia, near-infrared-spectroscopy (NIRS) guided monitoring can help to ensure adequate cerebral oxygenation. Although there is no specific NIRS threshold for adequate cerebral saturation, NIRS can reduce neurological complications(1). EEG-based patient monitoring allows estimation of the anesthetic level(2). Similarly, ischemia influences the raw EEG and consequently processed EEG(3). We hypothesize that an identification of desaturation-induced or anesthetic-induced EEG changes is possible. Hence, we assessed the influence of cerebral desaturation on the spectral entropy (SpEnt) of the EEG.

Material: We analyzed frontal NIRS and EEG recordings during cardiac surgery. We visually selected 9 patients with a desaturation event at stable isoflurane concentration and without the occurrence of EEG burst suppression. We calculated SpEnt from a 10-second EEG-period including the 0.24 to 31.96 Hz range, at either high or low saturation within each patient. We defined the cerebral desaturation as ‘mild’ (not below 50%) and ‘severe’ (below 50% NIRS) and compared the change of SpEnt between the high and low saturation for each patient.

Results: For all patients, except for one with mild cerebral desaturation, we observed a decrease in SpEnt, a parameter behavior observed with increasing anesthetic level, whereas we found a SpEnt increase for all patients with severe desaturation. An increase in SpEnt can also indicate an arousal reaction. Figure 1 presents the individual cases.

Conclusion: With this analysis we could identify a biphasic behavior of SpEnt dependent on the extent of cerebral desaturation. In terms of mild desaturations, SpEnt declines with decreasing NIRS level. In terms of severe desaturation however, SpEnt increase may be caused by a depression of neuronal activity. This biphasic course could influence EEG-based monitoring devices and lead to an index increase during a severe cerebral desaturation.


Intraoperative management of Stevens Johnson Syndrome in patient with meningioma diagnosis

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Background: A case of a patient with meningioma and Stevens Johnson Syndrome diagnosis is presented. Because of pneumocephalus and bleeding, after surgery a new craniotomy under general anesthesia was performed.

Case Report: 63-year-old patient needed a resection of right frontal meningioma, requiring reintervention for pneumocephus. Antibiotherapy treatment (cefotaxime and ampicillin) and anticomical therapy with phenytoin was required. The patient had burn skin lesions >80% of body surface. Stevens Johnson Syndrome was associated with anticonvulsant drugs or antibiotic therapy. There were no incidents with the airway. During surgery, she required careful mobilization of the skin, covering it with skin gel dressings. It was impossible arterial catheterization for continuous
Blood pressure control. There was strict control of temperature, hydroelectrolytic balance and diuresis during the intervention. For adequate hemodynamic control, norepinephrine was initiated (0.05-0.1 μg/kg/min).

Discussion: Stevens-Johnson Syndrome is a skin hypersensitivity reaction usually due to drugs (anticonvulsants and antibiotics are commonly implicated). Advanced age and immunocompromised states have been described as risk factors. There is hardly any information about intraoperative anesthetic management. 2 Optimal intraoperative management would consist of replacing with fluids and electrolytes, maintaining ambient temperature, using a serum heater, skin caves, nutritional support (enteral route is preferred), pain control, and monitoring of superinfections. The daily wound water loss in burn patients with more than 50% of affected skin could be 3 liters. In this case they may require up to 7 liters of crystalloid solutions in 24 hours. A urinary flow of 0.5-1 ml/kg should be maintained to avoid water over-resuscitation.

References:

Learning points: Stevens Johnson Syndrome has not any anaesthetic management described. Control of hydroelectrolytic balance, diuresis, temperature and nutritional support increase survival.

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Abnormal EEG patterns and sudden drop on bispectral index monitor as pattern suggestive of seizures. Case report

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Background and Goal of Study: We report the case of a 57-year-old male who developed generalized tonic-clonic seizures during general anesthesia accompanied by changes in bispectral index, suppression ratio and abnormal morphology of EEG.

Materials and Methods: A 57 year old ASA II patient with benign prostatic hyperplasia was programmed for elective cerebrospinal fistula repair via middle cranial fossa. Preoperative assessment was strictly normal. The patient was monitored with non invasive blood pressure, oxygen saturation and ECG, bispectral index monitor (BIS), quantitative NMT monitoring (TOFF CUFF) and capnography. General anesthesia was established with tracheal intubation and target controlled infusion (TCI) of remifentanil 3mcg/ml and propofol 5 mcg/ml plus rocuronium 0.6mg/kg. NMT block was allowed to spontaneously recover for monitoring the facial nerve during surgery. Anesthesia was maintained with TCI propofol and remifentanil titrated to BIS 40-50 and median arterial pressure of 60mmhg. During manipulation of the facial lobe for accessing the fistula the patient presented generalized tonic-clonic movements. BIS was 50 showing epileptiform spikes on the EEG. Seizures lasted <1min and were treated with bolus of 40mcg propofol, and 2 mg midazolam. After the seizure BIS dropped to 0 with a suppression index (SI) of 49, and recovered to baseline in 5 min. NMT blockade was instarated and after 20 min a new burst of epileptiform activity was seen in BIS reenacting the same pattern of post ictal suppression. Venous and arterial gasometry were analyzed, and all findings were within normal range. Surgery was continued and patient was extubated without showing any neurological symptoms.

Conclusion: Intraoperative tonic clonic movements during general anesthesia pose several challenges to the anesthesiologist. They require the establishment of differential diagnoses, rapid recognition, management, and treatment of reversible causes. BIS might be useful in orienting diagnosis in patients who present with tonic clonic movements during general anesthesia. It could also be helpful to take into account that patients with sudden drop of BIS preceded by abnormalities in EEG with NMT block might be having a seizure, to allow for initiation of the differential diagnosis and treatment of any precipitation factors, as well as contemplating treatment, continuation of surgery, choice of agent for maintenance of anesthesia and postoperative plan.

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Serum concentration of ropivacaine after the repeated administration to several parts of the head during awake craniotomy

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Background and Goal of Study: Patient needs to be awakening during awake craniotomy (AC). So, it is important to use local anesthetics effectively, such as ropivacaine. It has been reported that the maximum dose of ropivacaine is 3.6 mg/kg during AC. Although large amounts of ropivacaine injection has a risk of local anesthetic toxicity. So far, blood concentration of ropivacaine after the repeated administration in a short time has never been studied during AC. In this study, we measured the serum concentration of ropivacaine at the point of 15 min after each administration during AC in order to determine the safety dose.

Materials and Methods: After approval of Nagoya university ethics committee (Approval number:2017:0529) and registered with the University Hospital Medical Information Network (UMIN-ID:00030896), the elective AC patients with obtained informed consent (n = 30) were injected 0.375% ropivacaine before awake phase at the points as follows: scalp block (T1), headpin area (T2), skin incision area (T3) temporal muscle (T4) and dura mater (T5). Ropivacaine was administered in a single dose not exceeding 3 mg/kg, and allowing the total dose could exceed 3.6 mg/kg. Actual blood samples were collected using vacuum blood collection tubes containing a gel for separating serum 15 min after each ropivacaine administration. The blood concentration was measured by the HPLC-UV method, and the value was expressed as an average value ± standard deviation. In addition to the blood concentration of ropivacaine, complications during awake phase (nausea and vomiting, headache, seizure) were also evaluated as the secondary endpoints.

Results and Discussion: The average total ropivacaine dose was 5.01 ± 0.68 mg/kg with the maximum total dose of 6.3 mg/kg, and the average interval times from T1 to T5 was 128 ± 17.7 min. Until awake phase, there were no cases that the maximum concentration exceeded the toxic threshold of 4.3 μg/ml in all patients. (The mean serum concentration of T1: 1.23 ± 0.36 μg/ml, T5: 0.82 ± 0.26 μg/ml) No one local anesthetic toxicity symptoms were observed during awakening in all cases. Other complications at awake phase were: headache 9 cases (30%), nausea 4 cases (13%), seizure 3 cases (10%), agitation 2 cases (6%), and vomiting 1 case (3%).

Conclusion: It was suggested in case of the repeated administration that total dose up to 5 mg/kg could be safe without local anesthetic toxicity symptoms.

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“Awake” versus “asleep” deep brain stimulation surgery in Parkinson’s disease

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Background and Goal of Study: Deep brain stimulation (DBS) for Parkinson disease is an alternative for drug-resistant patients. Advancements in neuroimaging have led to image-based targeting of subthalamic nucleus under general anesthesia (GA, or “asleep DBS”) without the use of microelectrode recording (MER) or intraoperative test stimulation (performed under conscious sedation, CS). Our aim was to compare the anaesthetic concerns and complications of these two procedures.

Materials and Methods: Retrospective observational analysis comparing patients who underwent DBS surgery (2014-19), performed under CS or GA. Data collected included demographics, ASA, comorbidities, difficult airway criteria, intraoperative monitoring, duration of surgery and hospital admission. Intraoperative and postoperative complications were registered.

Results: 78 patients were analysed in 2 groups: CS 36 (47.4%) and GA 42 (52.6%). 25 women and 53 men, mean age 60.9 y (33-75). Four CS patients met difficult airway criteria and 7 in GA group. Globally, 23 patients suffered an intraoperative complication, 19 (52.7%) in CS group and 4 (9.5%) in GA group, being arterial hypertension the most frequent [8 (22%) in CS group and 1 (2.4%) in GA group] (table 1). Six patients (16.6%) presented agitation and 4 (11.1%) had a minor airway obstruction in CS group. Procedures under CS were performed in two surgical times. Total mean duration was 5.4 h (3.5-9.2 h) in GA and 4.7 h (3.1 - 9.2 h) in GA (p = 0.002). Length of admission was reduced from 8.7±3.9 days in the CS group to 3.7±4.0 in the GA group (p<0.0001).
**Awake anesthesia** or **awake craniotomy** is
We retrospectively studied intraoperative hemodynamic
To minimize pain and hemodynamic change,

Conclusion: Asleep DBS is associated with reduced morbidity compared with traditional DBS surgery under CS. Arterial hypertension was the most frequent incidence. Factors such as clausphobia, severe off-medication symptoms or a fear of being awake during the surgery are reduced, leading to an increased number of surgical candidates. Asleep DBS can be performed in one surgical time, which reduces the surgical and admission time.

References:

4756
Anesthesia for awake craniotomy in brain surgery – our experience
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Background and Goal of Study: “Awake anesthesia” or “awake craniotomy” is an anesthetic technique indicated in brain surgery when lesion is located in close proximity to those cortical tissues that are indispensable for defined cortical functions (motor, sensory, visual and language cortex). The technique allows a maximum of brain tumor resection with a minimal risk of functional damage in patients.

Materials and Methods: Between May 2018 and November 2019, in our clinic we performed a number of 7 cases of awake craniotomy for brain tumor resection. All patients have been subject of a preoperative evaluation for assess the patient’s health, cooperation, airway, and also to a psychological preparation. The patients were orally premedicated two hours before surgery with oral Clonidine 1mg. After induction of general anesthesia, an anesthetic technique indicated in brain surgery when lesion is located in close proximity to those cortical tissues that are indispensable for defined cortical functions (motor, sensory, visual and language cortex). Anesthesiologists have to manage patients in a way so that they are compliant throughout the awake state, maintaining adequate analgesia and motor functions.

Results and Discussion: The surgery in all 7 cases, were over all uneventful and in comfort conditions for the patients. During the intraoperative period, light neurological deterioration (dysarthria, paresthesia in upper limb) was observed in 2 patients with quick postoperative improvement. No intraoperative epileptic seizures were observed.

Conclusion: The key and safety of an “awake craniotomy” depends on patient motivation and cooperation, titration of anesthetics and maintenance a close psychological contact with the patient throughout the surgical procedure. The technique of “awake craniotomy” is important for the preservation of language and motor functions.

References:

5127
Scalp block and dexmedetomidine infusion in awake deep brain stimulation surgery
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Background and Goal of Study: To minimize pain and hemodynamic change, patients need a proper sedative and analgesics in awake deep brain stimulation surgery (DBS) using microelectrode recording (MER) or intraoperative test stimulation (ITS). We evaluated scalp block and dexmedetomidine infusion may be appropriate and tolerable for the patients with parkinson’s disease.

Materials and Methods: We retrospectively studied intraoperative hemodynamic parameters and perioperative medication in 5 patients undergoing DBS surgery. The focus of this study was investigating patient’s vital signs including BP and HR. The secondary focus was observing patient’s cooperation when required and feeling comfortable throughout the perioperative period. Bilateral scalp block (1.5% lidocaine + 0.25% bupivacaine) and 0.4-0.5 mcg/kg/hr dexmedetomidine infusion without loading dose were performed during DBS surgery.

Results and Discussion: BP and HR were stable without hemodynamic reaction and patients’ respiration were stable. Patients’ consciousness level was sedative, but they showed an accurate response to ITS and communication.

Conclusion: DBS using scalp block and low dose dexmedetomidine infusion can be performed safely for parkinson’s disease patients with comfortable condition during surgery and good clinical outcomes.

References:

5581
How can we manage awake craniotomy?
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Background and Goal of Study: Awake craniotomy allows speech mapping during neurosurgical interventions in patients with tumours in the area of the language cortex. Anesthesiologists have to manage patients in a way so that they are compliant throughout the awake state, maintaining adequate analgesia and anxiolysis. On our clinic we practice asleep-awake protocol. The aim of the study was to describe the protocol we are using.

Materials and Methods: 21 patients undergoing awake craniotomy during 30 months were introduced into general anesthesia with intubation. The anesthesia till awakening were maintained with combination of propofol and remifentanil continuously. The depth of anesthesia was monitored with bispectral index. Scalp block with bupivacaine was done. After opening of the skull, the awakening of the patients with extubation was done. Patient stayed awake with spontaneous breathing till the end of the procedure.

Results and Discussion: There were 12 females and 8 males, one of the females was operated two times. The mean age was 39.2 years (19-65). Mean ASA score was 2.05. One of the patients was agitated after awakening and in that patient only the biopsy of the tumour with additional sedation was done. One of the patients was agitated and managed with dexmedetomidine continuously after awakening. 17% of the patients had seizures during speech mapping stopped with cold normal saline. None of the patients needed reintubation.

Conclusion: According to our experience, this protocol is safe and effective during awake craniotomy. Prospective randomized trials are necessary to confirm the optimal anesthetic technique to be used.

References:
A retrospective cohort review comparing post-anesthesia recovery after “awake” craniotomies under regional anesthesia and “asleep” craniotomies under general anesthesia

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Background: An “awake” craniotomy (AC) is indicated for tumors near eloquent regions of the cortex, and it is associated with enhanced post-operative recovery and reduced hospital stay. As AC is often conducted under regional anesthesia (RA), these benefits in recovery are largely due to RA providing pain management in the post-operative period. To investigate these potential benefits in our institution, we compared the post-anesthesia course of craniotomies conducted under RA or under general anesthesia (GA).

Methods: A retrospective chart review was conducted in patients undergoing a craniotomy for supratentorial intra-axial tumors with a peritonal surgical exposure from January 2016 to December 2017. Patients with chronic opioid use and emergent cases were excluded. Primary outcome included pain scores on a numerical rating scale (NRS), opioid use as oral morphine milligram equivalence (OMME), first time to opioid, nausea, and sedation on the Richmond Agitation and Sedation Scale (RASS). These assessments were recorded until the second postoperative day (POD). Secondary outcomes included seizures, Karnofsky Performance Score (KPS) status, and hospital length of stay.

Results: Of the 91 patients identified to meet the above criteria, 56 underwent an AC under RA and 35 underwent surgery “asleep” under GA. Demographics and operative characteristics were similar between both groups except for lower intraoperative opioid use in the RA group compared to GA [mean mg of fentanyl 152.23 vs 293.57 (p=0.01) respectively]. A significant reduction in postoperative pain and opioid use was noted in the RA group compared to GA [first postoperative pain score 2 vs 5 (p<0.01); POD 0 median pain scores 2.5 vs 4 (p=0.01); mean time to first opioid dose 7.23 vs 3.42 hours (p<0.01); POD 0 mean opioid in mg 24.43 vs 14.49 (p<0.01) respectively]. Somnolence was less in the RA group compared to GA with RASS less than zero in 23% vs 43% (p=0.05) of the patients on POD 0 and 7% vs 20% (p=0.06) on POD 1. Nausea was experienced in 27% vs 40% (p=0.19) of the patients on POD 0 between RA and GA respectively, and no other differences were outcome noted.

Conclusion: AC under RA provides better post-operative pain control and a reduction in opioid use, and utilization of RA has the potential to minimize masking the postoperative neurological exam with opioid related side-effects such as somnolence.

Searching for the optimal sedation for brain mapping during awake craniotomy for epilepsy surgery.

A case report with regional block, dexmedetomidine and remifentanil infusions

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Background: Anaesthetic management for awake craniotomy remains challenging. In our case, we successfully combined a titration of dexmedetomidine and remifentanil with a scalp block, a scheme which has not been previously documented in the context of epilepsy surgery.

Case Report: A 33-year-old woman was presented for surgical resection of an epileptic focus near Brocca area. A two-time craniotomy surgery consisting of monitoring electrode placement followed by awake resection with brain mapping for speech testing was decided. As described in figure 1, sedoanalgesia was induced with dexmedetomidine and low-dose of remifentanil infusions. Local anaesthesia was employed for scalp block, Mayfield points and duramater. Infusions were adjusted to achieve full patient cooperation during language testing, alternating at other times with deeper levels of sedation. Haemodynamic and respiratory stability were maintained. Postoperatively the patient was admitted to ICU for 18 hours and suffered four short episodes of right hand-clonic seizures, despite of which she had no neurological injuries and was discharged on day 5.

Discussion: The optimal strategy for awake craniotomy has not been identified yet. Dexmedetomidine with its unique pattern is close to be the “ideal drug”, however, it may not be sufficient alone for all stages of awake craniotomy (1). The model of sedoanalgesia described in this case is, according to our experience, an optimal strategy to ensure an adequate level of sedation, providing a dynamic form of sedation with easily transition from sleep to wakefulness as well as clinical stability.

Effects of botulinum toxin on bispectral index monitor and electromyographic activity

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Background and Goal of Study: The use of botulinum toxin with aesthetic purpose began in the 90’s. With the popularization of the technique for the treatment of expression lines, the number of surgical procedures in applied botox patients has increased expressively. The aesthetic paralysis of the facial muscles with botulinum toxin may affect the bispectral index monitor (BIS), which requires muscular activity in addition to an awake EEG to generate values, indicating the patient is awake. The aim of this study is to evaluate the influence of botulinum toxin used in facial muscles on BIS values and electromyographic activity.

Materials and Methods: Three female volunteer patients were admitted to undergo the procedure of applying botulinum toxin A in the upper third facial area for aesthetic purposes. The applications were conducted by the same plastic surgeon. Each patient was evaluated in 3 different periods, observing the following parameters: BIS with bilateral sensor and electromyography (EMG) bilaterally. The evaluations were completed before application, 15 days after and 90 days after the application.

Results and Discussion: In the analyzed cases we observed a variable reduction in electromyographic values when compared to the pre-application values of the toxin. Furthermore, there were some recovery of motor activity, as evidenced by the partial increase in electromyography. In one patient, it was observed that electromyography values remains similar 15 days and 3 months after application.

Conclusion: This study shows that brain monitoring is influenced by the application of botulinum toxin on the face, which requires special attention from the anesthesiologist. The local effect of the toxin may affect the bispectral index monitor (BIS), which requires muscular activity in addition to an awake EEG to generate values, indicating the patient is awake. The aim of this study is to evaluate the influence of botulinum toxin used in facial muscles on BIS values and electromyographic activity.
Thromboelastometric (ROTEM) versus standard coagulation test (SCT) results in patients with traumatic brain injury (TBI) undergoing craniotomy

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Background and Goal of Study: Coagulopathy (CP) is a common finding in TBI patients associated with secondary brain damage. However, there is no clear guidance to the clinician on how CP should be managed. SCT have significant limitations. Viscoelastic tests (e.g. ROTEM) reflect whole blood coagulation from fibrinolysis and may add important information. We aimed to identify dynamic changes in coagulation, and to clarify associations between SCT and ROTEM results in patients with TBI undergoing craniotomy.

Materials and Methods: We present preliminary results of a prospective study in adult TBI patients undergoing urgent craniotomy. Patients with polytrauma (AllSextranractanr>3), hematologic disease, use of anticoagulants or antiplatelets, were not included. Blood was collected pre- (day 0) and post-operatively (days 1, 2, 3) and analyzed with SCT (prothrombin time index [PTI], partial thromboplastin time [APTT], platelet count [PLT], fibrinogen concentration [FIB]), and ROTEM assays (EXTEM, INTEM, FIBTEM). CP was considered as any deviation from normal coagulation test values. Dynamic changes of ROTEM and SCT results as well as interrelationships between them were investigated. Significance level for comparisons, p<0.05.

Results and Discussion: 69 patients were included. Patient coagulation profile was generally good and coagulation test abnormalities were mild. Significant negative correlations in PTI, APTT and PLT until day 2, whereas FIB increased from day 1. CP prevalence according to SCT increased from 36.2% (day 0) to 71.9% (day 2). Notably, ROTEM parameters generally improved from day 1, and CP prevalence according to ROTEM decreased from 36.2% (day 0) to 16.4% (day 3). EXTEM and INTEM A10 and MCF showed significant correlations (mostly moderate to strong) with PLT and FIB. FIBTEM A10 and MCF correlated strongly with FIB. Relationships between APTT and PTI with INTEM CT and EXTEM CT, were weak or absent. ROTEM improvements despite negative trends in SCT reflect that viscoelastic tests represent patient coagulation status from a different perspective and overall clot quality in some individuals may be adequate or even improved despite abnormalities found in standard coagulation tests.

Conclusion: PLT and FIB are the main determinants of clot quality. Mild APTT and PTI abnormalities are rarely clinically significant as reflected by ROTEM, and may trigger unnecessary procoagulant interventions in neurosurgical patients.

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Anesthetic management of severe pulmonary arterial hypertension in a patient undergoing craniotomy under general anaesthesia

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Background: Chronic Thromboembolic Pulmonary Hypertension (CTPH) represents a challenge in the perioperative anesthetic management with up to 3.5% mortality in non-cardiac surgery.1 Guidelines offer few recommendations regarding the evaluation and management of these patients. We present the case of a patient with a recent diagnosis of severe pulmonary artery hypertension (PAH) undergoing craniotomy under general anaesthesia.

Case Report: A 73-year-old, scheduled for a suspected high-grade gloma resection surgery was diagnosed of CTPH during cancer extension study and pre-operative assessment. He presented NYHA class II, right heart catheterization showed: CI: 2.29 L.min⁻¹.m⁻², PAP: 93/18 (41) mmHg, PVR: 652 dyn·sec·cm⁻⁵, compatible with precapillary PAH and right ventricle (RV) dysfunction, with a compatible echocardiography. Enoxaparin treatment was instituted. Epacprost infusion was started, increasing it daily, up to the maximum dose, with good patient tolerance. Inferior vena cava filter was placed the day before surgery. Extensive intra-operatively hemodynamic monitoring was performed, including TEE and pulmonary artery catheter. Total intravenous anaesthesia with propofol, remifentanil and rocuronium was performed. Systemic hypotension and elevation in PAP was managed with norepinephrine and milrinone. Iloprost was available, but it was not necessary to use. Scalp block was provided for analgesia. The patient was extubated in the OR and transferred to the ICU. Discharge from hospital happened three weeks after surgery without sequelae.

Discussion: PAH is a condition with high perioperative risk, mainly cardiovascular and pulmonary. The risk is even greater in neurosurgery procedures.2 For this reason despite most complications occur in the postoperative period, preoperative optimization reducing pulmonary vascular resistance and optimizing RV function, careful intraoperative hemodynamic monitoring and management, and adequate postoperative analgesia are mandatory.

References:

4714
Evaluation of factors that cause secondary brain damage on mortality and morbidity in patients undergoing emergency surgery due to head trauma

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Introduction: Traumatic brain injury is combination damage that occurs as of various metabolic events that develop after primary damage caused by trauma (1). Pathological events such as lactic acidosis, electrolyte imbalance, increased inflammation that occur during traumatic brain injury leads to poor prognosis in patients (2). This retrospective study was conducted to investigate the effect of factors that may cause secondary damage on mortality and morbidity in patients undergoing emergency surgery due to head trauma.

Materials and Methods: After ethics committee approval 108 patients who admitted to Bursa Uludag University hospital between 2013 and 2018, diagnosed with traumatic brain injury and operated within the first 24 hours after admission included in the study. We collected demographic data (age,sex), Glasgow Coma Score (GCS), American Society of Anesthesiology (ASA) class, Peripheral Oxygen saturation (SpO2), heart rate, systolic and diastolic blood pressure, body temperature, electrolytes (Na, K, Ca, Cl), haemoglobin (Hb), platelets (PLT), leukocytes (WBC), urea, creatinine, aspartate aminotransferase (AST), alanine aminotransferase (ALT), PaO₂, PaCO₂, PCO₂, inotropic and vasoactive drug use, blood glucose levels and inotropic agents dosage of the patients during admission – postoperative 48 hours period. We used Kolmogorov-Smirnov, Kruskal Wallis, Mann Whitney U, Wilcoxon, Fischer and Chi Square statistic tests.

Results and Discussion: Patients were divided into Healthy, Sequel and Exitus Group by postoperative surveillance. We investigated mortality and morbidity

in patients who underwent emergency operation within 24 hours after traumatic brain injury. We found that higher age and ASA class, lower GCS and diastolic blood pressure and inotropic agents requirement increased mortality and morbidity. Hypernatremia, hypocalcemia, hypokalemia, high creatinine and low platelet counts have also been found to increase mortality and morbidity. In addition, we have not detect the effects of heart rate, systolic blood pressure, body temperature, SpO2, WBC and CI values on the mortality and morbidity.

Conclusion: It seems that secondary damage caused by metabolic events like electrolyte imbalance in patients with head trauma should always keep in mind. If we encounter these situations, we should treat the patient and do replacements immediately.

References:
5381

Concentration gradients of routine laboratory analyses in serial lumbar cerebrospinal fluid aspires

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Background and Goal: Analysis of Cerebrospinal fluid (CSF) may illuminate the neurobiology of diverse neuropsychiatric disorders. As many of the molecules of interest are produced by or excreted from the brain, it is important to know whether there is a rostro-caudal gradient (RCG) in concentration. Limited evidence from patients with neurological disorders suggests a RCG for blood-derived proteins such as albumin, as well as inflammatory mediators.

Materials and Methods: This is a sub-study of the Anaesthetic Biobank of Cerebrospinal Fluid (ABC) for which CSF is obtained from patients undergoing elective surgery under spinal anaesthesia. Subjects were patients ≥18 years old, who were healthy, did not use regular medication and had a BMI<30. Immediately prior to intra-thecal local anaesthetic administration, CSF was aspirated sequentially into 5 x 2 ml syringes. The 5 fractions were immediately transported to the laboratory where routine analyses (albumin, total protein, glucose, leucocyte and erythrocyte count) were performed.

Preliminary results: Thirty patients have been enrolled (62% male; 77% ASA status I). Median age was 36 years (range 21-77 years), and duration of CSF aspiration 1 to 4 minutes. Within each fraction there was broad inter-patient variability in albumin and total protein concentration (overall ranges 0.04 - 0.33 g/L and 0.13 - 0.55 g/L, respectively). There were significant changes in albumin and total protein concentrations across the CSF fractions (RMANOVA; P values 0.008 and 0.043 respectively) with concentration decreasing from the first to the last fraction (Figure 1). There was no significant change in glucose concentration, and erythrocyte and leucocyte count across fractions.

Conclusion: We confirmed a RCG for albumin and total protein. Further work is required to investigate RCG’s for other CSF biomarkers and molecules of interest. When RCGs exist, comparisons among subjects and/or studies are only valid if standardized CSF sampling procedures are followed.

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Correlation between the measurement of the diameter of the optical nerve coat and tomographic findings of intracranial hypertension of a population from a University hospital in Colombia

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Background and goal of study: Intracranial hypertension requires the use of CT scan images of the skull to document the displacement of vascular and parenchymal structures, however, the tomograph is not always available in certain situations. Our hypothesis was that the ultrasound is a safe, economical and accessible method that can be used for the measurement of the optic nerve sheath diameter (ONSD) when CT scan is not an option.

Materials and Methods: This was an observational, descriptive, prospective, cross-sectional pilot study, approved by the Ethics committee of the Universidad del Valle code 226-016. All participants signed the informed consent. 25 patients conformed the intracranial hypertension group and 25 patients without intracranial hypertension conformed the control group. For the ultrasound measurement of the ONSD we used the SONOSITE TURBO® ultrasound. The tomographic images obtained from each patient diagnosed with intracranial hypertension were available in the software of the Hospital Universitario del Valle. As statistical analysis we performed a two tailed t-student test (alpha 0.05) in SPSS Statistics V25.

Results and Discussion: The global average (Left and right eye) of ONSD for the group with intracranial hypertension was 5.1±0.6 and a global average for the control group 4.8±0.5. The t-student test showed significant differences (P-value<0.05, alpha 0.05, two tailed test) between the measurements of the groups. Overall, our study indicated that ultrasound measurements of ONSD were effective to differentiate a group with intracranial hypertension, previously diagnosed by CT scan images, from patients without this condition. Our results are consistent with the finding of other studies; ultrasound measurements would allow the detection of intracranial pressure increasing before deciding an invasive neurosurgical monitoring.

Conclusion: According to our findings, we suggest the implementation of ultrasound measurements as a fast and safe tool, which, depending on the speed could improve survival and neurological prognosis, detecting an intracranial pressure elevated in cases when CT scan images are not an available option. Nevertheless, more studies should be made with a greater sample to further validate our results.

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Analysis of cerebrospinal fluid in diagnosis of postoperative meningitis in neurosurgical patients with subarachnoid hemorrhage

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Background and Goal of Study: The accurate incidence of postoperative bacterial meningitis in neurosurgical patients is unknown due to lack of gold standard and difficult diagnosis. Clinical signs can be nonspecific and affected with clinical state of patients and conditions that cause inflammatory response as well as subarachnoid hemorrhage, bone dust, implants or tumors. Blood in brain cause inflammatory response and affected cells count, protein and glucose levels. Our aim was evaluate cerebrospinal fluid cellularity and biochemical parameters in diagnosis of postoperative meningitis.

Materials and Methods: We conducted a retrospective descriptive study and collected data of cerebrospinal fluid cellularity (leucocyte and erythrocyte count), lactate, protein and glucose level and level of C reactive protein in peripheral blood. Correction of leucocyte count in cerebrospinal fluid was made according to erythrocyte value in cerebrospinal fluid.

Results and Discussion: Of the 35 patients, 18 were women (51,43%) and 17 were men (45.57%). The average year was 59,11 years and median was 60 years. According to biochemical analysis of cerebrospinal fluid glucose was decreased in 15 (42,86%), normal in 9 (25,71%) and elevated in 11 (31,43%) patients. Lactate were increased in 34 (97,14%) and normal in 1 (2,86%) patients. Total proteins were normal in 2 (5,71%) and increased in 33 (94,29) patients nad C reactive protein in cerebrospinal fluid was normal in 9 (25,71%) and increased in 26 (74,29%) patients. Corrected leucocyte count was increased in 33 (94,29%) and decreased in 2 (5,71%) patients. C reactive protein from peripheral blood was elevated in all 35 (100%) patients. Pleocytosis in cerebrospinal fluid as well as high C reactive protein level in peripheral blood can be a part of inflammatory response due subarachnoid hemorrhage. Lactate level in cerebrospinal fluid is good marker in diagnosis of postoperative meningitis according to inflammatory response.

Conclusion: High levels of lactate and protein in cerebrospinal fluid in regard to glucose levels are better markers in diagnosis of postoperative meningitis. Pleocytosis was significantly expresses in patients with subarachnoid hemorrhage even after correction of leucocyte count.
Cerebral blood flow velocity decrease and its relationship to hemodynamic parameters in reduced cardiac output induced by lower body negative pressure

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Background and Goal of Study: The integrated regulation of cerebral blood flow (CBF) and its determinants in health and disease are still largely unclear. While the concept of cerebral autoregulation has been present for a long time, other parameters such as cerebral output have been shown to affect CBF. It was the objective of this study to investigate the effect of lower body negative pressure (LBNP) on global hemodynamic parameters and parameters of cerebral perfusion represented by transcranial doppler sonography (TCD) and near infrared spectroscopy (NIRS).

Materials and Methods: After a standardized medical examination and informed consent, 5 healthy male subjects between age 20-30 were included. Subjects were placed in supine position on a hortan tilt table. Basic monitoring consisted of continuous ECG and oxygen saturation. Continuous blood pressure, cardiac output and stroke volume were measured using a finger cuff device. Cerebral monitoring included TCD using a robotic probe and frontal haem. After a baseline measurement of 10 minutes, LBNP was applied at -15 mmHg for 5 minutes, then decreased to -30 mmHg for 5 minutes. Pressure was further decreased in steps of 10 mmHg every 5 minutes until subjects reached presyncope. LBNP was stopped and the table was placed in head down tilt position until complete recovery. Data were analyzed offline. Values were compared to the baseline and to every previous pressure level using the Kruskal-Wallis test with post hoc Bonferroni corrections of multiple comparisons. Data are presented as median (interquartile range). Variables were further analyzed using a linear mixed model. P values of ≤0.05 were considered significant.

Results and Discussion: Subjects reached presyncope at LBNP levels between -40 and -70 mmHg. All hemodynamic and cerebral variables were significantly altered by LBNP below -50 mmHg. Before the mixed model analysis, stroke volume and mean cerebral artery flow velocity (MCAV) showed a strongly linear decrease with LBNP pressure level decrease in all subjects while this was not the case with mean arterial pressure, cardiac output and cerebral saturation. This suggests that stroke volume may play a central role in cerebral perfusion in situations with reduced cardiac preload. Our results also question the significance of intact cerebral autoregulation.

Conclusion: Stroke volume is an important factor for cerebral perfusion in LBNP.

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Case Report: epidural blood patch as a treatment of intracranial hypotension syndrome

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Background: Spontaneous intracranial hypotension syndrome is caused by cerebrospinal fluid (CSF) leakage characterised by postural headache associated with orthostatic symptoms without any trigger.

Case Report: 53-year-old man, no drug allergies. No neurological symptoms before. Clinical history: arterial hypertension and thyroidectomised in 2014. In the mixed model analysis, stroke volume and mean cerebral artery flow velocity (MCAV) showed a strongly linear decrease with LBNP pressure level decrease in all subjects while this was not the case with mean arterial pressure, cardiac output and cerebral saturation. This suggests that stroke volume may play a central role in cerebral perfusion in situations with reduced cardiac preload. Our results also question the significance of intact cerebral autoregulation.

Conclusion: Stroke volume is an important factor for cerebral perfusion in LBNP.

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5946

Dexmedetomidine ameliorates isoflurane-induced cognitive deficit in mice subjected to chronic traumatic brain injury by attenuation of the reactivation of monocyte-derived macrophages

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Background and Goal of Study: Traumatic brain injury (TBI) is a leading cause of long-term neurological deficit. Postoperative cognitive deficit (POCD) can irreversibly worsen cognitive impairment. Both TBI-induced cognitive deficit and POCD have been reported to be associated with inflammatory activation of hippocampal monocyte-derived macrophages (MDM). It is considered that hippocampal MDM regulated by isoflurane (iso) exposure would play a crucial role in POCD in TBI model mice. Although dexmedetomidine (DEX), an α2 adrenergoreceptor (AR) agonist, has been reported to have a neuroprotective effect, the mechanism underlying its effect has not been fully elucidated. We investigated whether treatment with DEX could remedy iso-induced cognitive deficit and inflammatory activation of hippocampal MDM several weeks after TBI.

Materials and Methods: Adult male C57BL/6 mice received bone marrow transplantation from green fluorescent protein C57BL/6 transgenic mice. Those mice were assigned to 5 groups: Naïve-iso, Sham-iso, TBI-iso, TBI-iso-DEX, and TBI-iso-DEX-Yohimbe (TBI-YOH) groups. A controlled cortical impact model of TBI was performed. At 4 weeks postoperatively, mice were exposed to iso in the presence or absence of DEX. In the TBI-YOH group, YOH (α2-AR antagonist) was administered prior to the administration of DEX. Cognitive function was assessed by the Barnes Maze test. The presence and expression levels of hippocampal MDM, microglia, and astrocytes were assessed by immunohistochemical staining. The expression levels of brain-derived neurotrophic factor (BDNF) and the BDNF high-affinity receptor tropomyosin-related kinase B (TrkB) were assessed by Western blotting. All statistical data were analyzed by one-way ANOVA or repeated measures two-way ANOVA with post-hoc Tukey’s multiple comparison appropriately. Statistical differences were considered significant with a value of P < 0.05.

Results and Discussion: TBI-iso-DEX mice showed amelioration of impaired learning of the task and found the hole faster than did in TBI-iso mice. TBI-iso-DEX mice had a profound depletion of hippocampal MDM compared to that in TBI-iso mice. TBI-iso-DEX mice had greatly increased levels of TrkB and BDNF. These phenomena were counteracted by YOH.

Conclusion: We demonstrated that DEX ameliorates iso-induced cognitive deficit in chronic TBI model mice. DEX had a neuroprotective effect by attenuation of the reactivation of MDM through the TrkB/BDNF pathway.

4545

Use of near-infrared spectroscopy (NIRS) during endovascular thrombectomy (EVT) in acute ischemic stroke

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Background and Goal of Study: NIRS is a non-invasive method of measuring regional tissue oxygen saturation (rSO2). The goal of this ongoing study was to determine if the NIRS monitor (O3® Regional Oxymetry, Masimo Corporation) can be used to detect changes in rSO2 associated with reperfusion during EVT in patients with an acute ischemic stroke.

Materials and Methods: After informed consent, 17 patients with a medial cerebral artery (M1) and/or unilateral internal carotid artery (ICA) occlusion diagnosed with...
CT angiography were enrolled in the study. NIRS sensors were applied to the scalp directly over the ischemic area and over the contrastralateral temporal region. The rSO2 values from the ischemic and non-ischemic hemisphere before and after EVT were compared. Data are summarized as median [IQR] and were analyzed with the Wilcoxon signed-rank test.

**Results and Discussion:** Data from 7 of 17 patients were excluded from further analysis because of either previously unknown bilateral ICA occlusion, an M2 or more distal occlusion, or recanalization by intravenous thrombolysis alone. Patient demographics, procedural characteristics and results are displayed in Table 1. The rSO2 of the affected vs. non-affected hemisphere was 67% [85-73] vs. 67% [85-69] before, and 69% [67-74] vs. 67% [64-72] after EVT (Figure). This is the first study which measures oxygenation with NIRS directly over the ischemic area of interest. The possible reasons why we found no change in rSO2 before and after EVT include: (a) contamination of the signal from extracranial tissue, (b) intracranial collaterals maintaining oxygenation, (c) impaired O2 consumption in the ischemic brain.

**Conclusion:** Despite application of the NIRS sensor over the ischemic region, no change in rSO2 was detected during successful perfusion restoration in patients with acute stroke due to a M1 and/or unilateral ICA occlusion.

**Table 1:** Patient demographic, procedural characteristics and results

<table>
<thead>
<tr>
<th>Age (median, IQR)</th>
<th>79 [65-81]</th>
<th>77/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male: no, Total no.</td>
<td>4/10</td>
<td>4/10</td>
</tr>
<tr>
<td>Intravenous thrombolysis/local anesthesia - no.</td>
<td>4/10</td>
<td>4/10</td>
</tr>
<tr>
<td>Neuroendovascular recanalization minim. (median, IQR)</td>
<td>4 [37.5-80]</td>
<td>4 [37.5-80]</td>
</tr>
<tr>
<td>Neuroendovascular recanalization max. (median, IQR)</td>
<td>4 [37.5-80]</td>
<td>4 [37.5-80]</td>
</tr>
<tr>
<td>PTA cavernous artery - no, Total no.</td>
<td>4/10</td>
<td>4/10</td>
</tr>
</tbody>
</table>

**Discussion:** Outcome after neurointerventional procedure is dependent on rapid diagnosis and early treatment of intraprocedural complications - the time factor! Vascular air embolism can be a feared complication of some invasive procedures, with relevance in neurosurgery. The true incidence of VAE is not known since many cases of VAE are subclinical. This is most often associated with sitting position craniotomies where the brain is in a higher position than the heart. Vascular air embolism may have cardiovascular, pulmonary, and neurologic sequelae that might be lethal. The detection of an ongoing episode is mainly a clinical diagnosis, taking into consideration the circumstances under which clinical alterations occur.

**Learning Points:** In future we need parameters that should be more indicative for patient’s interventional risk with the aim of safer classic endarterectomy in the subtotal occlusion. Anesthesiologist as a team member has a role in facilitating neuroradiological procedures, so an understanding of specific neuroradiological procedures, with potential complications, is crucial.


**Learning Points:** In future we need parameters that should be more indicative for patient’s interventional risk with the aim of safer classic endarterectomy in the subtotal occlusion. Anesthesiologist as a team member has a role in facilitating neuroradiological procedures, so an understanding of specific neuroradiological procedures, with potential complications, is crucial.


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**5543**

**Vascular air embolism in Neurosurgery – A case Report**

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**Background:** Vascular air embolism (VAE) is a feared complication of some invasive procedures, with relevance in neurosurgery. The true incidence of VAE is not known since many cases of VAE are subclinical. This is most often associated with sitting position craniotomies where the brain is in a higher position than the heart. Vascular air embolism may have cardiovascular, pulmonary, and neurologic sequelae that might be lethal. The detection of an ongoing episode is mainly a clinical diagnosis, taking into consideration the circumstances under which clinical alterations occur.

**Case Report:** We report a case of a 71 yo male, ASA 3, proposed to suboccipital craniotomy. Twenty minutes after the beginning of the surgery we found an abrupt decrease of etCO2 and SpO2 (80%). We immediately informed the surgeon, lowered the headboard and institute high-flow 100% oxygen. Fluid therapy has been optimized, preserving hemodynamic stability. A arterial blood gas sample was collected and revealed hypoxemia (paO2 54,3mmHg) and hypercapnia (paCO2 52,4mmHg) and hypercapnia (paCO2 52,4mmHg) and hypercapnia (paCO2 52,4mmHg). There was a fast recover returning to the baseline clinical and laboratorial status. There was no hemodynamic repercussions or further complications until the end of the procedure. At this time a precardial Doppler was made and show small and insignificant air bubbles in the right atrium. We chose to wake up the patient that was uneventfully extubated and transferred to the intensive care unit.

**Discussion:** Early diagnosis and treatment before catastrophic cardiovascular collapse are of utmost importance. The principal goals of management include prevention of further air entry; a reduction in the volume of air entrapped and respiratory function monitoring – a good plan in dealing with possible complications and close cooperation with neuroradiologist is essential for favourable outcome.

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**4953**

**Anesthesiologist’s nightmare in the angio suite during Carotid Artery Stenting**

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**Background:** Endovascular neurointerventions is one of the most expanding clinical field that demands the re-examination of conditions treated this way during the past few decades. The complexity of conditions treated this way strongly depends on the calcification’s content. Anesthesiologist as a team member plays a role in facilitating neuroradiological procedures, so an understanding of specific neuroradiological procedures, with potential complications, is crucial.

**Learning Points:** The optimal management of VAE is prevention. Vascular air embolism is a potentially life-threatening event and clinicians must be aware of this silent but dangerous entity for an early suspicion.

Propofol post-conditioning after temporary clipping reverses oxidative stress in aneurysm surgery

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Background and Goal of Study: Aneurysm clipping has a potential risk of cerebral ischemia-reperfusion (IR) injury due to transient clipping of the parent artery to obtain transmural pressure control and avoid bleeding during surgery. Neuron damage induced by oxidative stress is an important pathophysiological mechanism of cerebral IR injury[1]. Propofol has the capacity to limit lipid peroxidation and reduce the risk of cellular antioxidative stress systems [2]. Our research group has demonstrated that propofol post-conditioning provides long-term protection against focal cerebral IR injury in rats [3]. This study aims to investigate how propofol post-conditioning may influence cerebral IR injury in patients and provide evidence for patients in terms of proper selection and combination of anesthetics.

Materials and Methods: 60 patients undergoing intracranial aneurysm clipping were randomized into a propofol post-conditioning group or a sevoflurane group. Sevoflurane (0.5%-2%) was used for maintenance anesthesia in both groups. In propofol group, the inhaled concentration of sevoflurane was reduced after temporary clip removal to keep the bispectral index value between 40-60, and propofol (1.2 g/ml) was subsequently started. Blood samples were drawn at 6 time points.

Results and Discussion: Between the conclusion of the operation to 7 days after surgery, propofol post-conditioning decreased the serum concentration of OH and 8-isoprostane and micronuclei and nucleoplasmic bridges, furthermore, increased γ-tocopherol, SOD, MMSE and MoCA scores. Additional cognition scales and future studies should be taken into consideration to more fully assess cognition and explore patients’ prognoses.

Conclusion: Propofol post-conditioning may protect brain from oxidative stress injury up to 7 days, and the combination of sub-dose propofol/low concentration sevoflurane may have an advantage over sevoflurane alone after aneurysm clipping surgery.

References:

Acknowledgements: This study was supported by grants from the National Natural Science Foundation of China, Beijing, China (81072059, 81100984, 81571054).

Neuropsychology team input to cardiovascular instability approach. Case report of petroclival meningioma

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Background: During posterior fossa neurosurgery, cardiovascular instability and heart arrest may occur. Manipulation of medullary reticular formation and / or of the IV ventricle can result in arterial hypertension. Bradycardia may arise when operating in the vicinity of the pons and roots of V, IX and X. We report a case of successful multidisciplinary intervention between surgical, anesthesia and neuropsychology teams to halt lesion of brain stem.

Case Report: A 42yo, ASA II, history of hypertension, with left hypoaacusia and dysphagia. Proposed for excision of a big petroclival meningioma, 44x45x50mm with significant midline shift and brain stem molding. Submitted to total intravenous general anesthesia with TCI of Propofol/Remiphentanil. Monitored with ASA standards, invasive blood pressure, evoked potentials and electromyography (EMG) of selected cranial nerves (CN). During tumor removal, near CN IX, X and XII, it was observed 5 short periods of bradycardia with hypertension. At the same time inputs were being received through EMG of the tongue (CN XII). The combination of the two signs aimed towards a neurocardiogenic reflex being triggered. That particular area was therefore avoided and no further complications were observed. Preoperative dysphagia resolved.

Discussion: Mass effect distorts normal brain anatomy, rendering it difficult to recognize structures even under microscope.2 Monitoring the integrity of the brainstem during posterior fossa surgery is highly recommended. Recent case reports of severe cardiovascular events in posterior fossa surgery denotes the importance of constant hemodynamic monitoring, integrated carefully and simultaneously, guiding a planned approach to a potential irreversible neurologic lesion.

References:

Learning points: Multidisciplinary team coordination in the OR are crucial for the well-being of the patient.

Perioperative bleeding risk, how to predict the "blind" spots?: case report

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Background: Chronic subdural hematoma is frequent disease in elderly, but it’s rare in young patients.1 Suspicion of hematomatological disease, as a predisposing factor, should be made and additional tests and treatment protocol should be applied.

Case Report: A 29 years old male patient was admitted in the Emergency Department of the IV. Doctor had complaining of headache, discomfort, nausea and vomiting. He revealed he had a traumatic event, falling from 3m height, nearly 4 months ago. CT scan showed fronto-parieto-occipital subdural hematoma with left to right shift with different density indicating "several bleeding times". Emergency
surgery was performed. During the procedure, unexpected tendency for bleeding was noted and two FFPS were administered along with 1g Ca gluconate. The bleeding continued from every layer of the surgical site, so 1g of tranexamic acid was given and improvement was noted. The patient remained sedated due to risk of further bleeding till the next day. Family members revealed he had few episodes of nose bleeding as a child. There was suspicion for von Willebrand disease so additional tests were done. Ristocetin test showed hypoagglutination of the platelets. After 48th additional 500mg of tranexamic acid were administered for drain removal. Two weeks later Light Transmission Aggregometry test with ADP, Collagen and Ristocetin all showed hypoaggregation.

Discussion: Every chronic hematoma in young patients, especially in “several bleeding times”, should steer our thinking towards some hematological disorder as a predisposing risk factor. According to European WDG type 1 study, bleeding history is a better guide for diagnosis than laboratory findings2, because standard coagulation tests have two “blind” spots WFV and FXIII. Standardized bleeding questionnaire is a better predictor for perioperative bleeding risk because bleeding symptoms are more relevant than WFV levels and they shouldn’t be checked routinely in asymptomatic patients2.

References:

The role of extracellular signal-regulated kinase (ERK) 5 in spinal cord on pathological pain in mice

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Background and Goal of Study: Mitogen-activated protein kinase (MAPK) cascade is a superfAMILY transducing a broad range of intracellular signals. Extracellular signal-regulated kinase 1 and 2 (Erk1/2) belong to a subfamily of the large MAPK family, and recent findings indicate the different functions of these isoforms in mouse pain models. We previously revealed that, by using isoform specific mutant mice, Erk2 plays a predominant and/or specific role in pain plasticity, the contribution of Erk1 is limited. Erk5, also known as big mitogen-activated protein kinase 1, is a member of another subfamily of large MAPK family. Although accumulating evidence suggests the important roles of Erk5 to pain hypersensitivity, there is no report to study the specific contribution of Erk5 to pain plasticity by using Erk5 mutant mice. Hence, we investigate the function of Erk5 to pain plasticity by using conditional, region-specific, genetic deletion of Erk5.

Materials and Methods: To generate mice deficient for Erk5 specifically in the central nervous system, the floxed Erk5 mouse line was crossed with a Nestin promoter-driven cre mouse line. All mice used in this study were 8-12 weeks male littermates. The partial sciatic nerve ligation (PSNL) model was used as the neuropathic pain model, and allodynia was evaluated by the Von Frey test. Inflammatory pain was assessed by the Formalin test.

Results and Discussion: Although Erk5 mutant mice showed a normal baseline paw withdrawal threshold to mechanical stimuli, these mice had a reduced nociceptive response following a formalin injection to the hind paw. In a PSNL model, these mice showed normal mechanical allodynia and thermal hyperalgesia compared to control mice.

Conclusion: Erk5 in the spinal cord played an important role in inflammatory pain, but did not play an important role in allostynia and hyperalgesia.

5236

Dosing of Methadone for complex spine patients: Can we achieve personalized dosing using the patient as his own control

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Background and Goal of Study: Patients undergoing spine surgery experience significant amount of pain that can interfere with daily activities. Articles in the literature describe the use of methadone as a single dose from 0.2 mg/kg up to 0.5 mg/kg. We want to determine if methadone given in small aliquots until respiratory depression prior to induction of anesthesia can be used to determine a personalized correct dose required.

Materials and methods: The test hypothesis is that titrating methadone to respiratory depression allows the patient to a<-->ct as his own control determining the dose he will require. After IRB approval, patients undergoing complex spine surgery are randomized to two groups: Group 1: In the OR, with full monitors, the patient receives 0.2 mg/kg of methadone IV based on ideal body weight after intubation. Group 2: In the OR, with full monitors, the patient receives incremental aliquots of methadone up to 0.6 mg/kg based on ideal body weight titrated to apnea. Each subject receives a 10 mg loading dose then aliquots of 5 mg, given at 5 to 10 minute time intervals. After reaching the apnea threshold as determined by respiratory rate less than 4 breaths/min, induction of general anesthesia and intubation proceeds. Each subject receives a 10 mg loading dose then aliquots of 5 mg, given at 5 to 10 minute time intervals. After reaching the apnea threshold as determined by respiratory rate less than 4 breaths/min, induction of general anesthesia and intubation proceeds.

Results and Discussion: We collected intraoperative data: total dose of all anesthetics, length of surgery, number of levels, estimated blood loss, time to extubation, total and type of fluids and vasopressors administered, vital signs and total opioid use. The following post-operative data collected: patient daily pain score for the first 72 hours, total opioid usage, length of stay, time to get out of bed. We will calculate the opioid requirement for each 24-hour period and the whole 72 hours. The study was stopped after 20 subjects due to changes in intraoperative management of complex spine patients and implementation of ERAS protocols that conflicts with the strict adherence to study protocol. The protocol is being revised and requires a new institution review board approval. Statistical analysis: We are currently analyzing the data and will be ready for the poster. We do not have any respiratory depression events.

Conclusion: We describe a novel approach of dosing the long acting narcotic methadone using the patient as his own control to determine the most appropriate, personalized dose. The method appears to be safe and easily reproducible.
Cardiac, Thoracic and Vascular Anaesthesiology

4551

Transcatheter tricuspid valve replacement: a two-patient case report

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2Hospital Universitario Puerta de Hierro - Majadahonda (Spain)

Background: Tricuspid regurgitation (TR) is a common valvulopathy most frequently produced by annular dilatation and therefore leaflet tethering with a poor prognosis for severe cases [1]. Many patients are destined to a lifespan of futile pharmacological therapy [2]. Surgical treatment of the tricuspid valve (TV) is infrequently performed but the rise of less invasive, percutaneous therapies intends to end this reality. Transcatheter tricuspid valve replacement (TTVR) remains as a rarity in the therapeutic spectrum of TR.

Case Report: Case 1: Female, 59 years old with a tricuspid prothesis with an absence of coaptation and tenting of the prosthesis that produced severe TR. A general anesthesia was performed with invasive monitorization. A Sapiens3 prothesis was implanted with no incidents. Anticoagulation with enoxaparin was initiated that same day. Transthoracic echocardiography (TTE) after the procedure showed a correct function of the prosthesis with a minimal paravalvular leak. Case 2: Female, 74 years old, with TR regardless of a previous double aortoplasty. A general anesthesia was performed with invasive monitoring. A NaviGate prothesis was implanted with no incidents. The anticoagulation was initiated on the first day with a continuous heparin infusion. The post-procedural TTE showed no TR or leaks.

Discussion: Severe TR remains a rarely treated valvulopathy in spite of its repercussion in patient survival [2]. We are still at a very early stage of endovascular treatment of TR and very few of these procedures have been done worldwide. The importance of these cases relies in the need for a correct anesthetic approach to these patients. They represent the two only cases that have been performed in Spain.

References:

Learning points: Patients with a pathological TV bear a low life quality and a poor prognosis, with scarce effective treatment. Percutaneous treatment of the TV is still in its first steps but may be a reasonable option for these patients. The perioperative management of these patients is delicate due to their polipathology, the strict anticoagulation control needed and the procedure itself.

4565

Severe tricuspid regurgitation treated by percutaneous approach: a case series using transcatheter mitral clip device

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Background: Tricuspid valve (TV) dysfunction that causes significant tricuspid regurgitation (TR) is a common heart valve disease with few effective treatment options. Recent evidence seems to indicate that patients undergoing a transcatheter clip procedure due to mitral regurgitation have worse outcomes if concomitant TR is present. (1). Herein, we describe procedural performance, anesthetic considerations and clinical outcomes of this therapy in 7 patients.

Case report: 7 patients underwent the procedure. Grade of TR was severe in all cases, most of them had preserved left ventricular ejection fraction and two of them had severe pulmonary arterial hypertension. All were performed through transfemoral access. A clip was placed at the anteroseptal commissure in all patients, adding a second one in 3 of them. The procedure was performed under general anesthesia. Left radial artery and peripheral and venous catheters were cannulated and unfractionated heparin was administered after sheath insertion.

All patients were hemodynamically stable during the procedure without needing high doses of vasoactive drugs. Patients were delivered to the intensive care unit (ICU) after procedure in order to hemodynamic monitoring. All patients were extubated on the same day. No intraprocedural deaths or emergent conversions to open-heart surgery occurred. No other serious adverse events were reported. No device migration occurred. There was not in-hospital mortality nor 30 days mortality. Procedural success, defined as clip implantation without detachment or device migration and reduction of TR of ≥1 grade without tricuspid stenosis, was achieved in 6.

Discussion: High risk patients with TR may benefit from TV repair using a percutaneous approach which seems to be a safe, less invasive technique for this patients. Due to the growing interest in this new therapeutic approach, we must know the anesthetic implications of this procedure in this type of patients.

References:

Learning points: Despite our short experience and small number of cases treatment of TR using MitraClip devices it seems to be feasible and efficient in selected patients.

4587

Minimal invasive mitral surgery through the Heartport technique: a retrospective single-centre case series

1Hospital Universitario Puerta de Hierro Majadahonda - Majadahonda (Spain)

Background and Goal of Study: In recent years, new surgical procedures regarding minimal invasive approaches in cardiac surgery have become more important. The port-access technique has been overall accepted, due to its surgical safeness and effectiveness. Nonetheless, postoperative outcomes should be taken into consideration. This report aims to present the impact of clinical events over a medium-term follow up.

Materials and Methods: From March 2018 to October 2019, a total of 24 isolated mitral valve repairs (87.5%) and replacements (12.5%) through minimal invasive port-access Heartport technique conducted by mini-right thoracotomy have been performed in our center. Transthoracic echocardiogram control was completed before discharge. Clinical outcomes were studied during hospitalization and prospective cardiologic visit.

Results and Discussion: No mortality was registered (0%) after surgery and before discharge. Two cases of bleeding (8.3%) were reported, but only one (4.1%) underwent reoperation. Difficult pain control was experienced in six patients (25%), despite the use of diverse analgesia strategies. 25% of the sample suffered from pulmonary complications and renal failure in the immediate post operatory. Only one case (4.1%) of surgical wound infection was noted. Mean cross-clamp and perfusion time were 111 min and 167 min respectively, taking longer in comparison to our classical mitral replacement procedures series.

Conclusion: Although minimal invasive approach for mitral valve repair and replacement seems to be a promising alternative to sternotomy, with an emphasis on its more aesthetic results, it is not exempt from complications. Regarding the negative clinical outcomes, these might be a consequence of a sharp learning curve and its prolonged cross-clamp times associated. Due to insufficient published evidence, larger prospective randomized trials should be performed to compare the efficiency of port-access techniques to classic sternotomy procedures in terms of increased risk.
We outline the case of an 85 years old Japanese female who

A 67-year-old male 6-weeks post aortic and mitral bioprosthetic

2016 May;45(3):353-60.

References:

Conclusion:

CCI was 6 vs 5, p=0,25). Mild frailty was diagnosed in 17,7% patients (n=11) and
gender. Higher preoperative comorbidity was not associated with POD (median
There was no significant difference between age (mean 79,3 vs 79,2, p=0,8) and
anaesthesia. Of 62 patients enrolled to the analysis, 33,8% (n=21) developed POD.

Results and Discussion:

University Hospital. Delirium was diagnosed according to DSM V criteria. Frailty
patients who underwent TAVI procedure between 01.2018 and 10.2019 at Wroclaw
(TAVI) in recommended for patients at high surgical risk, especially for the elderly.

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Discussion:


Cardiac amyloidosis: case report and review of literature.

Cardiac amyloidosis: A case report and review of literature.

Download PDF Cardiac amyloidosis: case report.

tract obstruction simulating hypertrophic cardiomyopathy in a patient with primary
AL-type amyloid heart disease.

Learning points:
Cardiac Amyloidosis is associated with a severe AS in rare cases.

We must suspect cardiac amyloidosis post operative systolic anterior movement
and preoperative left ventricular outflow tract obstruction.

5138

Severe frailty syndrome – risk factor for delirium after transcatheter aortic valve implantation (TAVI)

Kupiec A., Kozera N., Protasiewicz M., Gozdzik W.

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Background and Goal of Study: Postoperative delirium (POD) is one of the most
common complication after cardiac surgery. Transcatheter aortic valve implantation
(TAVI) in recommended for patients at high surgical risk, especially for the elderly.
This population is particularly at high risk of POD due to advanced age and possible
co-occurrence of frailty syndrome. The aim of the study was to evaluate the influence
of frailty syndrome and comorbidity on POD occurrence after TAVI.

Materials and Methods: We retrospecively analysed the medical history of 86
patients who underwent TAVI procedure between 01.2018 and 10.2019 at Wroclaw
University Hospital. Delirium was diagnosed according to DSM V criteria. Frailty
syndrome was identified using 36-item frailty index. (1) Medical comorbidity was
measured using Charlson comorbidity index (CCI).

Results and Discussion: All TAVI procedures was transfemoral under general
anaesthesia. Of 62 patients enrolled to the analysis, 33,8% (n=21) developed POD.
There was no significant difference between age (mean 79,3 vs 79,2, p=0,8) and
gender. Higher preoperative comorbidity was not associated with POD (median
CCI was 8 vs 5, p=0,25). Mild frailty was diagnosed in 17,7% patients (n=11) and
moderate frailty in 54,8% (n=34). Severe frailty was diagnosed in 27,4% (n=17) and
it was associated with development of POD (p=0,007). (figure 1)

Conclusion: Preoperative diagnosis of frailty syndrome may help to identify
patients at particularly high risk of POD and apply prevention treatment.

References:

2016 May;45(3):363-60.

5574

Transcatheter mitral valve repair: a percutaneous approach to severe mitral regurgitation

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Background and Goal of Study: Mitral regurgitation (MR) is a common heart valve
pathology with high morbimortality rates unless accurate treatment is given. Over
the past few years, percutaneous techniques have become an important alternative
to surgery in severe MR. Multiple treatment options are available for sytomathic
moderate-severe or severe MR: medical treatment, open surgery and transcatheter
mitral valve repair (Mitraclip®). Mitraclip is foremost applicable to high surgical risk
patients. It is a device that enables the approach of mitral valves with one or more
clips, reducing MR area. The main objective of this study is to evaluate effectiveness
and security of this technique in our hospital, attending to MR area reduction and
complications rate.

Materials and Methods: We collected every Mitraclip placed in mitral position
in our hospital since April 2018 to September 2019. Mean age, gender, mean
ejection of left ventricle (MELV) were recorded. We measured MR area before and
after the clip placement, classifying it in four degrees: mild, moderate, moderate-
We report a case of a 58-year-old male patient diagnosed with mitral valve insufficiency. We examined 45 patients with mitral valve insufficiency. The diagnosis and treatment are of critical importance. The diagnosis is confirmed following pericardial and thorax fluid analysis. Surgical treatment should not be delayed in symptomatic patients.

Learning points: It seems that Mitraclip represents an effective and secure therapeutic option for patients with severe mitral regurgitation and high surgical risk.

5960

Chylothorax and chylopericardium after aortic valve replacement

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Background: Both chylothorax and chylopericardium are rare but severe complications of cardiac surgical procedures. They may be caused by an injury in the thoracic duct or its tributaries and result in a substantial increase in morbidity and mortality.

Case Report: We report a case of a 58-year-old male patient diagnosed with severe aortic stenosis who underwent scheduled metallic valve replacement. During his immediate recovery in our perioperative intensive care unit we observed pleural effusion.

Discussion: Chylothorax and chylopericardium are infrequent complications but severe enough to always have them in mind making our differential diagnosis. Their presence is suggested by a milky opaque effusion with laboratory findings including a triglyceride level >500mg/dL, cholesterol/triglyceride ratio of <1, negative cultures and cytology, lymphocyte predominance and fat globules. Initial treatment depends on the presence of symptoms. In the absence of clinical symptoms, dietary modifications sometimes associated with off-label use of somatostatin would be enough. Refractory effusions will require surgical therapy to prevent cardiac tamponade, dyspnea or malnutrition.

Learning points: Chylopericardium and chylothorax are rare complications of cardiothoracic surgery, associated with significant morbidity and mortality; prompt diagnosis and treatment are of critical importance. The diagnosis is confirmed following pericardial and thorax fluid analysis. Surgical treatment should not be delayed in symptomatic patients.

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State of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction with cardioprotection by electrical fibrillation and intermittent aortic clamping

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Background and Goal of Study: The aim of the work is to analyze the state of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction with cardioprotection by electrical fibrillation and intermittent aortic clamping.

Materials and Methods: We examined 45 patients with mitral valve insufficiency admitted to the Heart Institute Ministry of Health of Ukraine for surgical correction of the defect. All patients underwent an operation of mitral valve replacement, and the local protocol of the protection of myocardium was performed by applying electrical cardiac fibrillation and intermittent clamping of the aorta. Patients were fixed at the end of cardiopulmonary bypass, before being transferred to (intensive care unit) ICU, after leaving ICU the end systolic, end diastolic and stroke index (EDI, ESI, SI) of the left ventricle, left ventricular ejection fraction (EF), cardiac index (CI), systolic pressure in the pulmonary artery (PPAs) and global longitudinal myocardial strain (GLS).

Results and Discussion: The EDI was not statistically significantly altered during the study. At the stages of the study, the ESI gradually decreased and, before being transferred from an ICU, became significantly lower than the baseline (p<0.0001), although such dynamics did not affect the SI. The EF at the end of cardiopulmonary bypass was unreliable (p>0.3) increased to 53.6 ± 4.1% and then remained almost at the same level: 53.2 ± 5.4% before being transferred to the ICU and 54.2 ± 8.2% before transfer from ICU. The GLS module at the end of cardiopulmonary bypass significantly (p<0.0003) decreased to 7.9 ± 0.8%, then gradually returned to the previous level. PPAs after correction of the defect and at the end of cardiopulmonary bypass significantly and significantly decreased to 36.8 ± 2.6 mm Hg (p<0.0001), further, before transferring to the ICU, it became still significantly (p<0.004) lower. All CI changes during the study were unreliable.

Conclusion: These indicators indicate that the cardioprotection method used did not have a negative effect on myocardial contractility and central and intracardiac hemodynamic parameters.

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State of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction using crystalloid cardioplegia in the perioperative period

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Background and Goal of Study: The purpose of our work was to study the state of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction using crystalloid cardioplegia in the perioperative period.

Materials and Methods: We examined 40 patients with mitral valve insufficiency admitted for surgical correction of the defect. Patients underwent therapy and surgical correction using crystalloid cardioplegia.

Results and Discussion: The left ventricular ejection fraction at the exit from the cardiopulmonary bypass decreased to 50.7 ± 5.2% (p = 0.09 compared with the initial level). Then it increased insignificantly: to 51.7 ± 5.0% before transferring to intensive care unit and to 52.4 ± 5.8% (p = 0.7 compared to baseline) after transferring from intensive care unit. The global longitudinal myocardial strain module after correction of the defect and withdrawal from cardiopulmonary bypass significantly decreased by -12.4±0.8% to -11.3±0.7% (p <0.01) and then did not significantly change statistically until the end of the study being transferred from intensive care unit - 11.7±1.1% (p <0.005 compared with baseline). Systolic pressure in the pulmonary artery after correction of the defect and after leaving the cardiopulmonary bypass decreased significantly and reliably to 35.8 ± 3.0 mm Hg. Art. (p <0.0001) and then not significantly changed (35.3 ± 2.8 mm Hg before transferring to intensive care unit and 35.1 ± 2.7 mm Hg before transferring from intensive care unit). Despite this, the integral indicator of the circulatory system -
cardiac index - was below 2.51 / min · m² in only 5 (12.5 ± 5.2%) patients, while not being below 2.21 / min · m², which was due to a compensatory increase in heart rate (maximum - up to 96 min 1) and the appointment of sympathomimetic therapy. Conclusion: Surgical correction was accompanied by the greatest changes in global longitudinal myocardial strain, systolic pressure in the pulmonary artery and left ventricular ejection fraction at the exit stage of cardiopulmonary bypass.

Systolic anterior motion after mitral valve reconstructive surgery in non obstructive hypertrophic cardiomyopathy

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Background: Systolic anterior motion (SAM) of the mitral valve refers to the paradoxical movement of the anterior leaflet or chordae toward the interventricular septum during systole and it can be a life-threatening condition. The SAM is typically observed in patients with hypertrophic cardiomyopathy (HCM) or in patients following mitral valve reconstructive surgery.

Case Report: We present a case of a 42 years old men with a history of bipolar disorder a moderate psychomotor disable. Other disease were hemia hytus and iom deciciency anemia. The patient was scheduled for mitral valve reconstructive surgery. The relevant findings of intraoperative transesophageal echocardiography (TEE) reveal mitral valve with prolapse of the posterior leaflet with defects of coaptation that cause eccentric mitral insufficiency of wide regurgitation jet toward the atrial cavierting. There was no evidence of hypotrophic cardiomyopathy or left ventricular hypertrophy. Mitral valve repair surgery was implantation of tendon neochordae an annuloplasty. When extracorporeal circulation was discontinued severe SAM was evident by TEE (fig 1). Volemia was optimized and beta blocker was given, however, the haemodynamics situation was normalized but anatomic alteration of left ventricular outlet tract persisted. Rerelapse of mitral valve was decided and resection and sliding plasty of posterior leaflet was carried out. The technique performed solved the SAM (fig 2). The postoperative evolution was favourable. One month later the patient is asymptomatic with no SAM or mitral regurgitation on transthoracic echocardiography.

Discussion: SAM rates after mitral repair vary from 4% to 8% in the literature (1). Although SAM is often associated with surgical indications, the presence of SAM in the absence of other hypo-, normo- or hyperdynamic cardiomyopathies seems to be significantly associated with the presence of SAM in this surgical setting.

Conclusion: We report a rare case of SAM after mitral valve repair. This report highlights the importance of recognizing and addressing SAM in the postoperative setting to prevent complications and improve patient outcomes.

References:

Intravenous versus inhalational maintenance of anaesthesia on tissue oxygenation in cardiac surgery

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Background and Goal of Study: The aim of this study was to evaluate the effect of total intravenous anaesthesia (TIVA) and inhalational anaesthesia techniques on tissue oxygenation. For this purpose, the effects of midazolam-based TIVA or sevoflurane-based inhalational anaesthesia maintenance on intraoperative central and peripheral tissue oxygenation parameters were compared in patients undergoing coronary bypass surgery (CABG).

Materials and Methods: Ethics Committee and written informed consent were obtained. A total of 104 adults were randomized (n=52 per group). Induction was achieved with 10 midazolam, 0.2mg/kg rocuronium were applied with BIS guidance. During CPB, sevo vaporizer was used to maintain surgical haemodynamics mild hypotension, normothermia and oxygenation. HBOO was set up to 60%. During the maintenance of groupTIVA,3μg/kgfentanyl,0.01-0.05mgkg-1midazolam,0.8mgkg-1rocuronium were performed. In the sevo group, the sevo vaporizer was set up to maintain surgical haemodynamics mild hypotension, normothermia and oxygenation. HBOO was set up to 60%.

Results and Discussion: Demographic data were similar in both groups. Forearm NIRS values, central jugular and left forearm venous oxygen saturations were recorded. Measurement periods were: T1;5min after anesthesia induction, T2; at the 10th min of cardiopulmonary bypass (CPB), T4;10min after cross removal, T5;10 min after CPB, T6;sternum closing.

Concomitant with advances in anesthetic methods, there have been efforts to elucidate the nonanesthetic effects of anesthetics drugs, focusing on the adequacy of organ perfusion. The effects of midazolam-based TIVA and sevoflurane-based inhalation anesthesia maintenance on intraoperative central and peripheral tissue oxygenation parameters were compared in patients undergoing CABG, and it was found that sevoflurane-based anesthesia provides more ideal tissue oxygenation than TIVA.
Near-infrared spectroscopy (NIRS) enables noninvasive anesthesia care in cardiac surgery. The study included 740 cardiac surgery patients. We monitored 12 lead EKG, IBP, SpO2, etCO2 and Bis. GA was induced with Midazolam 1.5 mg, Thiopental 2.5 mg/kg, Remifentanil 0.25 μg/kg/min and Rocuronium. Failure of the ventilator led to use of a backup that was not equipped for anesthetic gas. Therefore, remaining within current best practice borders (3) was maintained with Propofol 2.5 mg/kg and Remifentanil 0.15-0.2 μg/kg/min to achieve Bis between 40 and 60. Vitals were monitored and arterial blood gas analysis performed every 30 minutes to detect metabolic abnormalities. The procedure was successfully completed in 120min.

Discussion: To the best of our knowledge this is the first documented TIVA with propofol during epicardial ablation with ajmaline injection to induce arrhythmias. Warning against Propofol is based on description of Brugada-like EKG followed by ventricular fibrillation due to high dosage of the drug and clinical reports of VA in patient with known BrS receiving propofol with no record of dose (2). In this case, the short procedure and the use of a different drug for induction allowed to conduct a TIVA with low dosage of propofol. No arrhythmic effect was observed except those evoked intentionally with ajmaline. No VA occurred despite two best to avoid drugs.

Learning points: There is increasing evidence of Propofol being used in low dose in BrS patient. In this particular case 12 lead EKG was monitored for the procedure so any alteration would have been noticed. This case adds to the evidence in favor of propofol being safe in low dose under close monitoring in patient with BrS.

References:

Concurrent publication: SRS has a higher cerebral specificity and tends to not be affected by extracranial blood flow. We hypothesized that extracranial content (nTHI, expressed in arbitrary units). Although both parameters generally provide concordant values, SRS has a higher cerebral specificity and tends to not be affected by extracranial disturbance of the NIRS signal during administration of various drugs, such as heparin, protamine, etc. Despite many publications concerning evaluation of IHR risk there’s still no consensus about causes of increase in IHR. The goal of a study is to identify predictors of IHR reactions in cardiac surgery.

Materials and Methods: The study included 740 cardiac surgery patients. We evaluated 37 factors, which were considered as potential predictors. Logistic regression was used with calculation of odds ratio (OR), 95% confidence interval (95% CI) and significance level (p) for each factor to determine the prediction model of the development of immediate hypersensitivity reactions. These factors were considered as predictors of immediate hypersensitivity reactions at p-value < 0.05. Sensitivity, specificity and significance level were determined for quantitative variables using ROC analysis.

Results and Discussion: Risk factors of immediate hypersensitivity reactions and SRS have been assessed. The study included 740 patients. The occurrence of extracranial disturbance of the NIRS signal was assessed with the use of angiotensin converting enzyme inhibitors (OR 0.52 (0.25—1.09), p=0.084), asthma (OR 1.13 (0.14—8.93), p<0.91), coronary angiography (less than 3 days before surgery) (OR 1.29 (0.53—3.15), p=0.57), allergic rhinconjunctivitis (OR 1.47 (0.33—6.57), p=0.61) and domestic allergy (OR 1.13 (0.26—4.94), p=0.87).

Conclusions: Patients with known previous allergic reactions to drugs and food products should be evaluated more precisely. Identifying risk factors of IHR is necessary to develop the allergic prophylaxis guidance protocol.

Preoperative predictors of immediate hypersensitivity reactions in cardiac surgery

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Background and Goal of Study: Anesthesia care in cardiac surgery is often associated with elevated risk of immediate hypersensitivity reactions (IHR) due to application of various drugs, such as heparin, protamine, etc. Despite many publications concerning evaluation of IHR risk there’s still no consensus about causes of increase in IHR. The goal of a study is to identify predictors of IHR reactions in cardiac surgery.

Materials and Methods: The study included 740 cardiac surgery patients. We evaluated 37 factors, which were considered as potential predictors. Logistic regression was used with calculation of odds ratio (OR), 95% confidence interval (95% CI) and significance level (p) for each factor to determine the prediction model of the development of immediate hypersensitivity reactions. These factors were considered as predictors of immediate hypersensitivity reactions at p-value < 0.05. Sensitivity, specificity and significance level were determined for quantitative variables using ROC analysis.

Results and Discussion: Risk factors of immediate hypersensitivity reactions and SRS have been assessed. The study included 740 patients. The occurrence of extracranial disturbance of the NIRS signal was assessed with the use of angiotensin converting enzyme inhibitors (OR 0.52 (0.25—1.09), p=0.084), asthma (OR 1.13 (0.14—8.93), p<0.91), coronary angiography (less than 3 days before surgery) (OR 1.29 (0.53—3.15), p=0.57), allergic rhinconjunctivitis (OR 1.47 (0.33—6.57), p=0.61) and domestic allergy (OR 1.13 (0.26—4.94), p=0.87).

Conclusions: Patients with known previous allergic reactions to drugs and food products should be evaluated more precisely. Identifying risk factors of IHR is necessary to develop the allergic prophylaxis guidance protocol.

Comparison of the effects of dexmedetomidine and remifentanil used in cardiac surgery on dynamic thiol-disulphide homeostasis

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Background and Goal of Study: Thiols are organic compounds containing the sulphhydryl group and have antioxidant effect on dynamic thiol-disulphide homeostasis (DTH). Paraoxonase-1 (PON-1) has an antioxidant effect on DTH, which is necessary to develop the allergic prophylaxis guidance protocol.

Discussion: The results indicate that NIRS might be prone to extracranial contamination. SRS is probably more reliable than MBL after administration of PE.

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agents in patients undergoing coronary artery bypass graft surgery (CABG) with cardiopulmonary bypass (CPB).

Materials and Methods: A total of 100 patients undergoing CABG under elective conditions were included in the study. Induction was performed with propofol, fentanyl, and rocuronium. Sevoflurane-remifentanil (Group R) or sevoflurane-dexmedetomidine (Group D) was used for the maintenance of anaesthesia. Central venous blood samples were taken immediately after internal jugular vein catheterization (T1), immediately after cross-clamp insertion (T2), when warming of the patient started (T3), 10 minutes after completion of protamine infusion (T4) and on post-op 1st day (T5). Total thiol, native thiols, disulphide, and PON-1 levels were studied.

Results and Discussion: Demographic data of both groups were similar. Total thiol, disulphide, PON-1, native thioltotal thiols, total thiols/disulphide, and native thiols/disulphide levels were similar in all time periods measured between the two groups. Native thiol levels were found significantly higher in T3 and T5 in Group D than in Group R (p = 0.017, p = 0.027, respectively). Sevoflurane-dexmedetomidine combination is more effective than sevoflurane-remifentanil combination in preventing damage during extracorporeal circulation. In a study by Türkcan et al., it was shown that the cardioprotective effect of dexmedetomidine was greater than that of remifentanil (1). The underlying cause of this effect is the protection against ischemia-reperfusion injury. Luyten et al. showed that antioxidant capacity during CPB increased contrary to expectations, but argued that the increase was lower than the increase in oxidative effect (2).

Conclusion: We think that in CABG with CPB, dexmedetomidine should be the first choice as an adjuvant.

References:

Long-term effect of esmolol on the coronary arteries' structure

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Background and Goal of Study: The morbidity and mortality associated with hypertensive patients are related to coronary remodeling. At present, several drugs have been demonstrated to be useful in the regression of ventricular remodeling after chronic treatment. Our group previously demonstrated that short-term treatment (48h) with esmolol produces early regression on coronary artery remodeling, although the long-term effect has not been studied yet (1). The aim of our study was to show the effects of short-term treatment with esmolol (48h) on coronary arteries’ structure in an experimental model of arterial hypertension and compensated left hypertrophy. Likewise, we wanted to know if this effect might remain in the long term.

Materials and Methods: Fourteen-month-old male spontaneously hypertensive rats (SHR) were randomized into 6 groups: three therapy groups with esmolol (300 µg/kg/min during 48h), one of them analyzed 48h after treatment, another one 7 days after treatment and the last one after 1 month (SHRE-48h, SHRE-7d and SHRE-1m), and three placebo groups for each therapy group (SHR-48h, SHR-7d and SHR-1m). 48 hours, 7 days and 1 month after treatment, we studied the coronary artery remodeling (geometry and composition of the left anterior descending coronary artery) using a confocal microscopy method (using the nuclear dye DAPI).

Results and Discussion: The external diameter, the wall width and the cross-sectional area from coronary artery were significantly lower in the esmolol group after 48h of treatment, and these findings remained after one week and one month. Likewise, we found a decrease in the thickness, the number of muscle cells and cell density of the middle layer after 48h of treatment; these findings remained after one week and one month except the cell density that showed no changes over time.

Conclusion: Short-term treatment with esmolol significantly attenuated coronary artery remodeling. These changes remain in the long term. The next goal will be to explain why this happens.

References:

Acknowledgments: This work was supported by a grant from FIS 16/02069 and Fondos FEDER, Spain.

Impact of low-opioid anesthesia on inflammatory response and clinical endpoints in cardiac surgery: a prospective study

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Background and Goal of Study: During coronary artery bypass grafting, patients are subjected to additional risk, which is caused by both conduct of surgical treatment and pathophysiological changes in homeostasis, provoked by the action of anesthetics and cardiopulmonary bypass.

Materials and Methods: The research involved 60 patients, who had been subjected to coronary artery bypass grafting with cardiopulmonary bypass. All patients were divided into two groups: the first group (30 patients) – low-opioid scheme of anesthesia and the second group (30 patients) – standard scheme of anesthetic management. Determination of IL-6 level in the blood was conducted before and after completion of CPB by ELISA test.

Results and Discussion: Having compared values of IL-6 between investigated groups after completion of cardiopulmonary bypass, it was established that the levels of IL-6 were reliably higher by 27.51% (p=0.001) in patients of the first group compared with the results of patients in the second group. Patients in the first group had significantly less time of mechanical ventilation compared to the second group (2 h (2;3) vs 4 h (3;5), p<0.021). Low cardiac output syndrome was significantly less frequently reported in patients of the first group (10.0% vs 33.3%, p=0.028). In addition, patients in the first group had significantly less time spent in ICU (2 days (1; 3) vs 3 days (3; 4), p=0.044).

Conclusion: The using of multimodal low-opioid anesthesia was associated with significantly lower IL-6 at the end of surgery, less mechanical ventilation duration, less frequent low cardiac output syndrome and a need for catecholamines, shorter ICU stays.

Successful Opioid Free Anesthesia in patients cardiac surgery, with and without cardiopulmonary bypass

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Background: Contemporary perioperative medicine is progressing with increasing questioning of current clinical practice. One of these is routine perioperative opioid use. An opioid-based anesthesia has been the cornerstone of intra- and postoperative management for a long time. Opioid-free anesthesia (OFA) is a technique in which non-opioid multimodal analgesics are used to provide adequate pain control in the perioperative period. The authors present 3 cases of successful implementation of an OFA regimen in cardiac surgery.

Case report: First case: a 43-year-old female patient was scheduled beating heart coronary surgery. Second case: 49-year-old male patient was listed CABGx2 with cardiopulmonary bypass (CPB). Third case: 49-year-old female patient was scheduled mitral valve replacement(MVR) with CPB. Patients had average adult weight and had no history of any disease, only MVR patient had atrial fibrillation. OPA protocol.0.25g/kg iv dexmedetomidine was given for 10min in the preoperative period. A 50ml solution containing 50µg dexmedetomidine, 50mg ketamine, 500mg lidocaine was prepared. Just before induction,1ml/10kg/10min infusion was performed from this solution. Then anesthesia was induced with propofol-rocuronium. For maintenance, this solution was continued throughout the operation by reducing the dose to 1ml/10kg/h and sevoflurane was administered with BISguidance.50mg fentanyl was added just before surgery.1.5g magnesium was given before CPB.1g paracetamol was given during sternum closing. Local anesthesia was performed with bupivacain in the chest drain regions of our patients. At the end of the operation, solution dose was reduced to0.5ml/10kg/h and continued in postoperative period. Paracetamol was administered every4h for first 24h. When the VAS score was over4, contramal1mg/kg was administered. Only, the 2nd patient needs 2 times contramal. The patients were extubated within 2-3h. When the VAS score was over4, contramal1mg/kg was administered. Only, the 2nd patient needs 2 times contramal. The patients were extubated within 2-3h. On post-op 1st day (T5) Total thiol, native thiols, disulphide, and PON-1 levels were studied.

References:
**5880**

**Open abdominal aortic aneurysm repair surgery conducted using an opioid free anaesthesia (OFA) protocol**

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**Background:** The implementation of an OFA protocol in a patient undergoing an open abdominal aortic aneurysm repair surgery. The patient had already been undergone an EVAR operation in the past when a 8 cm aortic aneurysm was diagnosed. Due to a type 1 endoleak an open abdominal approach was considered mandatory. The patient was also treated for coronary disease-10 years ago he had experienced a STEMI and was submitted to CABG surgery. The preoperative echocardiogram was normal with a preserved LV function (LVEF=55%).

**Case Report:** We present the case of a 69 year old male with a medical history of ischaemic heart disease. He was admitted for an open abdominal aortic aneurysm surgery repair (elective). He has had any history of smoking. BMI=20 and spirometry values were good (FVC=88%/FV1=91%). He was on aspirin, amiodipine, valsartan, atorvastatin and metoprolol. He was considered ASA II due to the ischaemic heart disease. An OFA protocol was used. Regional anaesthetic techniques were excluded except the infiltration of the surgical wound with ropivacaine. The application of the protocol consisted of 2 stages: the preoperative and the intraoperative. In the preoperative stage, pregabalin was administered in 2 doses of 150 mg each, the night before and the day of the operation. In the intraoperative stage, both induction and maintenance of anaesthesia were conducted according the OFA protocol by Mulier et al. Heart rate and arterial blood pressure were managed using esmolol, glycerine trinitrate and phenoxyphylline infusions titrated according to patient response. The hemodynamic monitoring was conducted using a FloTrac system and the depth of anaesthesia was measured using BIS. The operation lasted 4 hours, with no major complications. The patient was extubated and transferred to ICU. The postoperative pain was mild (VAS =6) and managed using a PCA with morphine.

**Discussion:** We adopted a protocol based in Muller’s technique with the exception of dexmetomidine. The main points could be compressed in sympatholysis and multimodal analgesia.

**References:**

**Learning points:** OFA provides cardiovascular stability and adequate intraoperative stress management with minimal needs in postoperative opioids. Further evidence however is needed.

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**5575**

**Anesthetic management of a patient with peripartum cardiomyopathy in cesarean delivery**

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**Background:** Peripartum cardiomyopathy (PPCM) is a rare life-threatening cardiomyopathy of unknown cause that occurs in the peripartum period in previously healthy women. The incidence varies widely depending on geographical region and ethnic background.

**Case Report:** We present a 23-year-old gravida four, parity two pregnant woman who presented to the health center with palpitation and dyspnea during the 27th week of pregnancy. Ejection fraction was 30% which was revealed by echocardiography. Prepregestational ejection fraction was normal and peripartum cardiomyopathy was diagnosed and she was hospitalized. Metoprolol was given once a day. In follow up echocardiography at 31st week, ejection fraction decreased to 15-20% left ventricular diastolic diameter was 5.5 cm, TAPSE was 1.5 cm. Systolic pulmonary arterial pressure was 28. She had increased symptoms and heart and obstetric team decided to perform a cesarean section delivery as soon as possible. Following ECG, invasive blood pressure measurement, cardiac output measurement and pulse oximetry monitoring, the patient was covered under sterile conditions and induced with 1mg / kg ketamine, 0.1mg / kg midazolam, 1mg / kg propofol and 0.6mg / kg rocuronium. Surgery started after endotracheal intubation and delivery of the baby of a patient with PPCM and we wanted to emphasize that anesthesia management can be performed with invasive monitoring and induction of anesthesia according to the patient and cardiac condition without the need for Ecmo or left ventricular assist device could be achieved.

**References:**
Remote ischemic preconditioning reduces the amounts of angiogenic proteins in human plasma and increases the numbers of Tie2 positive circulating monocytes

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Background and Goal of Study: Remote ischemic preconditioning (RIPC) is achieved by the application of brief episodes of non-lethal ischemia and reperfusion on a limb. RIPC protects various organs from ischemic damage, but its role in angiogenesis remains unclear. The numbers of non-ischemic resident monocytes in ischemic tissue after stroke are increased by RIPC [1] and recent work of our group suggests that cell types derived from monocytes such as PCMO and MREG also possess angiogenic potential [2] [3]. The aim of the study was to evaluate whether RIPC regulates the relative amounts of proangiogenic proteins in human plasma and if the numbers of positive proangiogenic angiopeptin receptor (Tie2) expressing monocytes is regulated by RIPC.

Materials and Methods: Ten healthy volunteers were subjected to RIPC using a blood pressure cuff inflated to >200mmHg for 3x5min on the upper arm. Peripheral blood monocytes were isolated by negative magnetic bead sorting (MACS) before RIPC (noRIPC), 3h after 1x RIPC (RIPC1) and at the end of one week of daily RIPC (RIPC7). The plasma was screened using proteome profiling arrays and the presence of Tie2 was analyzed on the surface of living monocytes by fluorescence-activated cell scanning (FACS).

Results and Discussion: RIPC1 decreased the amounts of 16/25 (64%) of angiogenic proteins in plasma. While 3/25 (24%) of the investigated factors were increased, 6/25 (12%) remained unaffected. The effect of RIPC7 was even more pronounced (70% decrease, 4% increase and 20% unaffected; Fig A). The top five RIPC regulated angiogenic plasma proteins (RIPC1/noRIPC; RIPC7/noRIPC) were: Artemin (0.36; 0.26), PD-ECGF (0.39; 0.23), Pentraxin (0.49; 0.42), Angiopoietin 2 (0.50; 0.39) and Angiopoietin 1 (0.52; 0.41) (Fig. B). FACS analyses of circulating monocytes revealed a significant increase in the numbers of Tie2 positive monocytes after RIPC7 (40.63±6.93% vs noRIPC 23.70±6.05%; P<0.05).

Conclusion: Our data show that while RIPC decreases the relative amounts of most of the angiogenic plasma proteins, it increases the proangiogenic Tie2 receptor on human monocytes. Further studies have to evaluate whether RIPC has the potential to influence angiogenesis via monocytic Tie2.

References:

Myocardial injury in non-cardiac surgery (MINS), a new entity with a bad prognosis. Preliminary results after two years of recruitment in a tertiary hospital

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Background and Goal of Study: MINS is defined as a troponin value ≥30ng/L with a rise and fall ≥20% regarding baseline due to perioperative myocardial ischemia. The goal of this study was to evaluate the incidence, characteristics and 30 postoperative (postop) day prognostic of patients who presented MINS.

Materials and Methods: Prospective single center cohort study, that included all patients over 45 years undergoing elective high cardiac risk non cardiac surgery or intermediate cardiac risk non cardiac surgery with cardiovascular risk factors from May 2017 to May 2019. Troponin was obtained at baseline, 3 hours postop and on the 1st, 2nd and 3 postop days. Follow-up was carried out until 30 days postoperatively. Dependent variables were MINS at 30 days after surgery. Mann- Whitney U test and Fisher exact test were used to compare quantitative and qualitative variables respectively.

Results and Discussion: A total of 746 patients were recruited. Demographic and perioperative data are summarized in figure 1.

Cardiothoracic and Vascular Anaesthesiology

Remote ischemic preconditioning affects lipopolysaccharide-induced release of inflammatory cytokines from human monocytes

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Background and Goal of Study: Remote ischemic preconditioning (RIPC), during which repeated episodes of non-lethal ischemia/reperfusion (IR) are applied, has been shown to be protective against I/R injury in distant organs. Although the underlying mechanisms of RIPC are only partially understood, recent studies suggest effects of RIPC on circulating monocytes which are also involved in lipopolysaccharide (LPS) induced inflammation and sepsis [1,2]. Aim of the study was to evaluate the effects of RIPC on the LPS induced release of inflammatory cytokines from human monocytes cultured in-vitro.

Materials and Methods: 10 healthy volunteers were enrolled in the present study. RIPC was induced daily for a total of 7 consecutive days by inflating a blood pressure cuff (3x5min, >200mmHg), which was placed on the upper arm. Blood samples were obtained before RIPC (No RIPC), directly after RIPC (RIPC1) and after 7 treatments (RIPC7). Conditioned (RIPC1, RIPC7) and unconditioned (No RIPC) monocytes were isolated by a standardized protocol and cultured with or without LPS (100ng/ml). After 24h, supernatants were collected and cytokine secretion was evaluated using proteome profiler arrays (A).

Results and Discussion: Incubating monocytes (No RIPC) with LPS resulted in an increased secretion of 17/105 (16%) cytokines from human monocytes cultured in-vitro. The top five cytokines from human monocytes and increases the numbers of Tie2 positive circulating monocytes.

References:
Conclusion: We could show that the in-vivo application of RIPC affects the inflammatory cytokine secretion of human monocytes in vitro. This proposes RIPC as a possible treatment of inflammatory diseases.

References:

5550
Reverse myocardial remodeling following multichannel blocker by inhibiting nuclear factor of activated T-cells and improving plasmatic oxidative status

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Background and Goal of Study: Left ventricular hypertrophy (LVH) is a problem in the clinical setting. Dronedarone is an antihypertrophic agent that was recently approved for the treatment of atrial fibrillation. However, its effect on regression of LVH has not been reported. We tested the hypothesis that administration of dronedarone induces regression of LVH by inhibiting nuclear factor of activated T-cells (NFATc4) and attenuating plasmatic oxidative stress.

Materials and Methods: Ten-month-old male SHR were randomly assigned to an intervention group (SHR-D), where animals received dronedarone treatment for a period of 14 days, or to a control group (SHR) where rats were given vehicle. A third group with normotensive control rats (WKY) was also added. At the end of the treatment we studied the cardiac structure and function using transthoracic echocardiogram, cardiac metabolism using the PET/CT study and size of myocyte by histological analysis. After treatment, a new biomarker of plasmatic oxidative stress was studied, and then left ventricular tissue was processed for Western blot analysis.

Results and Discussion: SHR-D rats showed statistically significant lower values in comparison to SHR group for left ventricular mass, glucose myocardial uptake and size of myocytes. There were no significant differences in the E/A ratio or ejection fraction. Dronedarone decreased levels of p-NFATc4, p-ERK1/2 and p-AKT compared to SHR and decreased protein thiolation index. All these values obtained in SHR-D rats were similar to the values measured in the normotensive WKY control group.

Conclusion: In the present study we show that short-term administration of dronedarone reversed LVH in SHR by downregulation NFATc4/ERK/AKT pathway and decreased of thioc-specific oxidative stress. If the results of this study are confirmed in humans, this effect should be very interesting in clinical practice in patients with atrial fibrillation and LVH induced by chronic hypertension.

Acknowledgments: Study financed by the Health Research Fund FIS P116/02069 and Fondos FEDER.

5822
Downregulation of ketone body catabolism exacerbate cardiac ischemia-reperfusion injury under obesity

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Background and Goal of Study: Epidemiological studies indicate that obesity is a high risk factor for cardiovascular disease. Ketone body β-hydroxybutyrate (β-OHB) is produced in the liver and serves as an alternative energy source for the extrahepatic tissues during nutrient deprivation. Recent studies show that the heart increases reliance on β-OHB as an alternative energy source during hypertrophy and heart failure. However, whether this cardiac fuel switch happened in obese mice and the impact on acute stress are unclear. Therefore, this study was designed to investigate the cardiac β-OHB metabolic profile and explore the role of β-OHB in myocardial ischemia-reperfusion (I-R) injury under obesity.

Materials and Methods: Three-month-old male mice of SV129 background were fed with either chow diet or high-fat diet (HFD, D12492, Research Diets) containing (kcal) 20% protein, 20% carbohydrate and 60% fat for 12 weeks. The in vivo I/R insult was induced by 30-min left anterior descending coronary artery (LAD) ligation and 24-h reperfusion. For carbon-13 (13C) nuclear magnetic resonance (NMR) spectroscopy, isolated mouse hearts were perfused with 13C-labeled mixed-substrate KH buffer (2,4-13C2) β-OHB, [U-13C] mixed-long chain fatty acids, lactate, glucose and insulin.

Results and Discussion: With a more rapid increase of body weight, the mice under HFD developed glucose intolerance within 3 months (Figures 1A-1C). Also, the HFD-fed mice were sensitive to in vivo cardiac I-R injury, as evidenced by reduced ejection fraction and a larger infarct size (Figures 1D and 1E). By performing carbon-13 (13C) isotopomer analysis of tissue extracts by nuclear magnetic resonance (NMR), we found a significant reduction of β-OHB oxidation in the heart from the HFD-fed mice (Figures 1F). This decreased β-OHB utilization was accompanied with a downregulation of protein abundances of β-hydroxybutyrate dehydrogenase 1 (BDH1), the enzyme that catalyzes the first step of β-OHB catabolism in mitochondria. Besides, the expression of other ketogenic enzymes succinyl-CoA:3-ketoacid CoA transferase (SCOT) and acetyl-CoA acetyltransferase 1 (ACAT1) remained unchanged.

Conclusion: Together, these data indicate an exacerbated cardiac I-R damage under obesity, which is associated with a BDH1-mediated suppression of β-OHB utilization.

5757
The effect of retrograde autologous priming method on intraoperative global tissue oxygenation in open cardiac surgery

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Background and goal of the study: Nowadays, the management of the cardiopulmonary bypass (CPB) has been focusing on countering the high incidence of blood transfusion, and the problem of acute haemodilution, induced by the addition of the priming volume. Studies have demonstrated the efficacy of retrograde autologous priming (RAP) in the reduction of blood transfusion requirement. The main purpose of this prospective observational study was to investigate the impact of RAP on the intraoperative global tissue oxygenation. The second aim was to evaluate intraoperative blood transfusion requirement.

Materials and Methods: 138 patients scheduled for cardiac surgery were randomly divided into liberal & RAP groups. The RAP group was treated with CPB using RAP, while the liberal group was treated with conventional CPB. The intraoperative time course of oxygen delivery (DO2), consumption (VO2) were evaluated. As surrogate markers of oxygen balance, the central venous oxygen saturation (ScvO2), venoarterial PCO2 difference (PvaCO2) were investigated. Parameters were recorded at 3 timepoints (after anesthesia induction, at the lowest temperature during CPB, sternum closing).

Results and discussion: RAP was used in 58 patients and compared with 50 liberal. Demographic-perioperative data were similar in both groups. Intraoperative global tissue oxygenation parameters DO2, VO2, ER, ScvO2, PvaCO2, lactate were not different between the groups. However, erythrocyte (ES) transfusion and diuretic medication requirements were significantly higher in the liberal group compared to the RAP group (p<0.043, 0.046, respectively). Although more ES transfusions were performed in liberal group, hemoglobin values were significantly lower during the measurement periods (p<0.001). There was no difference between the groups in terms of postoperative complications and mortality.

Conclusions: RAP is an effective adjunct to decrease the ES transfusion, however, no effect on intraoperative oxygenation parameters was observed. Since DO2, VO2, ER parameters are numerical calculations, increase in hemoglobin value by RAP or ES transfusion may result in similar results. ScvO2, PvaCO2, lactate were not affected by the administration of RAP or transfusion in the acute intraoperative period, but possibly the adverse effects of transfusion or positive effects of RAP could be observed if they were followed up postoperatively or longer. To our knowledge, there is no study in the literature that investigated tissue oxygenation during RAP.
Conditioning with netrin-1 in Acute myocardial infarction model of rat improves diastolic left ventricular dysfunction

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Background and Goal of Study: To evaluate the improvement of systolic and diastolic left ventricular (LV) dysfunction by preconditioning and postconditioning with netrin-1 after acute myocardial infarction (MI) in rat model, we examined the changes of echocardiographic parameters and compared with them before and after MI.

Materials and Methods: Male, 8-to 9-week-old, Spraque-Dawley rats with a mean body weight of 277.40 ± 48.6 g were anesthetized with intraperitoneal injection of pentobarbital at a dose of 65 mg / kg, followed by intubation and positive pressure ventilation for 15 minutes as a stabilizing period. After 30 minutes of ischemia in the acute MI model, netrin-1 (5mcg/kg) was slowly injected into MI group but vehicle (normal saline) into another MI group via tail vein. Netrin-1 preconditioning was administered intravenously 3 minutes before the induction of ischemia and 3 minutes after the induction of ischemia. Netrin-1 postconditioning was administered intravenously 5 minutes before the end of ischemic induction for 3 minutes and pentobarbital 35 mg / kg after 2 hours of reperfusion. And the echocardiographic evaluation was performed. Using Vevz100, Echocardiographic studies were performed before surgery and after 120 minutes of reperfusion. Echocardiographic parameters matched systolic function with fractional shortening (FS) and ejection fraction (EF), but diastolic function with E’ and E/E’ ratio.

Results and Discussion: Fractional shortening values were significantly increased in the pre-isch, pre-netrin, post-isch and post-netrin groups compared to the vehicle group. The EF (ejection fraction) and in the post-netrin group, the left ventricular systolic function was improved. E’ (initial diastolic velocity) values were significantly higher in the post-iso, post-isch, and post-netrin groups than in the vehicle group. EF / E’, Post-isch, post-isch, and post-netrin, respectively.

Conclusion: Preconditioning and postconditioning with netrin-1 makes meaningful improvement of systolic dysfunction with significant increase with FS and EF after acute MI. Also, it helps E’ recovery for LV diastolic function and E/E’ ratio for left atrial pressure.

Comparison between an oxidative stress score and individual biomarkers for diagnose patients with left ventricular hypertrophy

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Background and Goal of Study: Left ventricular hypertrophy (LVH) is a common manifestation of cardiovascular disease, which has been related to stroke, serious arrhythmias, and sudden cardiac death. Oxidative stress plays a key role in patients with LVH. A recently developed global index of oxidative stress, LVH score, takes into account a combination of plasma biomarkers of oxidative damage and antioxidant capacity, which has been validated in several pathologies however not in LVH.

Materials and Methods: Seventy consecutive patients were recruited in the cardiac surgery section of our institution and each was assigned to one of the two study groups: control group (without LVH) and LVH group (with LVH), based on an echocardiography study. Biomarkers plasmatic related to antioxidant defense systems (total thiols, reduced glutathione, total antioxidant capacity, dismutase superoxide and catalase), and oxidative damage (malondialdehyde and protein carbonyls) were assessed. The global index of oxidative stress related to LVH was calculated using the statistical methodology previously described (1). The ability of the score and individual biomarkers to discriminate LVH patients from control group was tested by the area under the ROC curve analysis. All procedures were approved by the Ethics Committee of Hospital Gregorio Marañón, Madrid, Spain.

Results and Discussion: The ROC analysis of each biomarker shows the lack of capacity of individual biomarkers to discriminate between the two clinical groups: AUCCSH 0.378; AUCCOD 0.430; AUCThio 0.374; AUCTAC 0.382; AUCtatalase 0.508; AUCMDA 0.624, and AUCthiols 0.641, however ROC curve for the global index (a combined measure of all biomarkers) was 0.742 (95% confidence interval [CI] 0.626–0.858; P < 0.001) with sensitivity of 68.6% and specificity of 68.5%.

Conclusion: The ability of score to detect patients with LVH was high that individual biomarkers. These results suggest that a global index could represent a valuable tool and a promising target in the prevention, diagnosis and the treatment of LVH.
### 4415

**High-dose Nitroglycerin Administered during Rewarming Preserves Erythrocyte Deformability in Cardiac Surgery with Cardiopulmonary Bypass**

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**Background and Goal of Study:** It remains unclear whether exogenous nitric oxide affects the molecular determinants of cellular deformability and improves red blood cell deformability in cardiac surgery with cardiopulmonary bypass. We aimed to determine whether high-dose nitroglycerin, a nitric oxide donor, preserves erythrocyte deformability during cardiopulmonary bypass and examine the signaling pathway of nitric oxide in erythrocytes.

**Materials and Methods:** In a randomized and controlled fashion, forty-two patients undergoing cardiac surgery with hypothermic cardiopulmonary bypass were allocated to high-dose (N=21) and low-dose groups (N=21). During rewarming period, patients were given intravenous nitroglycerin with an infusion rate 5 μg/kg-min and 3 μg/kg-min, respectively. Tyrosine phosphorylation level of non-muscle myosin IIA in erythrocyte membrane was used as an index of erythrocyte deformability and analyzed using immunoblotting.

**Results and Discussion:** Tyrosine phosphorylation of non-muscle myosin IIA was significantly enhanced after bypass in high-dose group (3.729 ± 1.700 folds, p = 0.001) but not in low-dose group (1.545 ± 0.595 folds, p = 0.076). The identity of pre-capillary resistances (Ra, Rv) and postcapillary resistances (Ra, Rv) in the DF and SF groups indicates that the differences in systemic vascular resistance (SVR) in DF from SF on the 1st and 4th stages significantly better than the right ventricular pumping ratio (RVPR) in the group of DF at all stages of the study and the physiological dead space (Vd) shows the inclusion in the organization-level gas exchange blood flow reserve additional regions such as the bronchial blood flow system closely associated with pulmonary blood flow and non-capillary perfusion vessels.

**Conclusion:** The main difference of conditions to maintain effective gas exchange in the lungs with the DF is the inclusion in the gas exchange in addition to the pulmonary blood flow vessels systemic blood flow vessels (bronchial blood flow and extracapillary perfusion) which are dilated under the DF in comparison with SF allowing DF to show cardioprotective properties in comparison with IF and SF more effectively.

### 4656

**Assessment of the effect of inhalation anesthetics to the efficiency of gas exchange in thoracic surgery**

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**Background and Goal of Study:** Maintenance of effective gas exchange in thoracic surgery using one-lung ventilation during general anesthesia with halogen anesthetics is one of the priorities.

**Materials and Methods:** 60 patients were included to the study. All patients were undergone to general anesthesia with CMV and endobronchial intubation; as a hypnotic component were used desflurane (DF, n=23), sevoflurane (SF, n=14), isoflurane (IF, n=23, retrospective group). According to the study stages, the indicators of systemic, pulmonary, intracardiac hemodynamics (Swan-Ganz), gas exchange and metabolism from the radial artery and mixed venous blood were analyzed. Stages of the study: stage 1- after anesthesia induction, both lungs ventilation (CMV); stage 2 - one-lung ventilation (OLV) not less 30 minutes; 3 and 4 stages – 60 and 80-120 minutes of OLV respectively; stage 5: 20-30 minutes after returning to both lungs ventilation (CMV).

**Results and Discussion:** The severity of changes in systemic, pulmonary hemodynamics and gas exchange hadn’t significant differences. The identity of pre- and postcapillary resistances (Ra, Rv) in the DF and SF groups indicates that the difference in the gas exchange level isn’t determined by the state of pulmonary gas exchange blood flow. Differences in systemic vascular resistance (SVR) in DF from SF on the 1st and 4th stages significantly better than the right ventricular pumping ratio (RVPR) in the group of DF at all stages of the study and the physiological dead space (VD) shows the inclusion in the organization-level gas exchange blood flow reserve additional regions such as the bronchial blood flow system closely associated with pulmonary blood flow and non-capillary perfusion vessels.

**Conclusion:** The main difference of conditions to maintain effective gas exchange in the lungs with the DF is the inclusion in the gas exchange in addition to the pulmonary blood flow vessels systemic blood flow vessels (bronchial blood flow and extracapillary perfusion) which are dilated under the DF in comparison with SF allowing DF to show cardioprotective properties in comparison with IF and SF more effectively.
The changes of pulmonary circulation in pregnant rats with PAH during the post-partum period

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Background and Goal of study: Maternal mortality of pregnant women with PAH remains high nowadays, especially during the post-partum period. We plan to observe the changes on pulmonary circulation in pregnant rats with PAH during the post-partum period in order to contribute to further study on the exact cause of death.

Materials and Methods: 120 female rats were randomly assigned into 2 groups: In pregnant MCT group, we performed MCT(40 mg/kg) subcutaneously over necks of the rats at 7 weeks old. Pregnant group was the control group and we only used saline in the same dose. The rats of both groups mated at 8 weeks old. Hemodynamic data and pulmonary tissues of the successful mated rats were collected at 12 weeks old(T1), 1 day after termination of pregnancy(T2), 3 days after termination of pregnancy(T3), 7 days after termination of pregnancy(T4). At last we had 15 samples at each time point from both two groups.

Results and Discussion: Compared to control group, pregnant group had greater PAP (p<0.01), PVR (p<0.05), relative medial thickness (p<0.05), occluded arterial density (p<0.001), as well as lower non-thickened arteries density (p<0.001) at each time point. Compared with data at T1, PAP and PVR at T2, T3 and T4 had no significant changes in pregnant group (p > 0.05), but increased gradually in pregnant MCT group (p<0.05). Compared with data at T1, relative medial thickness and non-thickened arteries density of both groups at T2, T3 and T4 had no significant changes (p > 0.05), but occluded arterial density of the pregnant MCT group at T2, T3 and T4 increased significantly (p<0.05). We noted prominent proliferative and occlusive changes in pulmonary arteries, which lead to increased PVR during pregnancy. There was no significant proliferative changes after pregnancy, but PVR increased gradually. It is noteworthy occluded arterial density increased significantly after pregnancy. Proliferation in pulmonary arteries were very difficult to change in a short time, but the occluding of the pulmonary arteries could be affected by many other factors. We considered there might be some factors that could dilate pulmonary arteries, and might weakened or disappeared after pregnancy, which cause occluded arterial density and PVR increase.

Conclusions: PVR increased gradually in pregnant rats with PAH during the post-partum period. Further etiological research may contribute to improve survival outcome of pregnancy with PAH.

Materials and Methods: 14 pigs were analyzed (FCV n=6, PCV n=8). Animals in the FCV group were ventilated with flow controlled ventilation (FCV) compared to standard of pressure controlled ventilation (PCV) – preliminary data of a prospective, randomized porcine study

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Background: Flow controlled ventilation is a ventilation method established to guarantee a continuous stable flow during the whole ventilation cycle. Additionally, in FCV direct intrathoracic pressure measurement allows to determine lung mechanic limits and therefore individually optimize ventilation. Aim of this study was to investigate FCV compared to PCV in a porcine model of simulated thoracic surgery requiring one lung ventilation (OLV).

Methods: Thoracic surgery was simulated with left sided thoracotomy and collapse of the left lung after the left main bronchus was blocked with an endotracheal bronchus-blocker. After 3 hours of OLV the bronchus-blocker was removed and double lung ventilation (DLV) observed for one hour. Ventilation was performed with compliance guided PEEP and peak pressure settings in PCV. FCV was established with compliance guided PEEP setting and peak pressure set to achieve a tidal volume of 7 ml kg⁻¹ at baseline (BL), DLV and 6 ml kg⁻¹ during OLV.

Results: 14 pigs were analyzed (FCV n=6, PCV n=8). Animals in the FCV group maintained normocapnia despite a significantly lower respiratory minute volume (8.1±0.1 vs. 11.6±0.4 l min⁻¹, p<0.001) compared to the PCV group, where permissive hypercapnia had to be accepted during OLV (paCO2 30.6±2.1 vs. 52±2.2 mmHg, p<0.001). Tidal volume was not different (5.0±0.2 vs. 6.0±0.1 ml kg⁻¹, p=0.23) and air trapping was ruled out with repeated measurements of intrapleural PEEP. Horowitz index was comparable in both groups (335±6.3 vs. 307±14.6, p=0.08) as well as pulmonary shunt fraction (5.0±0.8 vs. 7.0±1.9 %, p=0.15) during OLV. After switching to DLV comparable oxygenation was observed in both groups; however, as already observed in OLV, normocapnia was achieved with a significantly lower respiratory minute volume in FCV (7.1±0.48 vs. 11.6±0.27 l min⁻¹, p<0.001).

Conclusion: In this porcine study PCV was able to maintain normocapnia during OLV within a significant reduction of respiratory minute volume, whereas permissive hypercapnia had to be accepted in PCV. We hypothesize this finding is due to active control of expiratory flow, which is a novelty in FCV compared to PCV.

The efficacy of endobronchial blocker ez-blocker for selective lobar ventilation: case report

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Background: One lung ventilation is an anesthesiological technique. Endobronchial blocker is an efficient alternative for one lung ventilation. EZ blocker (EZB) is a Y shape semi rigid endobronchial blocker[1] described by Rispoli et al[2].

Case Report: We report a case of 51 year old man involved in a high impact road accident. TC total body was performed and showed: subdural hematoma in left front parietal region, IV-VII rib fractures, diaphragmatic rupture and herniation of the stomach into the thoracic cavity, hemothorax and left basal pulmonary contusion. He underwent laparoscopic-assisted right hemicolecotomy. The patient was subsequently transported to ICU for acute respiratory failure. The EZB was advanced under fiberoptic guidance (flexible scope Ambu® aScope™ 4 Broncho Slim 3.8/1.2) into the tracheostomy tube until the carina of left mainstem bronchus was visualized. Then the cuff was alternative inflated to achieve selective and sequential ventilation of superior and lower left lobe. This also allowed the surgeon to reach the lesions intraoperative. After identifying pulmonary lesions (two anterior and one posterior on the left superior lobe), the suture of lung lacerations was made. The lesions of upper lobes were already dealt with under fiberoptic guidance (flexible scope Ambu® aScope™ 4 Broncho Slim 3.8/1.2) into the tracheostomy tube until the carina of left mainstem bronchus was visualized. Then the cuff was alternative inflated to achieve selective and sequential ventilation of superior and lower left lobe. This also allowed the surgeon to reach the lesions intraoperative. After identifying pulmonary lesions (two anterior and one posterior on the left superior lobe), the suture of lung lacerations was made. The lesions of upper lobes were already dealt with.

Discussion: This is the first report describing use of EZB for selective and sequential lobar exclusion. It is an attractive approach in patients with low breathing reserve and when it is not possible to detect preoperatively lesions’ site.

References:

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Improved decarboxylation in one lung ventilation with flow controlled ventilation (FCV) compared to standard of pressure controlled ventilation (PCV) – preliminary data of a prospective, randomized porcine study

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Background: Flow controlled ventilation is a ventilation method established to guarantee a continuous stable flow during the whole ventilation cycle. Additionally, in FCV direct intrathoracic pressure measurement allows to determine lung mechanic limits and therefore individually optimize ventilation. Aim of this study was to investigate FCV compared to PCV in a porcine model of simulated thoracic surgery requiring one lung ventilation (OLV).

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Results: 14 pigs were analyzed (FCV n=6, PCV n=8). Animals in the FCV group maintained normocapnia despite a significantly lower respiratory minute volume (8.1±0.1 vs. 11.6±0.4 l min⁻¹, p<0.001) compared to the PCV group, where permissive hypercapnia had to be accepted during OLV (paCO2 30.6±2.1 vs. 52±2.2 mmHg, p<0.001). Tidal volume was not different (5.0±0.2 vs. 6.0±0.1 ml kg⁻¹, p=0.23) and air trapping was ruled out with repeated measurements of intrapleural PEEP. Horowitz index was comparable in both groups (335±6.3 vs. 307±14.6, p=0.08) as well as pulmonary shunt fraction (5.0±0.8 vs. 7.0±1.9 %, p=0.15) during OLV. After switching to DLV comparable oxygenation was observed in both groups; however, as already observed in OLV, normocapnia was achieved with a significantly lower respiratory minute volume in FCV (7.1±0.48 vs. 11.6±0.27 l min⁻¹, p<0.001).

Conclusion: In this porcine study PCV was able to maintain normocapnia during OLV within a significant reduction of respiratory minute volume, whereas permissive hypercapnia had to be accepted in PCV. We hypothesize this finding is due to active control of expiratory flow, which is a novelty in FCV compared to PCV.
Severe Refractory Acidosis During Extrapleural Pneumonectomy

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Background: We exposed a case of acute respiratory acidosis despite lung recruitment maneuvers during a extrapleural pneumonectomy.

Case Report: A 68-year-old male, COPD with Adenocarcinoma T4N2M0 was indicated left pneumonectomy. Spirometry and ergometry: FEV1/FVC 74, FEV1 68%, basal DlCO 68%, VO2max >13mL/min/kg. Selective ventilation was done, using a double-lumen left tube. Protective ventilator parameters were initiated, obtaining a peak pressure (Pp) 29 cmH2O, plateau pressure (Ppl) 25 cmH2O and driving pressure (DP) 17 cmH2O. Despite optimization of respiratory rate and PEEP, hypoxemia persisted. Rapid one lung collapse (OLC) and hemodynamics disturbances were observed. Fluidotherapy was not effective and norepinephrine was initiated. Extrapleural pneumonectomy with wide resection of chest wall and pericardium was performed. In the ICU, weaning was unsuccessful and he started with atrial fibrillation (Afib) with rapid ventricular response, multiorgan dysfunction and death.

Oxygen reserve index (ori) during one lung ventilation in patients undergoing thoracic surgery

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Background and Goal of Study: Rapid one lung collapse during thoracic surgery disturbs cardiovascular system and gas exchange. Oxygen reserve index (ORI) is a novel, noninvasive and sensitive parameter to measure of patient’s oxygen status in moderate hyperoxia with PaO2 ranges between 100 and 200 mmHg. It’s decrease below 0.24 suggests a fall of PaO2 below 100 mmHg with SpO2 > 98% [1]. The aim of this study was to compare the changes in ORI and SpO2 in patients undergoing thoracic surgery with one lung ventilation.

Materials and Methods: Adult patients undergoing thoracic surgery due to lung tumour were enrolled. A general anaesthesia and mechanical ventilation with FiO2 1.0 were used during anaesthesia and surgery. ORI and SpO2 were measured using Masimo device in seven time points: 1/ just before anaesthesia, 2/ just after the beginning of one lung ventilation, 3/ just after the end of one lung ventilation, 4/ just after lung re-expanded and 7/ after surgery and anaesthesia.

Results and Discussion: 39 patients (15 female and 24 male) aged 43 – 86 were studied. At time point 1, median value of ORI and SpO2 were 0.62 [0.47; 0.7; quartile 1 and 3] and 100% [99, 100], respectively. ORI decreased from time points 2 to 5 and 7. The greater decrease was noted at time point 4. (Figure1) ORI correlated with SpO2 at time points 4 and 7 (r = 0.4, p < 0.05 and r = 0.5, p < 0.001, respectively).

Conclusion: One lung ventilation impair patients oxygen status measured with ORI. Decrease in patients oxygen status correspond with SpO2 only during one lung ventilation and after anaesthesia and surgery.

References:

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Comparative effects of flow- vs. volume-controlled one-lung ventilation on respiratory variables in normo- and hypovolemic pigs

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Background and Goal of Study: Flow-controlled ventilation (FCV) enables the control of inspiratory and expiratory flow. Since the decrease in airway pressure is constant during expiration, FCV can improve gas exchange and reduce mechanical power. We hypothesized that one-lung ventilation (OLV) with FCV improves the arterial partial oxygen pressure (PaO2) compared with volume-controlled ventilation (VCV) in normo- and hypovolemic pigs.

Materials and Methods: We randomly assigned 16 juvenile anaesthetized pigs to one of two groups (n=8/group): 1) intravascular normovolemia and 2) intravascular hypovolemia. For induction of hypovolemia, 25% of the calculated blood volume (blood volume=70 ml/kg x body weight) was drawn through a central venous line. A right-sided thoracotomy was performed and 0.5 µg/kg/h E. coli lipopolysaccharide continuously infused. Subsequently, animals received OLV according to one of two sequences (60 min/ each mode, random sequence): I) VCV-FCV, II) FCV-VCV. Tidal volume of 5 ml/kg, fraction of inspired oxygen (FiO2)=1.0 and positive end-expiratory pressure (PEEP) of 5 cmH2O were used. Gas exchange, hemodynamics, respiratory variables and regional distribution of ventilation (electro impedance tomography) were determined every 20 min.

Results: PaO2 did not differ between modes (P=0.881). In the normovolemia group during FCV, the corrected expired minute volume (P=0.022) and PEEP (P=0.001) were lower compared with VCV. The minute volume (P=0.001), respiratory rate (P=0.001), total PEEP (P=0.001), and mechanical power (P≤0.001) were lower during FCV than VCV irrespective of the volemia status. The distribution of ventilation along the ventro-dorsal axes (centre of ventilation) did not differ between ventilation modes (P=0.103).

Conclusion: In normo- and hypovolemic pigs under OLV, FCV reduced the mechanical power compared with VCV, without effects on oxygenation. In normovolemic pigs, the efficiency of ventilation was higher in FCV compared to VCV.
A randomised controlled trial comparing high-flow nasal oxygen with standard oxygen therapy for conscious sedation during transfemoral transcatheter aortic valve implantation

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Background and Goal of Study: Transfemoral transcatheter aortic valve implantation (TAVI) is increasingly popular as a minimally invasive alternative to surgical aortic valve replacement in patients with symptomatic severe aortic stenosis. Conscious sedation and regional anaesthesia is preferred to general anaesthesia. Hypoxia commonly occurs and is confounded by patient comorbidities, supine procedural positioning and possible deep sedation. The aim of our study was to determine whether high-flow nasal oxygen (HFNO) improves gas exchange as measured by arterial PaO2. Secondary outcomes included intraoperative cerebral desaturation and neurological events during valve deployment, perioperative oxygen therapy duration, hospital length of stay, patient device satisfaction scores and complications.

Materials and Methods: We carried out a randomised controlled trial from 1 June 2019 to 1 April 2021. Ethical approval and written informed consent were obtained. 66 patients will be randomised to either HFNO (50-70L/min, FiO2 0.3, Opliflow®; Fisher and Paykel, Auckland) or standard oxygen therapy (SOT; nasal cannula, 2-8 L/min, FiO2 0.3). Conscious sedation with remifentanil infusion titrated to a Ramsay sedation score of 2-3 and regional anaesthesia were provided. Arterial blood gases were performed at induction and at 30-minute intervals. The study is powered for a 30% increase in PaO2, from a baseline of mean (SD) 10.1 (5.2) kPa; with an alpha of 0.05 and with 90% power. Interim analysis of 25 patients was performed using descriptive statistics, X2-chi squared test and linear regression from Prism 8 (GraphPad Software Inc., California, USA).

Results and Discussion: Demographic and clinical variables were comparable between the groups. Table 1 shows the comparison of primary and secondary outcomes between the HFNO and SOT groups. There was no significant difference between the remaining outcomes.

Table 1: Comparison of primary and secondary outcomes in HFNO vs SOT group. Values are mean (SEM), number (proportion) or median (IQR: range).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>HFNO (n=12)</th>
<th>SOT (n=13)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial PaO2 (kPa)</td>
<td></td>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td>Induction</td>
<td>15.2 (7.6)</td>
<td>12.45 (0.85)</td>
<td></td>
</tr>
<tr>
<td>30 minutes</td>
<td>13.67 (1.17)</td>
<td>12.45 (0.85)</td>
<td></td>
</tr>
<tr>
<td>60 minutes</td>
<td>12.93 (1.57)</td>
<td>11.73 (0.34)</td>
<td></td>
</tr>
<tr>
<td>Cerebral desaturation and asystole</td>
<td></td>
<td>13.40 (1.04)</td>
<td></td>
</tr>
<tr>
<td>(%)(&lt;80)</td>
<td>13.40 (1.04)</td>
<td>12.40 (0.41)</td>
<td></td>
</tr>
<tr>
<td>Patient device satisfaction time</td>
<td></td>
<td>2 (1-2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>(seconds)</td>
<td>2 (1-2)</td>
<td>2 (1-3)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Conclusion: HFNO significantly improved oxygenation, reduced perioperative duration of oxygen therapy, was associated with less neurological events and higher patient device satisfaction scores in this cohort.

4559

Dynamic description of hemodynamic variables during lung resection surgery

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Background: During lung resection surgery, patient is in lateral position, open chest and one-lung ventilation with tidal volume (VT)=8ml/kg. Under these conditions, dynamic pulse parameters are not validated. Our objective is to make a description of the evolution of hemodynamic variables at different times studied during lung surgery.

Materials and Methods: Observational and unencinted study approved by Scientific Committee of Clinic Hospital of Valencia. We included 25 patients scheduled for lung resection surgery. Monitoring with transpulmonary monitor PiCCO (Pulsion Medical Systems) to obtain cardiac output (CO) and hemodynamic parameters. Data collection times: T1: 10 min after anesthetic induction, bipulmonary ventilation (VT 8ml / kg), supine position and closed chest.T2: supine position with one-lung ventilation (VT 6ml/kg) and closed chest.T3: lateral position, bipulmonary ventilation (VT 8ml/kg), closed chest.T4: lateral position, one-lung ventilation (VT 6ml/kg), closed chest. T5: lateral position, one-lung ventilation (VT 6ml/kg) after 15 min with open chest. Hemodynamic variables of figure 1 were collected. We analyze the correlation and mixed linear regression between hemodynamic variables at different times.

Results: Pulse pressure variation (PPV) correlation coefficients showed statistically significant differences between times T1-T2 (r=0.58; p-value=0.008), T1-T3 (r=0.70; p-value<0.001) and T3-T4 (r=0.70; p-value<0.001). In interval T3-T4 a negative significant difference. (p=0.01, 95%CI [-6.23,-0.55]). Pearson's correlation of stroke volume variation (SVV) was statistically significant between times T1-T3 (r=0.78; p-value <0.001) and T3-T4 (r=0.70; p-value <0.001). In the interval T3-T4 a negative significant difference. (p=0.01, 95%CI [-5.16, 0.15]; p-value=0.07). In other mixed linear regression model, non-significant differences were found. However, a negative difference of 3.39% (variation percentage -27%) was estimated with statistically significant difference. (p=0.01, 95%CI [-6.23,-0.55]).

Conclusion: HFNO significantly improved oxygenation, reduced perioperative duration of oxygen therapy, was associated with less neurological events and higher patient device satisfaction scores in this cohort.

4538

Swan-Ganz fracture in an open heart surgery

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Background: The Swan-Ganz (SG) catheter has been replaced by less invasive monitors. Young doctors have less experience of placing and handling complications. We report a case of SG fracture in the cardiac surgery with delayed notice.

Case Report: The 51-year-old man had rheumatic heart disease and MV prolapse for 5 years under control. He had fever and exertional dyspnea after dental treatment. IE with severe MR was diagnosed by TEE. After antibiotics treatment, he still had severe MR and fatigue easily. Therefore, he was scheduled for MV repair. The patient received GA with invasive monitors as arterial blood pressure and SG catheter smoothly. His initial PA pressure was 29/19 mmHg. The surgical procedure was follow by sternotomy, aortic cannulation, right atrium two incisions for SVC and IVC cannulations, hypothermia and antegrade cardioplegia with CPB support. Left atrium was cutted for detachment SG catheter during aortic repair with a ring. Due to the small size of artery, we cutted catheter during cannulations.

Results: He was discharged 5 days after surgery.

Discussion: Complications of SG catheter include life threatening PA rupture, dysrhythmia, thrombosis and technique complications. Our case had accidental cutted catheter during cannulations.

References:

Learning points: Early evaluation of blood from wrong lumen though it could clot after protamine reversal. Low PA pressure could be another hint for incorrect position of SG catheter.
Impact of aortic insufficiency due to percutaneous left ventricular assist device on haemodynamics: A retrospective study

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Background and Goal of Study: Impella® is an antegrade left ventricular assist device with a pump catheter used in the left ventricle. Impella is placed across the aortic valve leading to a potential risk of aortic insufficiency (AI). Consequently, total flow of Impella may not be enough to the end-organ. Few studies have evaluated AI volume by Impella. Therefore, we evaluated the AI volume in this study.

Materials and Methods: Using medical charts, we collected consecutive patients undergoing Impella 5.0 insertion surgery during April 2016 to September 2019. Patients whose aortic valve didn’t open during systolic phase by echocardiography or pulse pressure < 10 mmHg were reviewed to calculate AI volume accurately. AI volume was defined as difference between the expected flow displayed on the Impella controller (Expected Impella flow) and continuous cardiac output measured by the pulmonary artery catheter (thermodilution technique).

Results and Discussion: Impella 5.0 was inserted in 19 patients, in which nine patients were diagnosed as no spontaneous cardiac output. The median expected Impella 5.0 flow was 4.6 L/min [first quartile, third quartile: 4.4, 4.9 L/min] and the median continuous cardiac output was 3.3 L/min [first quartile, third quartile: 3.1, 3.6 L/min]. The median difference was 1.4 L/min [first quartile, third quartile: 0.5, 1.6 L/min] which was 30.4% of median expected Impella 5.0 flow rate. Moreover, focused on six patients assisted with maximum support level P9 by Impella, the median difference and the portion were 1.5 L/min [first quartile, third quartile:1.3, 1.7 L/min] and 30.9%. The six of nine patients added venoarterial extra-corporal membrane oxygenation (VA-ECMO) for maintaining adequate total blood flow. No patients had AI before Impella 5.0 insertion, but three patients developed mild AI after Impella 5.0 placement.

Conclusion: New-onset AI decreased effective Impella 5.0 flow by 1.4 L/min (30.4%) in patients without spontaneous cardiac output. Some cases need to consider combining with other circulatory assist device such as VA-ECMO.
Unusual suture and migration of a pulmonary artery catheter to the left mammary vein

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Background: Invasive Pulmonary Artery Catheter (PAC) monitoring is frequently used in cardiovascular anesthesia. We report an unusual PAC migration to the left internal mammary vein, which later was accidentally sutured by the wire cerclage for sternotomy during the thoracic closure, in a female patient with history of cardiac surgery underwent a mitral valve replacement.

Case Report: 43 years old woman was scheduled for mitral valve replacement. General anesthesia induction was made. The left jugular vein was cannulated with a high flow catheter echo-guided without complications, continuing with the passage of the PAC, which advanced smoothly. Nonetheless, it was not possible to infuse the balloon, then three attempts to inflate the balloon were made, all unsuccessful. Central venous pressure, ventricular pressure and pulmonary artery pressure were absent, blood return was obtained through all catheter ways. It was decided to fix it at 30 cm. The transoperative process happened without complications. Three days after the surgery the attempt to remove the PAC was unsuccessful, a chest X-ray showed the catheter in an inappropriate location. CT angiography was done showing PAC into the left internal mammary vein, and the image of the cerclage wire was seen adjacent to the catheter. The patient underwent to a second-look surgery, during the procedure, was identified that the catheter was pierced by the wire of the sternal cerclage, the withdrawal was uneventful. The patience had a satisfactory progress and finally discharged in adequate conditions.

Discussion: The migration of a catheter to a lower tributary vein of the brachiocephalic vein is more frequent on the left side for two reasons: first there are more venous branches on the left side, second, the drainage site of these branches is exactly in front of the left internal jugular vein drainage site, where the PAC emerges if it is advanced from the left side.

References:

Learning Points: Before completing a surgical procedure that the PAC is not included in vascular, myocardial or sternal sutures.

5421

Assessing the measurement error of a method to quantify pulse pressure variation (PPV) in atrial fibrillation. Preliminary results

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Background and Goal of Study: We previously presented an algorithm to quantify Ventilation induced Pulse Pressure Variation (VPPV) in patients with atrial fibrillation [1, 2]. While the model showed predictable behaviour in response to volume changes, its precision and accuracy are yet to be determined. This study was designed to assess measurement error of the new algorithm for quantification of VPPV in atrial fibrillation.

Materials and Methods: After ethical approval and written informed consent we retrospectively built a database of perioperative haemodynamic records of patients with atrial fibrillation under general anaesthesia with full mechanical ventilation. From each subject, a stable data segment of 60s was randomly selected to calculate VPPV (VPPValgorithm). Replicates were then generated (VPPVrepl) from the original parameter (VPPValgorithm), by omitting 1 value of the original dataset for each reanalysis ( Jackknife technique). The aggregate of the replicates was used to assess bias and variance of calculated VPPValgorithm. Both measures of uncertainty were checked for proportionality.

Results and Discussion: Twenty-one patients were selected. The values of VPPValgorithm ranged from 0% to 43%. The bias, assessed as the difference between the mean of VPPVrepl and the VPPValgorithm , was 0 % (sd 0.4%). The coefficient of variation (CV), calculated as standard deviation of VPPVrepl divided by the mean of VPPVrepl , ranged from 0.02 to 5.63. There was a significant inverse relation between CV and the VPPValgorithm. (see figure). A non-linear least squares regression analysis revealed that CV rapidly regressed towards 0.09 (+/- 0.06).

Conclusion: Our preliminary findings show that, using a jackknife resampling technique, the new algorithm provides reliable measurements with minimal bias and an acceptable CV.
Cardiac tamponade after central venous catheterization: a report of two clinical cases


Background: Central venous catheter (CVC) is an indispensable tool in the management of critical patients. Of its complications, cardiac tamponade is one of the most life-threatening with an incidence of 0.2% and a mortality around 90%. Daily use of these devices and the terrible prognosis of this complication, turn it into a significant iatrogenic injury.

Case Report: Case 1: 67 yo woman having emergency surgery because of a bowel obstruction. A peripheral access CVC was catherized through basilic vein. After 36 hours, she had hypotension, profound sweating, poor general health and hypoventilation. A thorax x-ray and a CT-scan showed an hypotensive and extremely bradycardic needing the rapid response team for his stabilization. The CT showed that the dialysis catheter was at the inferior cava and the optimal catheterization and the best manage of any CVC. The use of ultrasound, the x-ray verification and the clinical suspicion play an important role in the prevention of these complications.

Learning points: This conditions should be assumed and noticed quickly and prompt reaction is required.

References:

Cardiac, Thoracic and Vascular Anaesthesiology

Microvascular effects of hypoxia, hyperoxia, hypocapnia and hypercapnia measured by vascular occlusion test in healthy volunteers: a post-hoc analysis


Background & Goal of Study: Changes in oxygen and carbon dioxide concentrations in blood or tissues are common during general anaesthesia. Tissue oxygen saturation (SIO2) can be measured by near-infrared spectroscopy during ischaemic provocation of the microcirculation by a vascular occlusion test (VOT). During occlusion one can estimate muscle oxygen consumption (downslope angle), after occlusion microvascular reactivity (recovery angle) followed by hyperperfusion (post-ischaemic hyperaemia phase). We aimed to assess whether hypoxia and hypercapnia will affect any of these variables.

Materials & Methods: Twenty healthy volunteers were included after local IRB approval in this observational study. A four-minute VOT was performed on the lower arm with SIO2 measured ipsilaterally on the thenar muscle. VOTs were performed at room air (baseline), during hyperoxia (FO2 1.0), mild hypoxia (FO2 0.14), and after a second baseline VOT, during hypocapnia (etCO2 2.5-3.0 vol%) and hypercapnia (etCO2 7.0-7.5 vol%) at room air. Downslope angle was measured in decline of SIO2 in %/min, recovery angle as incline in %/sec, and the area under the curve of the post-ischaemic hyperaemia phase (AUC-H) as absolute values. We of these devices and the early check of its position, with the aim of diminish the complications associated with this technique done frequently in our care units.

References:

4572

Preoperative use of angiotensin-converting enzyme inhibitors versus angiotensin receptor blockers: Is there any difference in postoperative renal function after elective cardiac surgery procedures?


Background and Goal of Study: Our aim was to investigate if there is any difference in postoperative renal effects between angiotensin-converting enzyme inhibitors (ACEI) and angiotensin receptor blockers (ARBs) in cardiac surgical patients.

Materials and Methods: Patients who underwent cardiac surgery procedures with the use of cardiopulmonary bypass in our Cardiothoracic Department from February 2016 to April 2019 were retrospectively investigated. Patients were divided in 2 groups based on preoperative medication: ACEI group and ARBs group. The following postoperative factors were investigated: Acute kidney injury (AKI- KDIGO criteria), need for renal replacement therapy because of AKI (RRT) and e-GFR decline during hospital stay (Exit GFR < GFR at admission). MDRD formula was used for estimation. Chi-square test was used for statistical analysis.

Results and Discussion: After excluded 58 urgent/emergent cases, 1760 patients were investigated. A total of 1062 patients were ACEI or ARBs preoperative users. ACEI group consisted of 635 patients [mean age 65.5±9.6, mean Euro score II 2.0±1.8 and 224 patients (35.3%) with a history of Diabetes mellitus]. ARBs group consisted of 427 patients [mean age 68.2±9.1, mean Euro score II 2.3±3.1 and 158 patients (37%) with a history of Diabetes mellitus]. Results are shown in table 1.

Conclusion: No statistical significant difference was found between ACEI and ARBs preoperative users regarding the postoperative incidence of AKI, AKI requiring renal replacement therapy and the decline in e-GFR during hospital stay.
analysed the data using repeated measures ANOVA.

**Results:** The values of the sequential VOT procedures are shown in Table 1. Hypoxia and hyperoxia did not influence the slope and recovery angles. In contrast, the AUC-H during hypoxia was lower when compared to baseline and hyperoxia (Table 1, p<0.005), indicating less hyperperfusion after ischaemia occurred. Neither hypoxacapnia nor hypercapnicapnia influenced any of the VOT characteristics.

**Conclusion:** In healthy volunteers at rest, exposure to either hypoxia, hyperoxia, hypoxacapnia and hypercapnicapnia did not influence microvascular O2 consumption or reactivity. Apart from hypoxia, none of the instances influenced post-ischaemic haempermeability.

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### 4573

**The effect of low dose Dexmedetomidine on the incidence of Acute Kidney Injury (AKI) in cardiac surgery: Secondary subanalysis of a randomized clinical trial**

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**Background and Goal of Study:** Cardiac surgery-associated AKI can occur in up to 30% of the patients. A meta-analysis showed that Dexmedetomidine (DEX) decreased cardiac surgery-associated AKI. We investigated the effect of the low dose DEX on the incidence of AKI in cardiac surgery.

**Materials and Methods:** This is a secondary subanalysis of a randomized double-blind trial of DEX vs Placebo (PL) in patients ≥ 60 y undergoing surgery with cardiopulmonary bypass (CPB) (NCT03388541). At the closure of chest, patients either received a continuous infusion of PL or DEX at a concentration of 0.4μg/kg/h. The study drug was administered at 5ml/h during 10h in all patients. AKI was defined according to RIFLE classification. The criteria that led to the worst possible classification during the entire hospital stay were used. A Mann-whitney U test, a Chi square or Fisher’s Exact test were used to compare both groups.

**Results and Discussion:** 420 patients were randomized (210 each group). 12 subjects did not receive the study medication for various reasons. Table 1 shows patients’ characteristics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>PL (N=203)</th>
<th>DEX (N=205)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(y)</td>
<td>70(65-76)</td>
<td>71(66-75)</td>
<td>0.943</td>
</tr>
<tr>
<td>Baseline sCr/crea</td>
<td>1.0 (0.88-1.2)</td>
<td>1.01 (0.86-1.7)</td>
<td>0.996</td>
</tr>
<tr>
<td>Baseline GFR</td>
<td>72(57-84)</td>
<td>71(68-84)</td>
<td>0.843</td>
</tr>
<tr>
<td>Euroscore%</td>
<td>1.99 (1.15-3.59)</td>
<td>1.75 (1.11-3.50)</td>
<td>0.551</td>
</tr>
<tr>
<td>CPB time(min)</td>
<td>104(78-131)</td>
<td>96(73-127)</td>
<td>0.256</td>
</tr>
</tbody>
</table>

Data are expressed in median(P25-P75) and N(%). Table 2 illustrates the incidence of RIFLE criteria.

**Conclusion:** Our results show no difference in the incidence of AKI between patients receiving DEX vs PL. However AKI in this study occurred in a low percentage of patients and the study was not powered for this subanalysis.

**References:**

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### 4839

**Hemolysis in patients undergone cardiac surgery required cardiopulmonary bypass; its association with postoperative acute kidney injury**

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**Background and Goal of Study:** Postoperative acute kidney injury (pAKI) is common after cardiovascular surgery (CVS) with cardiopulmonary bypass (CPB). Hemolysis due to CPB leads to an increase of plasma free hemoglobin (fHb). If serum haptoglobin (Hp), which is a fHb scavenger, is not high, excess fHb may cause nitric oxide depletion and vascular dysfunction, which may contribute to risk of pAKI. This prospective study aims to observe perioperative fHb and Hp, and to assess those associations with the risk of pAKI in this cohort.

**Materials and Methods:** We screened patients planned CVS required CPB from 2016 to 2019 in our hospital. We excluded patients with preoperative serum creatinine level over 2mg/dl. We measured fHb and Hp concentrations at the following 6 points: after anesthesia induction, 60 and 120 minutes after initiation of CPB, 30 and 120 minutes after wean from CPB, and at postoperative day 1. We defined pAKI according to AKIN criteria (an increase in creatinine level of 0.3 mg/dl or more above the preoperative value, or an increase of 50% or more). We divided patients into groups with and without pAKI. The comparison of changes in fHb and Hp concentration between two groups was performed using two way repeated ANOVA. Additionally, perioperative maximum fHb concentration (Max-fHb) was compared using t-test. A P value<0.05 was defined as a statistically significant difference.

**Results and Discussion:** We included 102 patients in this study, and 38 patients who received haptoglobin administration were excluded. Finally, 64 patients were included in the analysis. pAKI occurred in 21 patients (32.8%). Perioperative fHb concentration in AKI group was significantly higher than that in non-AKI group (p=0.0001) (figure A). Max-fHb in AKI group was 0.13±0.04g/dL, which was significantly higher than 0.087±0.04g/dL in non-AKI group (p<0.001). Perioperative Hp concentration in AKI group was significantly lower than that in non-AKI group (p=0.03) (figure B). These results may suggest the potential association of hemolysis with the risk of pAKI.

**Conclusion:** Increased fHb and decreased Hp were significantly associated with the risk of pAKI in patients with CVS requiring CPB.

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### 4355

**Management of General Anesthesia in a Patient with COL4A1 Mutation During Cardiac Surgery: a case report**

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**Background:** COL4A1 mutation was recently identified as a monogenic cause of the basement vascular membranes, which results in small vessel disease including hemorrhagic stroke, arteriovenous malformation, and aneurysms. There is no report on general anesthesia for cardiac surgery in a patient with COL4A1 mutation. In this report, we describe the case of a child with COL4A1 mutation who required general anesthesia for cardiac surgery.

**Case Report:** A 2-year-old male with a history of porencephaly, epilepsy controlled on antiepileptic drugs, left ventricular outflow tract obstruction (LVOTO) and moderate mitral regurgitation secondary to hypertrophic obstructive cardiomyopathy required cardiac surgery for worsening LVOTO. He was diagnosed with COL4A1 mutation with a genetic test at 3 months. At 2 years of age, he had a pneumonia that had
caused acute worsening of his LVOTO that did not improve upon resolution of his pneumonia. LVOT velocity was 4.0-6.5 m/s and the mean LVOT pressure gradient was 80-130 mmHg. He required resection of left ventricular abnormal myocardium and mitral valve repair. Of note, the patient had history of rhabdomyolysis with respiratory infections. General anesthesia was therefore induced by fentanyl, midazolam, rocuronium, and was maintained with continuous dosing of remifentanil, midazolam, and a bolus of rocuronium. Resection of left ventricular abnormal myocardium and edge-to-edge repair for the mitral valve was performed. LVOT velocity declined to 2.0 m/s. His perioperative course was uneventful.

Discussion: This is the first report of general anesthesia for cardiac surgery in a patient with COL4A1 mutation. The relationships between COL4A1 mutation and congenital heart disease or rhabdomyolysis have not been previously reported. Patients with COL4A1 mutation present with a variety of clinical features because of abnormalities in the structural integrity of the basement vascular membranes. They should be individually evaluated and carefully managed in the perioperative period according to their specific risk profile.


Learning points: Patients with COL4A1 mutation have an increased risk of intracranial hemorrhages so it is vital to maintain a normal perioperative blood pressure.

5739

Prediction model with panel data to calculate the risk score of acute kidney injury after cardiac surgery with cardiopulmonary bypass

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Background and Goal of Study: Cardiac surgery with cardiopulmonary bypass affects renal function in short and long time period. Incidence rate of acute kidney injury (AKI) following cardiac surgery is 5-30%. It is said that 1-2% of the AKI patients need renal replacement therapy after cardiac surgery. However, to predict AKI after cardiac surgery is difficult due to postoperative hemodilution. Currently, panel data such as continuous vital signs are essential features for personalized healthcare. The aim of this study was to determine the predict factors of AKI and to construct the model with panel data to calculate the risk score of AKI with using panel data such as continuous vital signs.

Materials and Methods: We retrospectively collected data of patients who underwent cardiac surgery with cardiopulmonary bypass at Yokohama city university hospital from 2017 June to 2019 Sep. AKI was defined by the KDIGO criteria using the change of sCr from baseline:. (1) increment of ≥0.3mg/dl (within 48 hours) (2); increment of ≥150% (within 7 days). Patients were divided into AKI and non-AKI group, and we collected the trend patterns of vital signs (systolic and diastolic blood pressure, heart rate and respiratory rate) about the two groups. In this report, we applied a functional logistic regression for constructing a model to predict AKI. All repeated measurements of vital signs were incorporated into the model as smoothed curves, and patients were classified into two groups by the estimated model which used diastolic blood pressure, systolic pressure and heart rate. Both groups experienced growth of sCr level at 24 hours and its decline at 48 hours after surgery. More significant hemodilution in study group led to decrease in sCr for 18% from baseline compared to 6% change in control group. Trend in lactate change was almost equal in both groups – 5% growth after the surgery, 21% and 29% decline in 24 hours, and 10% increase during the next 24 hours. Overall level of lactate in absolute units in study group was higher. In both groups the maximum of lactate level was observed at the time of the end of the surgery and the maximum of sCr – after 24 hours. There were no significant difference in the difference of lactate in study and control group (p-value – 0.95).

Conclusion: There were no statistically significant difference in the rate of AKI in neonates after cardiac surgery with CPB with UB or donor’s blood. More significant hemodilution had no results on the rate of AKI in neonates. Higher levels of the lactate level in study group had no effect on the AKI, it may be assumed that the lactate level is the result of higher level of fetal HB, but this statement needs to be studied more.

6333

Use of Modern hydroxethyl starch and Acute Kidney injury after cardiac surgery in high-risk patients: a prospective multicenter cohort

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Background and Goal of Study: Cardiac surgery-associated acute kidney injury (CSA-AKI) is associated with increased short- and long-term mortality. Data on the intraoperative and postoperative use of modern tetrastarch products in the cardiac surgical setting are limited. Given the uncertain generalizability of data from critically ill patients to the surgical population, we conducted a multicenter prospective cohort study to determine the association of intraoperative and postoperative modern tetrastarch (6% HES 1300/4) use, with postoperative renal failure in high-risk patients undergoing cardiac surgery.

Materials and Methods: This study was a multicentre prospective cohort study at 15 cardiac surgery centres in Spain and in the UK. The study cohort included all consecutive high-risk patients for developing CSA-AKI (Cleveland Score =>4), aged 18 yr or older (n=262) who underwent cardiac surgery between 15th of January 2017 and 15th of September 2018. The cohort was divided into two groups, namely patients who received (n=96) or did not receive (n=166) 6% HES 1300/4 intraoperatively and postoperatively. To confirm these regression-based analyses, we further conducted a complete case analysis – Cox proportional hazards analysis.

Results and Discussion: Of the overall cohort (n=262), 96 (36.7%) were exposed to 6% HES 1300/4 either intraoperatively or postoperatively. Postoperative AKI occurred in 145 patients (55.5%). Patients in the HES group had greater burden of comorbidity (e.g. higher weight, lower estimated Glomerular filtration rate [eGFR], higher chronic kidney disease (CKD) and slightly higher Cleveland score). In the multivariable logistic regression analysis, there is no significant difference between
groups with regard to AKI (OR 0.98, 95% CI 0.95-1.01, p=0.86) and RRT (OR 0.70, 95% CI 0.57-1.15, p = 0.47). In the propensity score matching analysis (n= 94 vs 94), there is no statistically significant difference between groups with regard to neither AKI (OR 0.91, 95% CI 0.77-1.06, p=0.32) nor to RRT (OR 0.95, 95% CI 0.84-1.15, p=0.41). The variables used for the matching were the ones with most clinical impact.

Conclusion: The intraoperative and postoperative use of modern hydroxyethyl starch 6% HES 1300/4 was not associated with increased risks of AKI and dialysis after cardiac surgery in our multicentre cohort of high-risk patients for developing CSA-AKI with Cleveland Score >=4.

6395

Giant axillary pseudoaneurysm in a patient with Alport syndrome

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Background and Goal of Study: describe the anesthetic management of urgent surgery of giant left axillary pseudoaneurysm (PSA) in a patient with Alport syndrome. Materials and Methods: 45-years-old male patient with Alport syndrome who develops long-standing chronic renal failure (CRF), in need of blood dialysis. Renal transplantation is performed 3 times, the last one in 2009, working well. He has previously presented PSA of venous artery fistula (AVF) in upper left limb (MSI) correcte by ligation. Subsequently he develops aneurysm of the brachial artery in MSI performing resection plus axillary brachial graft with PTFE. Currently the patient develops a giant left axillary PSA partially thrombosed, confirmed by angioTAC. It is decided to intervene urgently due to the high risk of breakage. It crosses blood. General anesthesia. Induction by rapid sequence, with propofol, succinylcholine,fentanyl and, maintenance with TCI (target controlled infusion system) f propofol, adjusting the doses according to BIS (bispectral index). The right radial artery, right jugular venous catheter, two peripheral pathways, and bladder catheter are channelled. Open surgery with PSA, resection and aubclavian artery bypass to previous axillary prosthesis. Incident-free procedure, with little bleeding, remaining hemodynamically stable.

Results and Discussion: Alport syndrome is an inherited disease that affects the basement membranes, due to the alteration of type IV collagen. Prevalence of 1:5000. Aneurysms of the thoracic and abdominal aorta have been reported, and a case of intracranial aneurysms. It is associated with progressive glomerular disease, sensorineural hearing loss and eye abnormalities. They need blood dialysis for end-stage renal disease and transplantation when appropriate. Uncommon development of aneurysms or PSA in AVF in the general population. These PSAs can evolve to thrombosis, infection, compression of neighboring structures, compartment syndrome and rupture. In small PSA the treatment is endovascular and in the large it is open surgery.

Conclusion: repeating pseudoaneurysms could be related to Alport syndrome. TIVA-TCI anesthesia with invasive blood pressure control was safe and effective in the case presented.

4591

Impact of gender on postoperative morbi-mortality in cardiac surgery children

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Background and Goal of Study: Impact of gender on postoperative mortality in children undergoing cardiac surgical mortality surgery remains debated (1,2). Most studies have been realized in the US while data for European populations are scarce. This study aims to assess the influence of sex difference on postoperative morbi-mortality in children operated in a tertiary university hospital in Belgium.

Materials and Methods: This retrospective cohort study included all children undergoing cardiac surgery with cardio-pulmonary bypass (CPB) between January 2006 and December 2015. Jehovah’s witnesses’ patients were excluded. Analgesic, CPB and surgical techniques were standardized. The primary objective was a composite outcome comprising in-hospital mortality or severe postoperative morbidity combining at least two of the following events: respiratory, cardiac or renal failure (3). A propensity score has been realized to compare males and females through matching of 11 clinically relevant prooperative variables. After matching, binary variables were compared using logistical regressions and continuous variables using linear regressions. Data are presented as mean ± SD or percentages. A p-value < 0.05 was considered statistically significant.

Results and Discussion: The database included 637 males (30,2 months ± 42,7 ; 11,3 kg ± 13) and 651 females (31,6 months ± 42,5 ; 10,9 kg ± 10,38).

<table>
<thead>
<tr>
<th></th>
<th>Males (n=637)</th>
<th>Females (n=651)</th>
<th>p-value (Adjusted)</th>
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<tr>
<td>Primary Outcome</td>
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<tr>
<td>Morb-mortality (%)</td>
<td>27,1</td>
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<tr>
<td>Secondary Outcomes</td>
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<td>In-Hospital Morbidity (%)</td>
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<td>Neurologic deficit (%)</td>
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<td>5,6</td>
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Conclusion: In the conditions of our study (monocentric, propensity matching and composite outcome), patient's gender does not influence early post-operative morbi-mortality.

References:

4471

Perioperative management for pheochromocytoma resection in a patient with untreated cyanotic congenital heart disease: a case report

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Background: Perioperative management for pheochromocytoma resection remains a challenge for anesthesiologists due to dramatic catecholamine fluctuation during surgery. This report describes an uncommon case of a 22-year-old female patient with pheochromocytoma and cyanotic congenital heart disease. The patient was born with cyanotic congenital heart disease, which might lead to severe problems.

Discussion: Intraoperative monitoring and adequate management may prevent the occurrence of perioperative complications. The patient presented obvious blue lips and clubbing fingers. Norepinephrine was continuously infused after induction to maintain systemic blood pressure. During pheochromocytoma manipulation, ABP drastically increased to 205/108 mmHg and SpO2 dropped to 70%. Nitroglycerin infusion was started and boluses of phentolamine, sodium nitroprusside and esmolol was given. ABP gradually decreased to normal whereas SpO2 was still around 75%. We administered an additional 100 µg bolus of nitroglycerin against to pulmonary vasoconstriction, and SpO2 gradually raised back to 87%. Patient was extubated in the OR and was discharged on postoperative day 13.

Learning points: Physiologic and preparation of pheochromocytoma. Physiologic of untreated congenital cardiac disease (DORV).
5321

Hypophosphatemia following staged surgical palliation of Hypoplastic Left Heart Syndrome

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Background and Goal of Study: Hypophosphatemia is commonly seen in critically ill children and has been shown to hamper clinical recovery. Patients after surgical palliation of HLHS are prone to develop this disturbance as they require large doses of medications known to decrease serum phosphorus levels. Moreover, deleterious effects of hypophosphatemia on the cardiopulmonary system can be especially harmful to those patients.

Materials and Methods: We conducted a retrospective review of the medical records of children consecutively admitted to our PICU between March 2014 to September 2018, who had HLHS. The following data were recorded: age, weight, presence of malnutrition, type of procedure with assigned Aristotle Basic Complexity Score, duration of cardiopulmonary bypass, serum phosphorus and magnesium levels monitored during the first 3 days of PICU admission, hemodynamic parameters, medications, use of blood products, duration of mechanical ventilation and PICU length of stay.

Results and Discussion: 89 children were included in the study, with a median age of 6.4 months (range: 2d - 75.7m). Throughout the study period decreased serum phosphorus levels occurred in 39 patients (44%), and we observed 6 cases of refractory hypophosphatemia, which did not respond to single potassium phosphate infusion. The mean age and weight at the time of the procedure was significantly lower for the hypophosphatemic group and the mean Aristotle Basic Complexity Score (peroperative morbidity, mortality, and technical difficulty of the procedure) was significantly higher. What’s more, epinephrine and dopamine use showed independent association with hypophosphatemia.

Conclusion: Hypophosphatemia is highly prevalent in children after staged surgical palliation of HLHS. Given the greater susceptibility and potential complications, serum phosphorus levels should be routinely measured after the surgery, so that appropriate replacement therapy may be started.

5592

Management of physiopathology in congenital complex cardiopathy in adults to keep pulmonary/systemic blood flow ratio (Qp/Qs) balance as a main goal. A case report

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Background and Goal of Study: Maintaining Qp/Qs balance in complex cardiopathy is a challenge. Despite congenital cardiac defects classifications, even if they are complex, anatomical variations and physiopathological hemodynamic (HD) adaptations.

Materials and Methods: We present a 23 year old woman with a single ventricle physiology, systemic circulation depending of stenotic ductus, tricuspid atresia associated with great vessels transposition, rudimentary right ventricle with a restrictive atrioventricular channel, hypoplastic aortic valve, filiform ascendant aorta and septal defect. The main concern was the disbalance of Qp/Qs, related to hyperfluss alterations after opening the RPA with the risk of shunting due to steal from the healthy lung and systemic, also shunting due to systemic theft after opening the ductus, associated with a resulting risk of coronary perfusion fall which depends on the pressure in the filiform aorta(1). General anesthesia was induced with midazolam 2.5mg, fentanyl 50mcg, propofol 55mg, calcium chloride 550mg, atropine 0.2mg, atracurium 25mg. Ventilatory parameters, pulmonary vasodilators, peripheral vasodilators, vasoactive agents and fluidotherapy were adjusted to V/Q optimization during the procedure with invasive blood pressure and central pressures registered by the hemodynamists. The patient went without severe desaturation or HD instability, dobutamine was retired at the end of the procedure.

Conclusion: As far as we know this is the first case reported of anesthetic management in such a complex cardiac congenital defect. We conclude that foreseeing the problems and their solutions creating a well defined plan of action including anesthetics, management of ventilator parameters and different drugs, is crucial to ensure an optimal outcome

References:

5787

Role of the ratio between venous-arterial carbon dioxide difference and arterial-venous oxygen content difference in predicting low cardiac output syndrome after surgery for congenital heart disease

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Background and Goal of Study: Low cardiac output syndrome (LCOS) is the most common complication after surgery for congenital heart disease (CHD). Classic markers to detect LCOS (blood lactate and ScVO2) have several pitfalls and may not be completely reliable indicators of global tissue hypoxia. Aim of the present study is to establish whether the ratio between the veno-arterial carbon dioxide and the arterial-venous oxygen differences (P(v-a)CO2/C(a-v)O2) could predict developing of LCOS after surgery for CHD.

Materials and Methods: This retrospective study involves 61 patients treated for CHD from June 2018 to September 2019 admitted at the Cardiothoracic Intensive Care Unit (ICU). According to our clinical practice, coupled arterial and central venous blood samples were drawn at admission in ICU after surgery, at the occurrence of haemodynamic instability or after any variation in fluid or drug therapy, and after extubation. LCOS was established according to echocardiographic criteria associated to a high inotropes requirement and end organ dysfunction (ie increasing in blood lactate levels, development of acute kidney injury or cerebral rSO2 desaturation). For data analysis, ROC curve were used to assess diagnostic performance of the following indices: lactate, ScVO2, P(v-a)CO2/C(a-v)O2, Oxygen Extraction Ratio (ER02).

Results and Discussion: High inotropic support was needed in 26.2% of cases and 14.8% of patients developed AKI. The overall incidence of LCOS was 47.5%. Comparing patients that developed LCOS to those with an uneventful postoperative course, there was no statistical significant difference in lactate (p=0.7) and ScVO2 levels (p=0.07). Patients developing LCOS showed an increased value of P(v-a)CO2/C(a-v)O2 (1.974 vs 1.505 p=0.001) and ER02 (0.34 vs 0.26 p=0.005). The best diagnostic performance in predicting LCOS was reached by P(v-a)CO2/C(a-v)O2 (best cut-off 1,669 mmHg/mL, NPV 83.3%, PPV 67.5%) and ER02 (best cut-off 0.27%, NPV 72.3%, PPV 60.5%).

Conclusion: Both P(v-a)CO2/C(a-v)O2 and ER02 seem to be more reliable markers of global anaerobic metabolism and useful tools in predicting LCOS even in pediatric cardiac surgery patients.

5878

Anesthetic management of a infant with cor triatriatum sinister anomaly and atioventricular canal defects undergoing closure of the ostium primum atrial septal defect and inlet ventricular septal defect

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Background: Cor-triatriatum is seen about 0.1% of patients with congenital heart disease, consisting of a membrane in the left atrium (1). Some challenges for anesthesiologists in patients with cor triatriatum should be managed. We report the anesthetic management of a 7-month old infant with cor triatriatum undergoing closure of atioventricular (AV) canal defects.

Case report: The patient was 7-month-old with 3000 gr body weight. She underwent an echocardiography and a complete AV canal defect, cor triatriatum were demonstrated. There was 20 mmHg systolic gradient distal to the pulmonary valve diagnosed as pulmonary hypertension. On the operation day, blood pressure was 88/50 mmHg and peripheral O2 saturation 88%. Peripheral venous access was obtained using 24-gauge cannula before induction and the child received 1.5 mg/kg

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ADHD symptomatology of children with congenital heart disease 7 years after cardiac surgery

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Background and Goal of Study: The aim of the present study was to investigate the differences in ADHD symptomatology between healthy controls and children who underwent cardiac surgery at different ages.

Materials and Methods: Altogether, 132 children (53 patients with congenital heart disease undergoing cardiac surgery under 3 years of age, 27 operated thereafter, and 52 healthy controls) were examined. ADHD symptoms were assessed on average 6.8 years after first surgery. Both patients and parents were asked to complete the Child Behaviour Checklist, while the ADHD Rating Scale-IV was completed by parents only.

Results and Discussion: Results of the general linear models indicated that surgery status was a significant predictor of most indicators of ADHD symptomatology even after controlling for sex and age at survey completion, with effect sizes in the medium range. Post hoc tests indicated that the ADHD symptoms of those treated surgically above 3 years of age were more severe not just than that of the control group but also those who were treated surgically at a younger age. The control group and those treated surgically below the age of three did not differ significantly across any of the five ADHD severity indicators.

Conclusion: Our findings indicate that the age at which the time of cardiac surgery is predictive of later ADHD symptomatology – with younger children having better outcomes.

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Severe tracheal stenosis: a challenging clinical case with a multidisciplinary approach

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Background: Tracheal stenosis is a rare but a life-threatening condition. The most common indications for tracheal resection and reconstruction are symptomatic concentric stenosis either idiopathic or related to prolonged intubation. First-line tracheal resection is a safe option and obviates the need for repeated endoscopic dilations.

Case Report: A 46-year-old male, ASA III, with a severe tracheal stenosis due to prolonged intubation by rupture of esophageal varices, was scheduled for tracheal resection and reconstruction. He was a current smoker and medical history included cirrhosis of alcoholic etiology and diabetes mellitus. He presented with stridor and shortness of breath. The exams showed a concentric 5 mm stenosis distancing 3 cm from the vocal cords. Intubation through the stenosis was successful using a microaryngoscopy tube number 5 and a bronchofiberscope under sedation and maintaining the spontaneous breathing. Sevoflurane, fentanyl and rocuronium were used for maintenance of general anesthesia. The surgical approach with resection of the stenosis around the endotracheal tube allowed no further mobilization of the tube throughout the procedure. Exubation, with forced flexion of the neck, was after complete recovery of consciousness, adequate spontaneous breathing, preventive reflex and muscle strength.

Discussion: Despite the relatively low occurrence, anaesthesia for tracheal resection is one of the most challenging aspects of our practice. The anaesthesiologist must provide adequate ventilation and oxygenation to a patient with a pre-operative critical airway, an intraoperative transacted airway and a precarious post-operative airway that may be edematous due to multiple manipulations and cervical flexion positioning. Our approach avoided a tracheotomy that is itself more invasive and carries an increased risk of restenosis.

References:

Anesthetic Strategy for very young children undergoing coronary artery bypass due to Kawasaki disease: Utopia or reality?

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Background: Kawasaki disease is one of the most common vasculitis in childhood. Of unknown etiology, it can cause a variety of cardiovascular complications, such as aneurysm and coronary artery stenosis, which may later lead to acute myocardial infarction, arrhythmias, heart failure and sudden death.

Case Report: 2 years old child, 11,470kg, Kawasaki Disease diagnosed in the previous year, in follow-up for residual pericardial effusion. IN a new control echocardiogram, an important left aneurysm measuring about 8mm in diameter was detected. Ventricular ejection fraction of 45%. The patient was then submitted to myocardial revascularization surgery under balanced general anesthesia using sevoflurane, fentanyl and rocuronium. Cephalothin for antibiotic prophylaxis and prevention of bleeding with transamin (bolus + maintenance). During surgery bolus of phenylephrine for blood pressure maintenance. Later on, dobutamine and milrinone at moderate doses, considering ventricular dysfunction were added. Long ICU stay, after surgery developed a severe cardiac dysfunction (EF 36%) and altered walking pattern.

Discussion: Treatment with aspirin-associated intravenous immunoglobulin is effective and should be started early within the first 10 days of illness to prevent cardiac sequelae. The persistence of fever after 24 hours of initiation of treatment should be assumed as refractory disease and it is associated with the development of coronary artery abnormalities. Myocardial revascularization surgery is often indicated in an attempt to relief the symptoms of angina, reduce the risk of acute myocardial failure and aneurysmal rupture. Anesthesia should always keep an hemodynamic stability, as well as maintain an average blood pressure level in order to avoid neurological complications due to hypoxia.

References:

Learning points: Induction in very young patients at risk of aneurysm rupture should be slow and always avoid hemodynamic changes. Hypoxic-ischemic lesions with consequent neurocognitive disorders due to brain immaturity is the risk factor to be considered during anesthesia.

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Anesthetic Strategy for very young children undergoing coronary artery bypass due to Kawasaki disease: Utopia or reality?

Melo W.1, Roessberg M.2, Lucas Passos R.3, Bernardez De Oliveira R.2, De Paula Tofani G.2, Abrao J.3
1Centro Universitário UNINORTE - Rio Branco (Brazil), 2Hospital Vila da Serra - Belo Horizonte (Brazil), 3Hospital das Clínicas da Faculdade de Medicina da USP - Ribeirão Preto (Brazil)

Background: Kawasaki disease is one of the most common vasculitis in childhood. Of unknown etiology, it can cause a variety of cardiovascular complications, such as aneurysm and coronary artery stenosis, which may later lead to acute myocardial infarction, arrhythmia, heart failure and sudden death.

Case Report: 2 years old child, 11,470kg, Kawasaki Disease diagnosed in the previous year, in follow-up for residual pericardial effusion. IN a new control
Effect of Thoracic Epidural Anesthesia on Cardiac Rhythm in Patients with Paroxysmal Atrial Fibrillation During the Perioperative Period in Thoracic Surgery

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Background: The occurrence of paroxysmal atrial fibrillation (PAF) in patients in thoracic surgery significantly worsens treatment outcomes. According to the literature review, thoracic epidural anesthesia (TEA) has a protective effect on the cardiac rhythm stabilization.

Goal of study: The research is aimed at assessing the effect of TEA on the incidence of PAF and the features of their course in patients with paroxysmal form of atrial fibrillation (PFAF) after thoracotomy.

Materials and Methods: The study included 2 groups of 20 patients who underwent a lobectomy. Patients of both groups were diagnosed with PFAF. Patients of the control group (CG) got general anesthesia with sevoflurane and fentanyl whereas in the studied group (SG) it was supplemented by TEA with ropivacaine (2 mg/ml) with fentanyl (2 mg/ml) for 3 days. The study assesses the incidence of PAF during the surgery and in the postoperative period, as well as the duration of paroxysms and the dose of amiodarone for their relief.

Results and Discussion: Initially, all patients had a sinus rhythm. During the intraparative period the incidence of PAF in patients of the CG was significantly higher than in that of the SG (50% (10/20) vs 15% (3/20); p=0.043). Moreover, the duration of PAF in the CG turned out to be longer than in the SG (20.1±5.7 min and 16.3±4.5 min respectively; p<0.05), and the dose of amiodarone is higher (245±53 mg vs 210±38 mg; p<0.05). The short duration of intraoperative PAF can be explained by the reflex character, which is confirmed by their occurrence during traction of the heart, as well as during electrocogulation. In the postoperative period, the incidence of PAF in the CG also exceeded that in the SG (65% (13/20) vs 25% (5/20); p=0.026). The duration of PAF (158±54.83 min) as well as the dose of amiodarone (515±135 mg) in patients of the CG, significantly exceeded the similar parameters in the SG (115.2±36.5 min and 405±118 mg respectively; in both cases p<0.05). In this situation positive effects of TEA can be associated with sympatholysis, improved gas exchange, correction of the pain syndrome, as well as the antiarrhythmic effect of the local anesthetic.

Conclusion: The addition of TEA to the anesthetic protocol and the postoperative analgesia in patients with PFAF in thoracic surgery improves the perioperative period by reducing the incidence of PAF, as well as their modification in the form of the decreased duration and less resistance to antiarrhythmic therapy.

Perioperative inflammation related to chronic arterial hypertension may be associated with a greater rate of cancer recurrence after lung resection surgery

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Background and Goal of Study: Chronic hypertension (HT) is one of the most common chronic medical conditions. Inflammation is a cause and consequence of chronic HT. Inflammatory response (IR) plays a major role in tumor progression. The goal of this study was to evaluate the relationship between chronic HT and inflammatory biomarkers (IB) during the perioperative period of lung resection surgery (LRS) and to evaluate its influence in cancer recurrence.

Materials and Methods: 174 patients who underwent LRS were classified as non-HT (n=95); HT grade I (n=38), patients preoperatively well controlled with 1 hypotensive drug, or HT grade II (n=41), patients who need 2 or more hypotensive drug to control preoperative arterial blood pressure or patients who have had an hypertensive emergency during the previous 12 months. Blood was drawn at baseline (before one lung ventilation [OLV]), at 30 min after the start and at the end of the OLV and 6 and 24 hours after the end of the surgery. IB were measured using Western blot. Kruskal-Wallis, Mann-Whitney U and χ2 tests were used to analyse results and compare all data and Kaplan-Meier estimator was used to analyse recurrence.

Results and Discussion: Table 1 and Graph 1 shows the results from this study. IR was higher at 6 hours postoperative in HT patients. Preoperative HT was associated with a bigger rate of oncological recurrence. HT is associated to a broader inflammatory state, which can worsen tumor progression. Thus, there could be a causal relationship between the highest perioperative inflammatory response in HT patients and the greatest recurrence rate in these patients.

Atypical ACTH-producing carcinoid tumor of thymic origin. Anesthetic management. Postoperative complications

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Case report: Patient, 48-year-old male, in charge of Thoracic Surgery of General Hospital of Valencia for surgery of atypical ACTH-producing carcinoid tumor of thymic origin. The patient has secondary Cushing syndrome, with alkalosis and hypokalemia, IDDM, hypertension and pulmonary aspergillosis, in treatment with ketocanazole. In pulmonary CT the anterior mediastinal mass is visualized, in contact with large vessels. In preoperative analysis, thymocticenemia secondary to chronic treatment with ketocanazole. Surgery is scheduled, along with Cardiac Surgery. Transfusion of 1 pool of platelets and administration of 200 mg hydrocortisone. Airway management was performed using 37 Fr Vivaisight DL and a videolaryngoscope. Thymic tumor excision through sternotomy, without complications. In the immediate postoperative period in ICU, massive bleeding, requiring urgent intervention, where diffuse bleeding is noted. After that, coagulopathy with polytransfusion and severe ARDS requiring deep sedation, relaxation, pulmonary protection ventilation and inhaled nitric oxide. Unfavorable evolution, the patient died 3 weeks of admission.

Discussion: Cushing syndrome by ectopic ACTH secretion is caused by excess ACTH secretion by a non-pulmonary tumor. Hypokalemia, psychiatric disorders and fractures are most frequently observed. There is a high risk of opportunistic infections. In preoperative assessment is necessary to stabilize coexisting diseases before surgery. The lung is the main site in 50% of cases. Other origins include thymic endocrine tumors. The treatment is curative surgery. The anesthetic management of the mediastinal masses is complex, especially to prevent airway complications. There is no correlation between the clinic and the degree of tracheal compression seen in imaging test. Minimizing invasive procedures allows limiting the use of general anesthesia and neuromuscular relaxants, thus avoiding ventilatory collapse. The intensity of the perioperative immunoinflammatory response is related to postoperative prognosis, recommending the use of anesthetic techniques to attenuate it (locoregional anesthesia, halogenated agents). Perioperative hypovolemia increases morbidity, stay in ICU and postoperative mortality, due to respiratory complications. In conclusion, the perioperative treatment must be adapted to the patient and the surgical procedure, in order to limit the harmful consequences of surgical, anesthetic and ventilatory aggressions.
The Effects of Thoracoscopic Intercostal Nerve Blocks in Patients Receiving Non-intubated VATS and Endotracheal Intubated VATS

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Background and Goal of Study: Regional anesthesia may have anesthetic-sparing effects. However, the effects of regional anesthesia were rarely investigated. In this study, we analyzed the effects of intraoperative thoracoscopic intercostal nerve blocks (ICBs) from T3 to T8 on the effect-site concentration (Ce) of propofol and remifentanil infusions for non-intubated VATS (NIVATS) and intubated VATS (IVATS).

Materials and Methods: Sixty ASA I to II patients suitable for NIVATS were randomly divided into IVATS and ICBs. Groups. Anesthesia was induced and maintained with intravenous propofol and remifentanil with TCI. ICBs were performed after artificial pneumothorax. The data of BIS, Ce for remifentanil and propofol were recorded and retrospectively analyzed.

Results and Discussion: The effects on ICBs, the changes of Ce were demonstrated in figure 1. The results of two-way ANOVA were shown in table 1. Conclusion: More analgesics but not hypnotics were needed on IVATS than on NIVATS. The effects of ICBs onset almost immediately after blocks by a significantly reduced BIS. The anesthetic-sparing effects are shown by significantly decreased Ce for both drugs 10 minutes after ICBs.

Postoperative quality of recovery after nonintubated thoracoscopic lung resection surgery: a randomized controlled trial

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Background and Goal of Study: Nonintubated anesthesia has been reported as a feasible alternative of intubated general anesthesia for patients undergoing thoracoscopic pulmonary resection. Retrospective studies showed that a nonintubated thoracoscopic approach provides faster recovery after surgery. However, the quality of recovery after nonintubated thoracoscopic surgery is rarely evaluated in a prospectively randomized study design.

Materials and Methods: We evaluated the postoperative quality of recovery and safety of nonintubated thoracoscopic approach for management of lung tumors. Patients were randomly assigned to undergo thoracic surgery using either nonintubated or intubated approaches. A modified Postoperative Quality of Recovery Scale (PQRS) was used to assess physiological, emotive, nociceptive, functional, and cognitive recovery at 50 minutes (T50) and 1 day (D1) after surgery. Each domain recovery as primary endpoints was defined as PQRS scores returning to baseline values or better. Postoperative hospital stay, chest drainage, and complications were also evaluated as secondary endpoints.

Results and Discussion: A total of 151 patients were assigned to receive nonintubated anesthesia and 149 to receive intubated anesthesia for thoracoscopic pulmonary resection. There were no differences between groups in overall recovery (odds ratios for nonintubated group in T50 and D1 were 6.67 (CI: 4.06 – 162.57) and 1.25 (CI: 0.54 – 2.89), respectively. Individual domains were only significantly favored nonintubated group in T50 nociceptive recovery (odds ratio: 2.21, CI: 1.28 – 3.81) but less favor nonintubated group in D1 cognitive recovery (odds ratio: 0.39, CI: 0.20 – 0.74). Clinically, there were no differences between groups in length of hospital stay, chest drainage, and postoperative complications.

Conclusion: Nonintubated anesthesia management for thoracoscopic surgery did not provide a better overall quality of recovery after surgery. Even so, it may be associated with faster immediate nociceptive recovery but with less favored early cognitive recovery. Tracheal intubation or not seems to be equally safe in selective patients undergoing thoracoscopic surgery.

An approach to a new minimal invasive surgical procedure for chest wall repair in patients with pectus excavatum: “PECTUS UP”

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Background and Goal of Study: Pectus excavatum (PE) is the most common chest wall malformation with an incidence of 1 out of 400 newborn and it is three times more frequent in males. The cardiopulmonary morbidity and the psychosocial impact has it are the main clinical issues we found in these patients. In recent years, new surgical procedures regarding pectus excavatum chest wall repair have emerged, one of which is the “PECTUS Up”. Due to its minimal invasiveness and the much shorter recovery period associated, this procedure is blazing new trails towards chest wall repair surgery.

Materials and Methods: From June 2017 to August 2019 a total of 18 (n=18) pectus excavatum repair surgeries by the “PECTUS Up” method were performed in our hospital. While hospitalized, or at the prospective surgeon visits, patients were asked about their satisfaction with the procedure. The main clinical outcomes were short and long term complications, mean hospitalization time, individual satisfaction with the procedure and the use of analgesia in the postoperative period.

Results and Discussion: No cases of intraoperative complications were found in this study (0%). Short term complications were mild pain (2 patients, 11%) ten days after the surgery and the appearance of a serous exudate at the surgical wound reported by three patients (17%), whereas long term complications involved problems in relation to subdermal metal plate. A protrusion of the plate was noted in five patients (27%). Nevertheless, two of these patient’s surgical wires were broken, desestabilizing the plate and leading to a recurrence of the pectus excavatum. The mean hospital stay time was 2.55 days. Analgesia used in these patients involved NSAIDs and opioids. The whole sample with no recurrence of the pectus excavatum (88%, sixteen patients) reported high levels of satisfaction with the procedure. Conclusion: “PECTUS Up” is a minimal invasive surgical procedure used for chest wall repairation in pectus excavatum. It has shown a short convalescence period and satisfactory short and medium term results with low incidence of complications, although long term effectiveness is still needed to be validated.

Routine practice of Erector Spinae Plane Block for Video Assisted Thoracoscopic Surgery: Experience in our centre

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Background and Goal of Study: The erector spinae plane (ESP) block was described in 2016 as a novel regional anesthetic technique for thoracic analgesia. [1] This block is easier to perform than Paravertebral Block and Thoracic Epidural, therefore, it represents an attractive alternative to the existing techniques. In this descriptive report we describe our experience with ESP Block as part of a multimodal analgesic approach in several patients who underwent different video-assisted thoracoscopic (VATS) surgeries.

Materials and Methods: After general anaesthesia induction, the ESP block was performed in lateral decubitus between T5 and T7 level with ultrasonic guidance. There were administered a volume of 30 mL of local anaesthetic. No cases of intraoperative complications were found in this series of cases we performed a total amount of 78 ESP Block; 60 were a single puncture, 5 were 2 level puncture and 13 were with catheter placement. Pending of the final results, most of the patients reported a good level of analgesia with high satisfaction during their admission. Although some of them required rescue analgesia with opioids, all patients were able to complete their postoperative pulmonary rehabilitation with adequate pain management. Neither complications related to the blocks nor the use of opioids were seen.

Conclusions: ESP block seems to be a safe, easy and effective technique for thoracic surgery; consequently it has become a regular practice in our center and in some procedures it is now our first regional analgesia choice. Adding a catheter and
Intrathecal morphine (ITM) provides prolonged analgesia. By obtaining ethics committee approval, we conducted a study to evaluate the effect of intrathecal morphine, bupivacaine, and serratus anterior plane block (SAPB) in patients where trochar was inserted at upper than lower intercostal space (3-4 vs 5-7) at 0, and 6 hours during postoperative period.

**Background and Goal of Study:** In pediatric patients, pain control after open thoracotomy is a challenging problem. Erector spinae plane block is a new and promising block for many analgesia treatments.

**Case Report:** A 4-year-old, 18kg boy, was admitted to the hospital with metastatic nodule adjacent to the pleural area in the right lung and right surgical resection was planned. The patient was evaluated the day before the surgery and examination was normal. After obtaining consent from parents, he was taken into the operating room. The operation took 90 minutes in right lateral decubitus position and the tumour was removed through a posterolateral incision. The patient was administered 15mg/kg paracetamol for analgesia. ESPB was planned for postoperative analgesia. IV fentanyl PCA (10mcg bolus, 30min lockout) was programmed as a rescue analgesic. At the end of surgery while the patient is still in the lateral position, transvers process of T5 vertebra visualized with a linear USG probe. A 22G block needle was inserted in-plane in a craniocaudal direction to contact the tip of the T5 transvers process. After the correction of the needle tip location with 2ml 0.9 NaCl, 8ml 0.025 bupivacaine was injected that was seen to spread from T3 to T6. There were no additional problems during the operation period. Postoperative pain was utilized with Wong-Baker FACES Pain Rating Scale at 2,6,24 and 48 hours. The scores at rest were 4-2-2-2 respectively. The scores didn’t change with movement and coughing. He needed analgesic only at eighth hour after operation. He was discharged from the hospital 6 days after the operation.

**Discussion:** ESPB is a recently described interfacial plane block for the treatment of thoracic neuropathic pain, trauma, and acute pain after surgery. With easy recognition of sonoanatomy, ESPB is a simple and reliable block, provides multisegmental analgesia with a single injection, besides doesn’t have the adverse effects and complications of paravertebral block and thoracic epidural analgesia.

**References:**

**Learning points:** ESPB is an effective regional analgesia technique that can be easily performed with ultrasound guidance in pediatric patients.

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**Erector Spinae Plane Block as an Effective Analgesia Method After Thoracotomy in a 4 Year Old Boy**

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**Background:** In pediatric patients, pain control after open thoracotomy is a challenging problem. Erector spinae plane block is a new and promising block for many analgesia treatments.

**Case Report:** A 4-year-old, 18kg boy, was admitted to the hospital with metastatic nodule adjacent to the pleural area in the right lung and right surgical resection was planned. The patient was evaluated the day before the surgery and examination was normal. After obtaining consent from parents, he was taken into the operating room. The operation took 90 minutes in right lateral decubitus position and the tumour was removed through a posterolateral incision. The patient was administered 15mg/kg paracetamol for analgesia. ESPB was planned for postoperative analgesia. IV fentanyl PCA (10mcg bolus, 30min lockout) was programmed as a rescue analgesic. At the end of surgery while the patient is still in the lateral position, transvers process of T5 vertebra visualized with a linear USG probe. A 22G block needle was inserted in-plane in a craniocaudal direction to contact the tip of the T5 transvers process. After the correction of the needle tip location with 2ml 0.9 NaCl, 8ml 0.025 bupivacaine was injected that was seen to spread from T3 to T6. There were no additional problems during the operation period. Postoperative pain was utilized with Wong-Baker FACES Pain Rating Scale at 2,6,24 and 48 hours. The scores at rest were 4-2-2-2 respectively. The scores didn’t change with movement and coughing. He needed analgesic only at eighth hour after operation. He was discharged from the hospital 6 days after the operation.

**Discussion:** ESPB is a recently described interfacial plane block for the treatment of thoracic neuropathic pain, trauma, and acute pain after surgery. With easy recognition of sonoanatomy, ESPB is a simple and reliable block, provides multisegmental analgesia with a single injection, besides doesn’t have the adverse effects and complications of paravertebral block and thoracic epidural analgesia.

**References:**

**Learning points:** ESPB is an effective regional analgesia technique that can be easily performed with ultrasound guidance in pediatric patients.

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**The effect of US guided serratus anterior plane block (SAPB) in addition to intrathoracic morphine for early postoperative period after Video-Assisted Thoracoscopic Surgery (VATS): a randomised controlled study**

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**Background and Goal of Study:** Intrathecal morphine (ITM) provides prolonged postoperative analgesia lasting approximately 24h, but the peak analgesic effect occurs up to six hours after administration. Therefore, an additional analgesia is needed for about 6h. The aim of this study was to evaluate the effect of serratus anterior plane block (SAPB) in addition to intrathecal morphine for early postoperative period after VATS on the amount of morphine consumption and the Visual Analogue Scale (VAS) scores.

**Materials and Methods:** By obtaining ethics committee approval, we conducted a prospective study in 64 patients, undergoing VATS. VATS Group (n=32) received 0.4 ml/kg bupivacaine 0.25% at the level of fifth rib with US guidance in addition to intrathecal morphine 0.6 mg, ITM Group (n=32) received only intrathecal morphine 0.6 mg after an induction of anesthesia. Primary outcomes were the amount of morphine consumption, VAS-S and VAS-D. Mann Whitney U test used for comparison.

**Results and Discussion:** A total of 64 patients included in the study. Mean morphine consumption was significantly lower in the SAPB group at all hours. Compared with the control group, VAS scores at rest and coughing were significantly lower at 0.6 and 12 hours after surgery (Figure 1-2). Pain scores were significantly higher in the SAPB group in patients where trochar was inserted at upper than lower intercostal space (3-4 vs 5-7) at 0, and 6 hours during postoperative period.

**Conclusion:** SAPB added intrathecal morphine are safe and effective way to improve pain control for early postoperative period after VATS. SAPB ensures better analgesia until the peak effect of spinal morphine occurs. More studies needed to investigate proper technique in patients who operated with upper intercostal space.
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Blowout syndrome of femoral artery radical vascular

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Background: Carcinoma of the vulva represents 4-5% of all genital tract carcinoma. The occurrence of metastatic changes in the inguinal lymph nodes, often associated with the present infection and radiation therapy may involve femoral blood vessels, lead to bleeding, severe hemorrhagic shock and death.

Case Report: A 60-year-old woman, received due to occasional bleeding from the inguinal region. Six months ago a radical operation was performed with bilateral dissection of the inguinal lymph nodes due to the vulvar carcinoma. During hospitalization, there is spontaneous, massive bleeding from the left femoral artery, the development of severe haemorrhagic shock, respiratory failure, and disturbances of consciousness with a predisposing heart failure. Immediately she was introduced into the operating room with resuscitation measures and compression of left iliac region. Introduced in general anesthesia and surgery was performed on femoral artery. Postoperatively she was on mechanical ventilation and analgesosedation to hemodynamic stabilization and correction of biochemical disorders. She was discharged from the hospital 12 days after surgery.

Discussion: Respecting the reanimation recommendations made it possible to get time to perform surgical intervention and to prevent further loss of blood from the femoral artery. Although numerous surgical vascular techniques have been described in clinical practice, there is disturbed circulation in the femoral vessels due to metastatic changes in the lymph nodes of the inguinal region, our surgical team has done the femoral artery wall suture. Such a procedure is dictated by the difficult general condition of the patient, by the lack of a vascular surgeon in the operative team (intervention performed by abdominal surgeons), by insufficient team experience to deal with such urgent vascular situations, but also by the need to quickly and effectively stop further bleeding from the femoral artery.

Learning points: Aggressive reanimation treatment, taken on time and with respect to the resuscitation guide and intensive care, can save the life of these patients. Minimally invasive surgical approach is a highly desirable, safe and effective palliative management option in such cases.

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Pre-operative cardiac evaluation of patients undergoing peripheral vascular surgery using coronary CT-derived fractional flow reserve (FFRCT) may reduce post-operative cardiac complications

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Background and Goal of Study: Patients undergoing peripheral vascular surgery (PVS) have high risk of cardiac complications with 3% hospital mortality and >5% 30-day MACE (death/MI). Current guidelines recommend no pre-op cardiac testing of patients with no CAD symptoms. A new non-invasive cardiac test, coronary CT-derived fractional flow reserve (FFRCT) reliably identifies patients with coronary ischemia. We sought to determine whether pre-op diagnosis of coronary ischemia using FFRCT can facilitate multidisciplinary care of PVS patients to reduce post-op death/MI.

Materials and Methods: Patients with no cardiac symptoms admitted for elective PVS had pre-op coronary CT angiography (CTA) and FFRCT in a prospective Study and were compared to matched Control patients undergoing surgery with standard pre-op cardiac evaluation. FFRCT results were available to treating physicians in Study with guidance by multidisciplinary Vascular Team. Coronary ischemia was defined as FFRCT ≤0.80 distal to stenosis in a major coronary artery with ≤0.75 indicating severe ischemia. Primary endpoint was MACE (death/MI) at 30 days and 6 months.

Results and Discussion: Study patients (n=126) were similar to Controls (n=130) with regard to age (66±8 v. 66±8 years), gender (80% v. 82% male), cardiac risk factors, and surgery performed. Coronary CTA in Study revealed left main disease in 7% and >50% stenosis in 70%. FFRCT analysis revealed significant silent coronary ischemia in 86 patients (68%) with severe ischemia in 53%. Indicated vascular surgery was performed in Study with knowledge of silent ischemia using cardiac anesthesia and intensive care with no post-op deaths or MI. In Control there were 7 MIs and 5 post-op deaths. MACE at 30 days, in Study was 0% vs 5.4% in Control (p=0.060). On the basis of FFRCT findings, elective coronary revascularization was performed in 50 patients with severe coronary ischemia (45 stents; 5 CABG), 1-3 months after recovery from surgery. MACE at 6 months was reduced in Study (2/126, 1.6%) compared to Control (9/130, 6.9%, P=0.034).

Conclusion: Patients undergoing PVS have high prevalence (68%) of silent coronary ischemia. Pre-op diagnosis with FFRCT can identify high risk patients and facilitate multidisciplinary care to improve outcome. Favorable results with staged peripheral and coronary revascularization suggest the need for prospective, controlled trials to further define the role of FFRCT in assessment of PVD patients.

4837

Considerations in performing anesthesia for the patient with an aortoesophageal fistula secondary to the aortic lesion; a rare and fatal complication

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Background: Aortoesophageal fistula secondary to the aortic lesion (AEF) is a rare lethal complication.123 For us anesthesiologists, however, its novelty is not widely known. Through this case, considerations for AEF are discussed.

Case Report: 45-year-old man presented melena four months after the total arch replacement due to acute aortic dissection. The gastrointestinal fiberscope revealed an AEF and he received silent grafting (TEVAR) in the descending aorta. As the infection of the esophagus did not improve in spite of fasting and antibiotics, he was scheduled for esophagectomy and descending aorta replacement, which was 6 months after the diagnosis of AEF. His cardiopulmonary function was normal and the laboratory exam showed WBC 7.1×10^9/L, Hb 8.3g/dL, Ht 23.8%, PTT 194.0s, aPTT 44.2, Alb 8.6g/dL, Cr 1.7mg/dL. He came to the OR on fast. In the operation, he got deteriorated after esophagectomy with refractory hypotension, deteriorated ventilation and oxygenation, and massive bleeding. Due to the uncontrollable status, the surgeons decided to pack gauzes to close the chest. He died in the ICU 19 hours after the operation.

Discussion: There is no consensus concerning the optimal treatment for AEF. Recently, however, a few studies reported that conservative treatments result in no late survival13 and that esophagectomy and descending aorta replacement should be done as soon as the diagnosis of AEF is12. The deterioration of the patient is attributed to intravascular hypovolemia due to malnutrition, surgical stress, cardiopulmonary bypass (CPB) and massive bleeding, which was far complicated by focal infection becoming systemic through CPB and also by massive bleeding. Administration of albumin and fresh frozen plasma from the early stage, and using a suction system other than the CPB might have brought another result.

References:

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Neutrophil-lymphocyte ratio and platelet-lymphocyte ratio as predictors for adverse events in endovascular aneurysm repair for abdominal aortic aneurysm

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Background and Goal of Study: This study investigated the association of chronic inflammatory markers with the clinical outcome after endovascular aneurysm repair (EVAR) for abdominal aortic aneurysm.

Materials and Methods: The study included 230 consecutive AAA patients, treated...
Adverse events occurred in 12 patients (6%). Seven patients suffered from cardiovascular event and five patients from acute kidney injury. The values of NLR and PLR were significantly increased after the procedure (NLR from 3.34 to 8.64, p<0.001 and PLR from 11.37 to 17.21, p<0.001). None of the markers were predictive for the occurrence of a cardiovascular event. Receiver operating characteristic curve analysis showed that postoperative NLR and PLR were strong predictors of acute kidney injury after the EVAR procedure (area under the curve, NLR 0.843; P=0.009 and PLR 0.754, p=0.05). Areas under the curve for preoperative values of NLR and PLR were 0.595 (p=0.46) and 0.804 (p= 0.426). A threshold postoperative NLR value of 9.9 was highly associated with the occurrence of acute kidney injury, with a sensitivity of 80% and specificity of 83%. A threshold postoperative PLR value of 22.6 was highly associated with the occurrence of acute kidney injury, with a sensitivity of 80% and specificity of 83%.

Conclusion: Postoperative NLR and PLR are useful prognostic factors for the occurrence of acute kidney injury after EVAR for AAA.

Postoperative complications after Type b aortic dissection endovascular treatment

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Background and Goal of Study: Aortic dissection is a life-threatening condition associated with high morbidity and mortality. Type B aortic dissection, according to the Stanford classification, involves only the descending aorta. Endovascular treatment is one of the most innovative approaches of this disease. The aim of this study is to evaluate the postoperative complications after endovascular surgical treatment of type B aortic dissection.

Materials and Methods: In this descriptive, retrospective and uncenteric observational study, we collected data from the electronic medical records of 25 patients undergoing endovascular surgery over a period of 5 years (January 2015 – September 2019). We analyzed different variables, such as sex, age, hospital admission, ASA-classification, mortality during hospital admission, general postoperative complications and specific postoperative complications. We performed the statistical analysis using SPSS Statistics. Data are presented in absolute values and percentages or mean ± SD.

Results and Discussion: After studying 25 patients in our hospital, we observed these overall results: 72% were men, average age was 66 (±11) years old, and ASA II and III was obtained in most patients (96%). The average hospital admission was 14 (±11) days. Thoracic endovascular aortic repair was performed in 23 patients (95%), 16 of which were emergent surgeries (64%). Mortality during hospital admission was 16%. We observed an incidence of general postoperative complications in 80% of the patients and specific postoperative complications in 72%. The most frequent complications were arterial hypertension (72%), delirium (32%), acute kidney injury (28%), refractory pain (24%), cardiorespiratory arrest (16%) and infection (16%).

Conclusion: Our results suggest that thoracic endovascular aortic repair in Stanford type b aortic dissections lead to an increased incidence of arterial hypertension, delirium, acute kidney injury and refractory pain in postoperative care units. Nevertheless, further investigation is needed to determine this association in larger prospective studies.

Open abdominal aortic aneurysm repair: how to determine the Maximum Surgical Blood Ordering Schedule?

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Background and Goal of Study: Despite advances in surgery, endovascular aneurysm repair is not always an option. Patients undergoing elective open abdominal aortic aneurysm (AAA) repair are at greater risk of requiring red blood cells (RBC) transfusion, with multiple studies showing association between RBC transfusion and increased mortality and morbidity2. Avoiding over crossmatching is important in order to best manage RBC stock and avoid unnecessary allocation of resources. However, there is a lack of guidelines advising the number of crossmatch units RBC needed. The C/T index is the ratio of blood cross-match blood units to the number of transfused blood units. Researchers have rated C/T index from 2.1 to 9.1 units as the result of the optimal use of blood. We determine the Maximum Surgical Blood Ordering Schedule (MSBOS) for open AAA repair at our hospital.

Materials and Methods: A retrospective observational study took place in our hospital between January 2016 and April 2017, for all patients who underwent open AAA elective repair and analyzed, among others, the hemoglobin values, blood loss and RBC units transfused.

Results and Discussion: For a population of 35 patients, an average of 3.49 RBC units per person were pre-operatively cross-matched. In total only an average of 0.91 units were transfused per patient. Because only 37.1% of the patients were transfused, this subgroup received an average of 2.46 RBC units. The mean value of preoperative hemoglobin was 13.4 g/dL and blood loss was around 1575 ml per surgery with a delta hemoglobin mean value of 5g/dL. With the aim of avoiding unnecessary cross-matching and maintaining patient safety we opted for a C/T index of 3.1 to determine our MSBOS.

Conclusion: For patients submitted to open AAA repair at our hospital, we established an MSBOS of 3.

References:
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Spinal cord injury (SCI) after a successful hybrid repair combining endovascular thoracic stent placement (tevar) with an open bypass from the descending aorta to the femoral artery

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Background: We present a patient with a failed attempt at emergency endovascular repair of a ruptured abdominal aortic aneurysm that required in the same surgery the explant of the prosthesis and closure of the aorta below the superior mesenteric artery, ligation of both renal arteries and a bypass axillobifemoral. Two years later, he goes to the operating room for a TEVAR and a bypass from the descending aorta to the femoral artery because of thrombosis of the axillofemoral bypass.

Case Report: 69 year-old man with history of hypertension, and late-stage renal failure (RF) who is programmed for a TEVAR because of an aortic ulcer (aortic coverage of 10 cm) and revascularization of the legs with an opened aorto-femoral bypass. The stent is placed from the left humeral artery. On the day before surgery, the CSF drainage is placed uneventfully, obtaining pressures around 20 mmHg. On the day of the intervention, surgery occurs without complications, requiring low doses of norepinephrine during legs reperfusion, no blood products were required. During the immediate postoperative period, urgent reintervention for mediastinal bleeding is required, observing a right ventricular lesion resolved with primary suture. After 48 hours, when sedation is withdrawal, motor paralysis is observed which does not improve despite CSF drainage and hemodynamic optimization, controlling with imaging tests the ischemic cord injury in T4.

Discussion: Extent aortic repair, regardless of operative strategy, is associated with a significant morbidity and mortality risks. Risk factors for the development of SCI after TEVAR have been identified. Patient-related factors include advanced age, perioperative hypotension, kidney disease, COPD and HTA. RI has been postulated as a marker of widespread peripheral atherosclerotic disease, which suggests that such patients have a compromised collateral network of blood supply to the spinal cord. Surgical risk factors include the extent of the coverage and occlusion of the left subclavian artery (LSA).

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4. Hashemi, S., et all;Determining Model for Maximum Blood Request (MSBOS) for Surgery; An Elective Surgery in Imam Ali Hospital, Zahedan, Iran; UHOSCR 13(2)April 19.
**Is cerebrospinal fluid drainage indicated in endovascular repair of low-risk thoracic aortic aneurysm?**

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**Background:** Medullary ischaemia (SCI) is a serious complication of thoracic endovascular aortic surgery (TEVAR) that increases short and long-term mortality. The incidence depends on the location and protection measures, but the length of the excluded segment seems to be the only independent predictor factor. Clinical guidelines recommend placement of cerebrospinal fluid drainage (CSFD) only in high-risk patients. Our patient developed a delayed paralysis in the postoperative requiring CSFD insertion to improve SCI.

**Case Report:** An 86-year-old man with an asymptomatic thoracic aorta aneurysm 20 cm long had its preoperative CSFD rejected due to the length of the segment to be occluded without any other risk factors. Two stent-graft were placed with an occluded segment of 22.8 cm. The intervention had no incidences neither need of vasoactive drugs. He was extubated without neurological focal point and transferred to the ICU. Five hours later he showed reduced mobility in left leg without any hemodynamic changes. After coagulation check, CSFD for delayed paraplegia management was placed. The pressure was 25 mmHg and fluid was extracted to 15 mmHg with clinical improvement. It was then monitored with 8–10 mmHg without need of drainage, with slight improvement but without complete resolution of the paresis. MRI confirmed ischemic dorsal myelopathy T6 to T9 and proved on CT that the prostheses didn’t show complications. The drainage was withdrawn and discharged the third day without neurological changes. The paresis was not modified and continued with rehabilitation until being transferred to an specialized center.

**Discussion:** This is an SCI case in a low risk TEVAR, so no prophylactic CSFD was placed(1). Length of aortic coverage was the only independent predictor of SCI with 205 mm of aortic coverage as the threshold for increased risk, doubling the probability every 10%. However, Maier y cols. conclude that the use of CSFD is associated with a significant lower incidence of SCI after low-risk TEVAR than nonuse. The importance of the spinal cord’s collateral blood supply network and its imbalance after TEVAR could be a contributing factor in this case.

**References:**

**Learning point:** Highlight of CSFD utility in low risk TEVAR.

**Preoperative Anaemia Prevalence in Elective Vascular Surgery: A Portuguese Unicentric Retrospective Study**

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**Background and Goal of Study:** Preoperative anaemia prevalence on vascular surgery is reported to be more than 30%. Anaemia is an independent predictor of adverse outcomes (hospital length of stay, morbidity and mortality) and the strongest predictor of intra and postoperative RBC transfusions, another independent risk factor for poorer outcome. Our goal was to identify the prevalence of preoperative anaemia in elective vascular surgery on a tertiary hospital.

**Materials and Methods:** We conducted a retrospective descriptive analysis of adult patients submitted to elective vascular surgery between 1st January 2018 and 31st March 2018. Anaemia definition was based on WHO Hb thresholds (non-pregnant women < 12.0 g/dL, men < 13.0 g/dL). Data collected were: age, gender, weight, ASA-PS, comorbidities, type of surgery, preoperative blood tests (hemoglobin, fibrinogen, coagulation, creatinine) and preop renal replacement therapy. The statistical analysis of epidemiological and clinical data was performed with SPSS®.

**Results and Discussion:** The study involved 128 patients with 69.5% male and 70.3% ASA-PS III. The prevalence of preoperative anaemia was 51.6%. The anaemia group was in average older (67.98 vs 66.19 years), female patients (69.69% vs 31.81%), with systemic disease (90.9% ASA III or IV vs 64.51%) and under renal replacement therapy (24% vs 3.22%). A higher incidence of preop anaemia was found in patients submitted to limb amputation (90.91%), followed by arteriovenous fistulae (80%). Carotid endarterectomy and endovascular aortic repair had the lowest preop anaemia (21% and 24% respectively). Vascular preoperative anaemia is multifactorial but predominantly an iron-deficiency state. Vascular patients are frequently anemic due to significant comorbidities including cardiac disease, diabetes, and malnutrition. RBC transfusion is common, exacerbated by antiplatelet agent use, prolonged operations time and intraoperative anticoagulation.

**Conclusion:** This vascular surgery population revealed a high prevalence of preoperative anaemia (51.6%) in concordance with literature. The correction and optimization of preoperative anaemia represents the “First Pillar of PBM - Optimize red cell mass”. Nonemergency procedures should be postponed until appropriate anaemia treatment, especially if the anticipated blood loss is more than 500 to 1,000 mL. Preoperative anaemia in surgical care is an issue of patient safety demanding scientific societies recommendations.

**Paraparesis following endovascular aneurysm repair (EVAR) in absence of anticipated risk factors. How important is teamwork?**

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**Background:** Despite advances in endovascular technique and measures aimed at spinal protection, paraparesis and paraplegia continue to be devastating complications of aortic aneurysm repair surgery. Patients with planned extensive thoracic aorta coverage (>200 mm) or previous aortic aneurysm surgery have a high risk for developing spinal cord ischaemia (SCI). Long procedure time is another known major risk factor for SCI2. Cerebrospinal fluid drainage (CSFD) is an effective measure in the treatment of SCI and its prophylactic use is recommended in patients with a high risk of SCI1.

**Case Report:** A 75-year-old male with a juxtarenal aortic aneurysm underwent first stage fenestrated endovascular aneurysm repair (FEVAR). Prophylactic CSFD was not put in place given that the planned aortic draft coverage was <200mm and the patient had showed no previous aortic surgery. Procedure time was longer than expected (7.5 hours). Nevertheless, hypotension, hyperthermia and anaemia were successfully avoided throughout the whole procedure. Following extubation a few hours later, the patient complained of paresis and anaesthesia of the lower limbs. Shortly after, the MRI showed signs of SCI at T11-T12. Although CSFD was initiated 6 hours later in an attempt to optimise spinal cord perfusion, paraparesia as well as spinchter incontinence remained.

**Discussion:** Despite being a known risk factor for SCI, procedure time is often difficult to predict. Interdisciplinary cooperation between surgeons and anaesthesiologists is crucial to assess whether the possible benefits of prophylactic CSFD outweigh its risks. If procedure time turns out to be longer than anticipated, a collaborative effort is also needed to maximise vigilance for early symptoms of SCI and, if necessary, initiate therapeutic measures, such as CSFD, as soon as possible.

**References:**
1. Eur J Vasc Endovasc Surg 2017;53:4-52.

**Learning points:** Teamwork between surgeons and anaesthesiologists is of paramount importance to decide on a case-by-case basis which patients could benefit from prophylactic CSFD placement. This decision should be based on the patient’s risk factors and the predicted procedure time. If CSFD is not put in place prophylactically but procedure time is longer than predicted, cooperation between surgeons, anaesthesiologists and ICU staff is equally important to guarantee early extubation, light neurological surveillance and, should SCI arise, timely CSFD.

**Airway and anesthetic management of a patient undergoing tracheoplasty for tracheobronchomalacia**

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**Background:** Airway management of tracheoplasty surgery represents one of the greater challenges for the anesthesiologist. The surgery requires access to the posterior aspect of the tracheobronchial tree via right thoracotomy (1). While various techniques for lung isolation in the setting on tracheoplasty were previously utilized (2) here we describe the use of reinforced single lumen tube for left endobronchial access. Following induction of anesthesia flexible bronchoscopy via LMA confirmed the diagnosis and patient was intubated with 8.0 reinforced endotracheal tube that was advanced into the left main
bronchus and used as an endobronchial tube. TIVA with propofol and remifentanil provided adequate depth of anesthesia during subsequent multiple episodes of ETT repositioning and apnea during surgery. At the resolution of surgery; reconfirmation of the trachea was confirmed with flexible bronchoscopy and patient was extubated.

Discussion: Airway management for tracheoplasty requires easy repositioning of ETT in the setting of one lung isolation. Previously described techniques require either modification of existing double lumen tubes by the surgeon (2) or specialized long reinforced ETTs (3) that may not be readily available. Here we describe a simple technique using reinforced endotracheal for left main stem intubation.

References:

Learning points: A safe anesthetic technique for tracheoplasty requires detailed understanding of the surgical procedure and close communication between the anesthesiologist and the thoracic surgeon. Here we present a simple alternative to the previously described airway management for tracheoplasty.

5506

Acute bleeding endobronchial tumour: a different airway approach

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Background: Surgical treatment of endobronchial tumours are always a challenge for the anesthesiologist due to differences when ventilating the patient, especially when an emergency occurs and this tumour starts bleeding. We present a case report of a patient with an acute bleeding endobronchial tumour in which an emergency thoracotomy was performed.

Materials and Methods: A 47-years-old woman with no significant past medical history, was hospitalized in the intensive care unit (ICU) because of respiratory insufficiency after repeated episodes of pneumonia. During a fibrobronchoscopy, an endobronchial mass that occluded the right main bronchus was detected and started bleeding after the procedure handling. The patient was intubated with a single lumen tube at the ICU and was transferred to the operating room for an emergent thoracotomy; an attempt of right selective intubation was performed without success, due to the blood in the endobronchial lumen the ventilation was impossible. When placed in left lateral decubitus, a severe hypoxaemia led to cardiorespiratory arrest. After 1 min of cardiac arrest and unachievable ventilation, we agreed with the surgeon to perform an emergent thoracotomy and a bronchotomy to place the tube in the left main bronchus. A right pneumonectomy was carried out. The patient remained in the ICU for five days, and was discharged after 7 days.

Discussion: Airway management in important bleeding endobronchial tumours is a critical situation that can override the traditional algorithms. A selective intubation must be considered preferable, with the setback that it would probably be a difficult fibrobronchoscopy because of the occupation of the lumen and must be performed blindly [1]. In extreme situations, a thoracotomy and placement of a tube through a bronchotomy can be considered.

Conclusion: Few cases of endobronchial intubation through a bronchotomy are reported. We could consider this approach in big endobronchial tumours, tracheal tumours or in blunt thoracic trauma when a double lumen tube is not possible to place. The relevance of this case report lies in the rarity of the technique performed to control the airway and to give an option for dealing with this uncommon and not necessarily catastrophic situation.

References:

4903

Autonomic stimulation is not different between single-lumen and double-lumen endotracheal intubation

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Background and Goal of Study: Tracheal intubation is associated with autonomic stimulation and adverse effects in susceptible patients. Traditionally double-lumen endobronchial intubation is considered mandatory during thoracoscopic surgery. Whether endotracheal intubation with a larger lumen of the endotracheal tube may exaggerate sympathetic stimulation is less investigated. The aim of this study was to determine if different intubation techniques may have an impact on the sympathovagal balance, which was evaluated using heart rate variability (HRV).

Materials and Methods: A total of 60 ASA class I-II patients 20-65 year of age were recruited. Thirty of them were scheduled for otorhinolaryngology surgery under general anesthesia with tracheal intubation of single lumen tube (group S), and the other 30 were scheduled for thoracoscopic surgery requiring double-lumen endotracheal intubation (group D). Heart rate variability was derived by continuous analysis and the HRV parameters of different groups were compared between three periods: (1) pre-induction baseline (2) pre-intubation and (3) immediately post-intubation. Two-way ANOVA with repeated measures was used for statistical analysis.

Results and Discussion: There were a significant increase in the HRV spectral power in low-frequency (LF) power bands for both single-lumen and double-lumen endotracheal intubation groups after intubation. Moreover, there was no significant difference between the single-lumen and double-lumen endotracheal intubation groups.

5573

Protocol: Utility of capnography and gas analysis in checking the correct placement and function of the double-lumen tube for one-lung ventilation

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Background and Goal of Study: During general anesthesia in thoracic surgery it is common to employ one lung ventilation (OLV) so immobility of the non-ventilated lung (NVL) facilitates surgical manipulation. On one hand this is achieved with a double-lumen endobronchial tube (DLT) which must be correctly positioned and sealed properly. For its placement, current gold standard is flexible bronchofibroscope. On the other hand, capnography and gas analyzer measures the gas mixture inhaled and exhaled by the patient and it is mandatory in interventions under general anesthesia. However, new utilities of this device are currently being studied. Goal of study: Evaluate the analysis of the gases from the NVL as a predictor of malposition or sealing failure of DLT during OLV compared to bronchofibroscope.

Materials and Methods: 21 patients scheduled for thoracic surgery with OLV using DLT in the HGUA from September until December 2nd, 2019. The method used was: After initiation of OLV, a diagnostic algorithm was followed that included: auscultation, data collected from NVL through a capnography accessory line connected to the clamped lumen of DLT (expiratory oxygen fraction and morphology of CO2 curve) and pressures and volumes recorded by the anesthesia station, to evaluate the position and sealing of the DLT. Findings were immediately compared to bronchofibroscope views. At the end of this study, results of both techniques were compared in 2x2 tables to estimate sensitivity, specificity, and positive and negative predictive values (PPV and NPV) of the new method compared to fibroscope.

Results and Discussion: This algorithm showed for all diagnosis a sensitivity and specificity of 50% and 86% respectively, with a 60% PPV and 81% NPV. Specifically, it detected distally displacement of DLT with 40% sensitivity and 100% specificity, showing 100% PPV. It also diagnosticated proximal displacement with 100% sensitivity and specificity. Even more, the algorithm allowed to detect sealing
problems of the tube before surgeon or anesthetist station notice it.

Conclusion: The gas analysis and morphology of CO2 curve of the clamped lumen is a good alternative to bronchoscopy being simpler, cheaper and less invasive method. Moreover, it allows to notice sealing problems not been detected by fibroscope and providing complementary and valuable information. Besides, we believe than with a larger sample of patients its effectiveness would be even more evident.

5846

Mediastinal mass, superior vena cava syndrome and respiratory failure: a case report

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Background: Anaesthesia for patients with mediastinal masses imply on imminent risk of airway collapse after induction.1 Superior vena cava syndrome is also a challenge because of its hemodynamic features.2 In this case we discuss a patient with both of the pathologies that presents for an emergency tracheostomy.

Case Report: 58 year old male patient, former smoker, treating hypertension and new onset hypothyroidism with a past of squamous cell carcinoma of the tonsil treated with chemoradiotherapy in remission for 3 years. He was brought to the surgical ward by the head and neck surgery team with breathing effort and laryngeal stridor to undergo emergency tracheostomy. The procedure was performed under sedation with dexmedetomidine and local lidocaine and it was noticeable that the blood flow through the IVs was dependable on the respiratory pattern. After the tracheostomy the patient maintained the breathing pattern and the differential diagnoses were addressed. He received treatment for bronchospasm with no improvement and only after the chest radiography, echocardiography and blood tests we could understand that he had severe haemodynamic and respiratory impairment due to a mediastinal mass occupying ¾ of the diameter of the chest, severe right atrium dysfunction with superior vena cava syndrome, hypoxaemia and sodium level of 100 mEq/L.

Discussion: These pathologies are often described as anaesthesiology challenges due to the ventilatory and haemodynamic components.1 The point-of-care evaluation of these patients can be decisive and the after-effects life changing. In this case we decided to proceed with a form of sedation that would maintain the respiratory drive2 and offer positive pressure (PSV), the only way we could ensure airway patency.

References:

5907

Insertion depth of double-lumen endotracheal tube (DLT) changes in repeat lung surgery

Myoga Y.1

Background and Goal of Study: Insertion depth of double-lumen endotracheal tube (DLT) changes with various factors such as body position and post-lung resection, and pleuropneumonia. Our purpose were to evaluate to change of the insertion depth from 1st lung surgery to 2nd lung surgery.

Materials and Methods: We retrospectively reviewed 1744 patients who underwent thoracic operations requiring intubation of DLT at our institution, using electronic chart, collected from August in 2010 to September in 2019. We extracted data on poly-surgery patients and calculated change of insertion depth from 1st lung surgery to 2nd lung surgery. Mann-Whitney U test was performed to analyze the effect of lung resection volume on change of insertion depth.

Results and Discussion: We identified 133 poly-surgery patients. 75 patients’ data sets of 1st and 2nd lung surgery’s insertion depth were missing. The median age of the 58 patients at the time of 1st lung surgery was 68 years (16–85). Operation included 55 lung resection and the others (empyema curettage). At 2nd surgery, there were three cases of intubation failure as follows: DLTs were misplaced to the right main bronchus in two cases, one was unable to be placed to the left main bronchus. The change of insertion depth from 1st surgery to 2nd surgery were 0 - 3 cm (Lobectomy at 1st surgery: 31 cases) and 2 - 1 cm (Segmentectomy or partial resection at 1st surgery: 24 cases). The absolute value of change in Lobectomy group (0 – 3 cm) was significantly larger compared to Segmentectomy or partial resection group (0 – 2 cm) (p = 0.03). In one empyema curettage case, the insertion depth became minus 4 cm due to abscess cavity.

6002

Impact of one-lung ventilation duration on the prognosis of patients undergoing lung resection surgery

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Background and Goal of Study: During thoracic surgery, periods of one-lung ventilation (OLV) are required in order to make easier the surgical technique. However, OLV could imply a negative impact on patients due to pathophysiology associated with it. The aim of our study was to assess the association between OLV duration and prognosis of patients undergoing lung resection surgery (LRS).

Materials and Methods: This is a sub-study of the randomized controlled trial NCT 02168751, performed in patients who underwent LRS and approved by the local Ethics Committee in Madrid, Spain in 2011. 174 patients scheduled for LRS were recruited and divided into 3 groups based on OLV time. Group 1 had OLV for less than 120 minutes, group 2 between 121 and 180 minutes, and group 3 more than 181 minutes. All patients were managed with the same anesthetist protocol and ventilatory settings. BAL was performed in both lungs before and after OLV period in order to determine inflammatory local biomarkers. They were measured using Western Blot. We recorded postoperative complications, survival and IL6/IL10 ratio. ANOVA test was used to compare between three groups, and Kaplan Meyer curves were obtained to assess long term survival. Statistical significance was defined as p-value <0.05.

Results and Discussion: Our results are shown in Table 1 and Figure 1. Postoperative pulmonary Complications (PPC), Acute Kidney Injury (AKI), hospital stay, IL6/IL10 ratio and mortality were higher in patients who had longer OLV (p<0.05). Limiting OLV time could decrease incidence of PPC observed in our study and long term mortality, although it should be balanced against a more difficult surgical technique.

Table 1. Postoperative complications related to OLV duration

<table>
<thead>
<tr>
<th>OLV duration</th>
<th>&lt;120min</th>
<th>121-180</th>
<th>&gt;181min</th>
<th>p-value</th>
</tr>
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<tbody>
<tr>
<td>PPC</td>
<td>9 / 15</td>
<td>9 / 16.7</td>
<td>15 / 31.7</td>
<td>0.041</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>4 / 33.3</td>
<td>4 / 42.4</td>
<td>14 / 23.3</td>
<td>0.005</td>
</tr>
<tr>
<td>Respiratory infection</td>
<td>3 / 6</td>
<td>8 / 11.1</td>
<td>2 / 23.1</td>
<td>0.023</td>
</tr>
<tr>
<td>Alveolitis</td>
<td>2 / 3.3</td>
<td>4 / 6.7</td>
<td>4 / 6.7</td>
<td>0.403</td>
</tr>
<tr>
<td>SODA/AL</td>
<td>0 / 0</td>
<td>0 / 0.04</td>
<td>3 / 5</td>
<td>0.045</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>3 / 5</td>
<td>3 / 5.5</td>
<td>7 / 13.7</td>
<td>0.31</td>
</tr>
<tr>
<td>AKI</td>
<td>2 / 3.2</td>
<td>1 / 1.9</td>
<td>9 / 15.5</td>
<td>0.009</td>
</tr>
<tr>
<td>Infection</td>
<td>10 / 16.7</td>
<td>12 / 22.7</td>
<td>17 / 28.3</td>
<td>0.209</td>
</tr>
<tr>
<td>Hospital stay</td>
<td>17 / 28.3</td>
<td>31 / 57.4</td>
<td>37 / 65.1</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

| IL6/IL10 dependent lung - End | 0.169 | 0.127 | 0.381 | 0.036 |

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Image 304x140 to 559x255
Detection sensitivity of bronchial intubation by auscultation.

A total of 206 patients were enrolled for analysis. A 77 yo, BMI 32, El Ganzouri 11, ASA 3 man was submitted to perioperative management could influence TB should be suspected in the scenario of incomplete OLV; the ventilated side, which is likely the cause for the reduced diagnostic sensitivity seen in bronchial intubation from auscultation.

Figure 1. Long term survival

Conclusions: Thoracic surgery is related to an important morbidity and mortality burden. Our study showed the association between PPC and long term mortality with duration of OLV.

6029

Analysis of respiratory sound monitoring on the non-ventilated side during one-lung ventilation

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Background and Goal of Study: Detection sensitivity of bronchial intubation by auscultation is less than 50%. One hypothesis for this is due to transmitted respiratory sounds from the ventilated lung. To better understanding this phenomenon, we investigated how the respiratory sounds change during one-lung ventilation from the non-ventilated side using a novel respiratory sound monitoring system.

Materials and Methods: Following approval from our institutional review board, 5 elective thoracic surgery patients were recruited. Tracheal intubation was performed with a double lumen endotracheal tube, and mechanical ventilation was continued throughout the measurement. Probes for the continuous respiratory monitoring were attached to the body surface. It was affixed to a total of 5 points at the nipple level: the midline, left and right anterior axillary lines, and at the midpoint between them. One-lung ventilation was performed interchangeably on the right and left lungs, and respiratory sounds were recorded on the ventilated and non-ventilated side.

The sound pressure for 30 seconds was analyzed for two frequency bands of 150-800Hz and 400-1200Hz and compared between the ventilated and non-ventilated lung areas. Statistical analysis was performed by paired t-test, and a P < 0.05 was considered significant.

Results and Discussion: At all measurement points, respiratory sounds were auscultated on the non-ventilated side. The sound pressure on the non-ventilated side averaged 33.3% (range 9.4-93.0%) of the sound pressure of the ventilated side. However, the difference between the two groups was small in decibel (average 11.0 dB). The respiratory sound ratio auscultated on the left side during right lung ventilation had higher than those on the right side during left lung ventilation (400-1200 Hz: 67.5±17.1% vs 37.0±18.6%, P=0.04, 150-500 Hz: 29.5±14.6% vs 11.0±4.5%, P=0.02). The sound pressure on the non-ventilated side was significantly higher in the 400-1200 Hz than in the 150-800 Hz (P=0.02).

Conclusion: By using a novel continuous respiratory sound monitor, we were able to quantitatively observe significant decrease lung sound on the non-ventilated side by about one third of the ventilated side during one-lung ventilation. However, even with this reduction respiratory sounds were able to auscultated on the non-ventilated side, which is likely the cause for the reduced diagnostic sensitivity seen in bronchial intubation from auscultation.

6040

Endobronchial blocker and tracheal bronchus: case of misdiagnosed congenital anatomic variant

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Background: In case of difficult airway management or predicted post operative mechanical ventilation, bronchial blocker (BB) are more often used compared to double lumen tube (DLT) to achieve selective one lung ventilation (OLV) during thoracic surgery. We describe a case of an incomplete OLV due to an aberrant tracheal bronchus (TB) arising from the right side of supracarinal trachea successfully managed with dependent lung apneic oxygen insufflation (AOI) interspersed to bilateral ventilation (BLV).

Case Report: A 77 yo, BMI 32, El Ganzouri 11, ASA 3 man was submitted to elective video assisted thoracoscopy surgery (VATS) due to upper lobe lung cancer. An awake fiberoptic (FB) intubation was performed and a right Arndt 7 french BB was inserted (Cook Medical, Bloomington, IN, USA), as we predicted a difficult airway management. Nevertheless, a complete collapse of right upper lobe, where cancer was located, could not be obtained. A right TB was suspected and confirmed by a carefully FB examination. Therefore, in order to not interrupt the procedure, BB was displaced on left bronchus; 5 minutes of 4 mL/kg of ideal body weight (IBW) BLV was alternated to 3 minutes of AOI on the dependent lung for a total time of 15 minutes. This procedure allowed to maintain an oxygen saturation of 93%, an end tidal carbon dioxide below 50 mmHg and surgery was completed as scheduled. At the end of surgical resection, BLV was re-established, BB was removed and the patient transferred in ICU for protected extubation. After 24 hours of monitoring, the patient was extubated without any complications.

Discussion: In the clinical scenario of incomplete lung collapse in patient submitted to OLV with BB, a TB should be considered. In these circumstances, is recommended the use of a DLT to achieve OLV completely. Nevertheless, DLT position could be challenging in case both predicted difficult airway management and post operative ventilation. In our case report, the displacement of BB in the left bronchus allowed AOI on the dependent lung and surgery was completed without any complications.

Learning Points: BB should be suspected in the scenario of incomplete OLV; displacement of BB on depend lung could allow AOI.

4317

Hypothermia is an independent risk factor for prolonged ICU stay in coronary artery bypass patients

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Background and Goal of Study: Perioperative management could influence outcomes in coronary artery bypass (CABG) patient, but its importance is less well documented. Maintaining normothermia was an important perioperative issue, and we would like to explore whether hypothermia on intensive care unit (ICU) admission was an independent risk factor for increased morbidity and mortality.

Materials and Methods: We collected medical and perioperative records for isolated elective CABG patients from Jan. 2018 to Jun. 2019. The outcome of interest was mortality, surgical site infection rate, ventilator dependent time, intensive care unit stay, and hospitalization duration. We did multivariate regression to adjust for age, sex and EuroSCORE II, and analyze the relationship of hypothermia during ICU admission and clinical outcomes.

Results and Discussion: A total of 206 patients were enrolled for analysis. 71 patients had off-pump CABG surgeries, and 135 patients had on-pump CABG surgeries. Hypothermia patients were taller (p=0.012), had lower LVEF (p=0.016), and more frequently had off-pump CABG (p=0.04). No 30-day mortality was noted in our analysis. Hypothermia was not associated with higher surgical site infection site or longer intubation time. After adjustment for sex, age, CPB duration, left ventricular ejection fraction, and EuroSCORE II, higher EuroScore II (p<0.001) and hypothermia on the admission to ICU (p<0.001) were independent risk factors for longer ICU stay.

Conclusion: In addition to EuroSCORE II, hypothermia on admission to ICU was an independent risk factor for prolonged ICU stay in elective coronary artery bypass patients.
Predictive value of STOP-BANG Score in patients undergoing Coronary Artery Bypass (CABG)

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Background: Obstructive Sleep Apnea (OSA) increases post operative cardiac complications and mortality in the general population. The STOP-Bang questionnaire was specifically developed to be an easy-to-use screening tool to predict risk patient having OSA. The association between STOP-Bang score and mortality and morbidity undergoing cardiac surgery is not well established. The study aims to determine the association between STOP-Bang score and composite cardiac outcome and 30-day and 1-year mortality in patients undergoing Coronary Artery Bypass (CABG). Secondary outcomes were pulmonary, neurological, infection, renal complications, re-operation and readmissions and length of stays.

Methods: This was a prospective cohort study of patients undergoing cardiac surgery. STOP-Bang questionnaire was administered prior to surgery. Ethics approval was obtained from Institutional Review Board. Patients are excluded if they had valvular replacement surgery. Peri-operative data and post operative outcomes including morbidity, mortality and length of stay was collected for a follow-up period of 1 year. COX proportional hazard was used for analysis of mortality, while multivariable linear or logistical regression models were used where appropriate for analysis.

Results and Discussion: Among 1349 patients recruited for the study, 919 patients met inclusion criteria and was categorized into Low (N=197), Intermediate (N=626) and High (N=626) risk groups based on STOP-Bang Score of 1-2, 3-4 and 5-8. The rates of composite cardiac complications were 53/197(26.9%) in low risk, 128/626(20.3%) in intermediate risk and 123/626(19.7%) in high group risk (p<0.077). STOP-Bang risk groups did not predict 30 day mortality (Ref group: Low risk. Intermediate risk p=0.576 and high risk p=0.448) and 1 year mortality (Ref group: Low risk. Intermediate risk p=0.988 and high risk p=0.345). In exploratory analysis, we found increased risk group was associated with increased risk of acute kidney injury (AKI) (Adjusted HR 1.39, [95% CI 0.21-0.63, p=0.036]) but reduction in re-admissions to ICU (Adjusted HR 0.49, [95% CI -0.024 - -1.40, p=0.49]). Subgroup analysis shows female and thinner patients have more re-admissions to ICU (p<0.05). There was no significant differences in other secondary outcomes.

Conclusion: STOP-Bang Score is not useful in predicting cardiac outcomes and mortality in patients undergoing CABG surgery, but may predict post-operative AKI.

The effect of low-opioid anesthesia on the level of endocrine-metabolic response and cardiосpecific enzymes during coronary artery bypass grafting (CABG) under artificial blood circulation (ABC)

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Background and Goal of Study: The effectiveness of multimodal low-opioid anesthesia as an anesthetic assurance technique during CABG surgery under ABC. Materials and Methods: The study included 96 patients aged 61±9.1 year who underwent CABG under ABC. Patients were divided into 2 groups. The induction in both groups was performed with propofol (1.3±0.3 mg/kg), fentanyl (1.3±0.2 mcg/kg), myorelaxation - plicseparonium bromide (0.08 mg/kg). The maintenance in Group I(n=46): sevoflurane (1.15MAK), lidocaine (bolus 1 mg/kg followed by continuous infusion 1.5-2 mg/kg/h), dexmethemidine 0.8 mg/kg/min., magnesium sulfate iv (20 mg/kg). The Group II (n=50) at this stage received: sevoflurane (1.5-2MAK), fentanyl (12.3±2.1 mg/kg for the entire operation). During the main stage we used artificial electric fibrillation. The level of endocrine-metabolic response was determined by measuring blood lactate and cortisol level dynamics in blood plasma. Results and Discussion: The average duration of anesthesia in the groups was 24 hours postoperatively (p > 0.05). In distribution of responders after PLR (p=0.83) and FCT (p=0.2) and in E/e’st (p<0.01). There was no significant differences in other secondary outcomes. By determining the Spearman’s rho was found that the increase in IL-6 was statistically significantly influenced by the anesthesia technique (p<0.018), and the age, the duration of fibrillation, the number of aortic dissections, the duration of ABC in Group I with the growth of IL-6 were not correlated (p>0.05). Conclusion: The multimodal low-opioid anesthesia technique did not have negative effects on the coronary blood flow, which can ensure adequate analgesia, indicated by the absence of endocrine-metabolic changes and has no pathologic effect on the dynamics of cardiосpecific enzymes.

The effect of high thoracic epidural anesthesia on response to fluid therapy and myocardial function after off-pump coronary artery bypass grafting

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Background and Goal of Study: In off-pump coronary artery bypass grafting (OPCAB), high thoracic epidural anesthesia (HTEA) with local anesthetics and opioids can provide effective analgesia and reduce the number of perioperative complications. However, the hemodynamic effects of HTEA in coronary surgery are controversial and require further evaluation. The aim of our study was to estimate the effects of HTEA on response to fluid therapy and myocardial function after OPCAB.

Materials and Methods: Twenty-nine patients scheduled for elective OPCAB were enrolled into a single center prospective randomized study. All patients received sevoflurane anesthesia (1 MAC) and fentanyl 2-4 µg/kg/h. The control group (n=15) in off-pump coronary artery bypass grafting (OPCAB), we used passive legs rising (PLR) test and fluid challenge test (FCT) (7 ml/kg of crystalloids at Th2-5 level with administration of 0.5% ropivacaine 1 mg/kg before surgery and at a rate of 2-4 mL/h. In the HTEA group (n=14), an epidural catheter was inserted and lidocaine (bolus 1 mg/kg followed by continuous infusion 1-1.5MAC), fentanyl (12.3±2.1 mg/kg for the entire operation). During the main stage we used artificial electric fibrillation. The level of endocrine-metabolic response was determined by measuring blood lactate and cortisol level dynamics in blood plasma.

Results: The multimodal low-opioid anesthesia technique did not have negative effects on the coronary blood flow, which can ensure adequate analgesia, indicated by the absence of endocrine-metabolic changes and has no pathologic effect on the dynamics of cardiосpecific enzymes.
the absence of median sternotomy, ice slush or a traumatic intubation; possibly necessary precautions to avoid long term morbidity.

Learning points: Postoperative VCP may result from multiple surgical and non-surgical factors. It is important to recognise various contributing factors and take necessary precautions to avoid long term morbidity.

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Intraoperative use of clonidine and dexmedetomidine for the prevention of postoperative delirium after coronary artery bypass grafting

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Background and Goal of Study: Delirium is a common complication after heart surgery. That is why, a large number of drugs, including clonidine and dexmedetomidine, have been proposed for the prevention of postoperative delirium. However, there is still no convincing evidence of their ability to reduce the mentioned complication significantly. The goal of our study was to evaluate the effectiveness of the intraoperative use of clonidine and dexmedetomidine for the prevention of postoperative delirium.

Materials and Methods: Within the study 200 patients who underwent surgical treatment for ischemic heart disease were randomized into three groups. The control group included 100 people, the clonidine group - 50 and the dexmedetomidine group - 50. Patients in all groups were comparable by gender, age, Charlson's comorbidity index, ASA and EuroScore II scores. All patients underwent general anesthesia (sevoflurane inhalation with intravenous infusion of fentanyl and propofol). Intraoperatively, dexmedetomidine or clonidine were used in a dose of 0.5 μg/kg/hour in clonidine and dexmedetomidine groups. The infusion started after anesthesia induction and lasted 2 hours after surgery. The existence of postoperative delirium was assessed by the Nursing delirium screening scale (NuDESC) during the patient's stay in the intensive care unit. Mean arterial pressure (MAP), heart rate (HR), need of inotropic support, delirium and postoperative mechanical ventilation duration were analyzed.

Results and Discussion: The frequency of delirium was significantly higher in the control group. Postoperative delirium was detected in 19 patients from the control group. The NuDESC scores also differed significantly among groups and they were lower in clonidine and dexmedetomidine groups. No significant difference in MAP, HR, need of inotropic support and delirium duration between groups was revealed. In control and clonidine groups the duration of postoperative mechanical ventilation was higher in comparison to the dexmedetomidine group.

Conclusion: Intraoperative use of clonidine and dexmedetomidine in the studied doses reduces the incidence of postoperative delirium after coronary artery bypass grafting and does not affect the hemodynamics significantly. However, the use of clonidine increases the duration of postoperative ventilation.

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The impact of anesthesiologist and surgeon performance on outcomes after coronary artery bypass surgery

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Background and Goal of Study: Coronary artery bypass grafting (CABG) is one of the most common procedures in cardiac surgery and disparities exist in clinical practice, especially in anesthesiology. This is further exacerbated when off-pump surgery is performed. We aimed to characterize the contribution of operators to outcomes after CABG.

Materials and Methods: We designed a retrospective cohort study including patients that had undergone CABG at our hospital from 2004 to 2014. We collected sociodemographical data, as well as variables relating to patient and surgery characteristics, postoperative complications including stroke, acute myocardial infarction or ischemia demanding reintervention, acute renal sepsis, and atrial fibrillation episodes, 30-day mortality after surgery and all-cause mortality up to the end of 2016. We used mixed effects multilevel models to ascertain the influence of anesthesiologists and surgeons on these outcomes as random effects, as well as the effect of patient and surgical risk in the form of EUROSCORE II and off-pump surgery. We compared models with and without random effects using the likelihood ratio test.

Results and Discussion: We included 3,303 patients with a median follow-up time of 5.8 years. The prevalence of off-pump surgery was 44.7%. We found a significant contribution of anesthesiologists to the incidence of postoperative ischemia (p<0.01). This outcome was also influenced by surgeons and off-pump surgery. This was the only outcome not significantly impacted by EUROSCORE II (p<0.001). Surgeons also significantly influenced the incidence of post-operative atrial fibrillation (p<0.001).

Conclusion: We report on the contributions of surgeon and anesthesiologist to outcomes after CABG. Studies with greater statistical power may perform subgroup analyses to bring out other intriguing associations and effect modifications reported in the literature.

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Ultra-fast-track anesthetic technique promotes extubation in the operating room in patients undergoing off-pump coronary artery bypass graft surgery

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Background and Goal of Study: To determine if implementation of ultra-fast-track anesthetic technique (UFTAT) promotes extubation in the operating room (OR) in patients undergoing off-pump coronary artery bypass graft (CABG) surgery.

Materials and Methods: Two groups represented UFTAT (n = 42) and standard anesthesia (controls, n = 22) techniques. Anesthetic protocol was executed with propofol, fentanyl, rocuronium, isoflurane, dexmedetomidine and high thoracic epidural analgesia in the UFTAT group and propofol, fentanyl, rocuronium, isoflurane in the control group. Active temperature control was an integral part of UFTAT technology. The fluid was preheated. Warming of the head and skin, moistened inhaled gases, a mattress with heating of circulating water and maintaining the operating room temperature of 24°C were used. The control group used heating of the head and skin, moistened inhaled gases, a mattress with heating of circulating water. The temperature in the operating room remained constant (20°C). The quality of sewn shunts in each patient was checked by means of intraoperative shuntography. In case of adequate myocardial revascularization and the absence of bleeding, through safety drains, activation of patients was used. Patients who did not satisfy extubation criteria within 20 minutes from the end of skin suturing transferred to the intensive care unit (ICU).

Results and Discussion: All patients in the UFTAT group were extubated in the operating room within 20 minutes after a skin suturing. None of the patients required reintubation. Postoperative PaO₂ were 88,8 +/- 7,2 and PaCO₂ 39,1 +/- 4,8. Rectal temperature decreased from 36,6 +/- 0,2 degrees to 36,2 +/- 0,3 degrees in the UFTAT group. ICU length of stay differed statistically significantly between the groups (p < 0.0001). Patients who were extubated in the operating room required lower nurse-to-patient acuity ratio (1:2) in the ICU. No difference was found in hospital length of stay. There were no perioperative deaths.

Conclusion: Implementation of UFTAT technique provided adequate hemodynamic control and facilitated extubation in the operating room in all patients. The impact of UFTAT on earlier patient discharge and actual cost savings requires further evaluation.
The relationship between transfusion and outcomes in patients undergoing isolate off-pump coronary artery bypass grafting

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Background and Goal of Study: The relationship between transfusion and clinic outcomes in patients undergoing off-pump coronary bypass grafting (OPCABG) was not clear. The aim of this study was to retrospectively study the relationship between perioperative transfusion and clinical outcomes in patients undergoing OPCABG after excluding time factor in a high-volume cardiac hospital.

Materials and Methods: Perioperative data of 2,178 patients who underwent isolated valve, or combined CABG and valve surgery were retrospectively analyzed.

Results and Discussion: No differences were seen in baseline and demographics. In postoperative ICU, we observed less administrations of fentanyl in the full sternotomy group (27% vs. 44% of patients, p<0.05). In the thoracic ward, a larger consumption of opioids was seen in postoperative day 5, 6 and 7 (figure 1, *p<0.05) in the ministernotomy group. The regression model revealed that the equipotent dose of opioids tended to be higher in the ministernotomy group (2.63 mg/day, 95%CI [-0.07 to 5.34], p=0.06). Moreover, the use of gabapentin was correlated with lower opioid administration (-10.55 mg/day, 95%CI [-31.2 to -5.8], p<0.01). In conclusion, these results point towards a larger administration of opioids in the ministernotomy group compared with full sternotomy in the first week after cardiac surgery.

Conclusion: Ministernotomy may not provide advantages in terms of analgesic administration in the immediate postoperative period. A multimodal analgesia strategy may be recommended in this category and its potential advantages could be the object of a next prospective study.

Multi-modal analgesia with wound infiltration after median sternotomy

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Background and Goal of Study: Opiate analgesics have been routinely used after cardiac surgery for postoperative pain control but have some unsavory side-effects which could delay patient recovery and prolong discharge after surgery. Infiltration of local analgesics at wound site could play as a part of opioid-minimizing multimodal pain regimen by blocking peripheral nerve. The aim of this study was to find out the efficacy of continuous local analgesics wound infiltration on decreasing post-cardiac surgery pain, opioid consumption, and effect on incidence of postoperative complications and enhancing recovery. It has also been thought that a smaller surgical incision would imply less postoperative pain. The aim of this study was to evaluate the consumption of opioids after ministernotomy in comparison with full sternotomy.

Materials and Methods: This was a retrospective observational study, including all patients for aortic valve replacement (AVR) (n=78) and combined AVR and coronary artery bypass grafting procedures (n=58) at Aalborg University Hospital during 2017. Data were collected by reviewing medical charts and compared using Student’s t-test, Mann-Whitney test, Chi-squared test, or Fisher’s exact test as appropriate. Regression analysis, adjusted for repeated measures and potential confounders, was used for comparison of equipotent opioid administration.

Results and Discussion: No differences were seen in baseline and demographics. In postoperative ICU, we observed less administrations of fentanyl in the full sternotomy group (27% vs. 44% of patients, p<0.05). In the thoracic ward, a larger consumption of opioids was seen in postoperative day 5, 6 and 7 (figure 1, *p<0.05) in the ministernotomy group. The regression model revealed that the equipotent dose of opioids tended to be higher in the ministernotomy group (2.63 mg/day, 95%CI [-0.07 to 5.34], p=0.06). Moreover, the use of gabapentin was correlated with lower opioid administration (-10.55 mg/day, 95%CI [-31.2 to -5.8], p<0.01). In conclusion, these results point towards a larger administration of opioids in the ministernotomy group compared with full sternotomy in the first week after cardiac surgery.

Conclusion: Ministernotomy may not provide advantages in terms of analgesic administration in the immediate postoperative period. A multimodal analgesia strategy may be recommended in this category and its potential advantages could be the object of a next prospective study.

Ministernotomy versus full sternotomy: a retrospective study of opioid consumption in the first postoperative period after cardiac surgery

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Background and Goal of Study: Most cardiac operations are conducted via full median sternotomy. In the past decades, various minimally invasive techniques have been flourishing, with ministernotomy being promising in reducing long term postoperative complications and enhancing recovery. It has also been thought that a smaller surgical incision would imply less postoperative pain. The aim of this study was to evaluate the consumption of opioids after ministernotomy in comparison with full sternotomy.

Materials and Methods: This was a retrospective observational study, including all patients for aortic valve replacement (AVR) (n=78) and combined AVR and coronary artery bypass grafting procedures (n=58) at Aalborg University Hospital during 2017. Data were collected by reviewing medical charts and compared using Student’s t-test, Mann-Whitney test, Chi-squared test, or Fisher’s exact test as appropriate. Regression analysis, adjusted for repeated measures and potential confounders, was used for comparison of equipotent opioid administration.

Results and Discussion: No differences were seen in baseline and demographics. In postoperative ICU, we observed less administrations of fentanyl in the full sternotomy group (27% vs. 44% of patients, p<0.05). In the thoracic ward, a larger consumption of opioids was seen in postoperative day 5, 6 and 7 (figure 1, *p<0.05) in the ministernotomy group. The regression model revealed that the equipotent dose of opioids tended to be higher in the ministernotomy group (2.63 mg/day, 95%CI [-0.07 to 5.34], p=0.06). Moreover, the use of gabapentin was correlated with lower opioid administration (-10.55 mg/day, 95%CI [-31.2 to -5.8], p<0.01). In conclusion, these results point towards a larger administration of opioids in the ministernotomy group compared with full sternotomy in the first week after cardiac surgery.

Conclusion: Ministernotomy may not provide advantages in terms of analgesic administration in the immediate postoperative period. A multimodal analgesia strategy may be recommended in this category and its potential advantages could be the object of a next prospective study.

Ultrasonography of the central veins through the supraclavicular view reveals pathology and provides solutions for optimal PICC line insertion

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Background: Novel supraclavicular ultrasonographic techniques allow for the visualisation of central veins including the right subclavian vein and both the right and left brachiocephalic veins. This facilitates an anatomical survey prior to catheter insertion and helps identify pathology. This case report presents a patient in whom a large, right-sided venous thrombus was observed allowing for an alternative approach with successful validation of catheter tip position.

Case report: A 38-year-old male with a history of acute lymphoblastic leukaemia was referred for PICC line insertion. Pre-procedural ultrasonography with a microconvex probe placed in the right supraclavicular fossa revealed a large, mobile thrombus at the junction between the right subclavian vein and the internal jugular vein without concomitant limb swelling. Hence, a left-sided approach was chosen. During catheter insertion, the confluence of the brachiocephalic veins was
visualised in real-time using the same supraclavicular view. The catheter tip was seen as it entered the superior vena cava ensuring optimal tip positioning (see figure). Upon insertion appropriate anticoagulant therapy was administered.

**Discussion:** The case presents a patient with asymptomatic deep vein thrombosis which would not have been discovered without a pre-procedural ultrasound examination. It is not recommended to insert a catheter in close proximity to a pre-existing thrombus, as there is a risk of thrombus dislocation and, in addition, the catheter may act as a substrate for further thrombus formation. In the present case, supraclavicular ultrasonography facilitated a change in strategy, and despite left-sided insertion correct catheter tip position was ensured in real-time.

**Learning points:** Supraclavicular ultrasonography allows for an anatomical survey of the right-sided central veins prior to PICC line insertion. When pathology is found, ultrasonography helps reveal feasible alternative strategies. The right-sided supraclavicular fossa view facilitates real-time confirmation of correct catheter tip positioning even in PICC lines placed on the left side.

**Materials and Methods:**


**References:**

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**5054**

**Lung ultrasound versus auscultation techniques in confirming endobronchial intubation in patients for thoracic surgeries**

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**Background and Goal of Study:** The lung condition during one lung ventilation (OLV) may be similar with the pneumothorax, which the lung ultrasound can detect with high specificity and sensitivity. We hypothesized that lung ultrasound may be effective as much as bronchoscopy for confirmation of double lumen tube (DLT) position. Therefore, for this purpose, we investigated the sensitivity, specificity, positive prediction value, negative prediction value, and overall accuracy of auscultation and lung ultrasound techniques.

**Materials and Methods:** We enrolled 30 patients who were aged above 18 years requiring endobronchial intubation for OLV. We excluded patients without lung sliding by lung ultrasound before anesthetic induction, and refusing to attend this study. For blinding, 4 researchers were involved in the measurement of one person responsible for auscultation (AR), lung ultrasound (UR), bronchoscopy (FR), and principal researcher (PR). After OLV, the AR first determined the success if the breathing sound was not heard in unventilated lung, and was clearly heard in the ventilated lung. And then, the UR determined the success if there was no lung sliding and was lung pulse. And then, the FR determined the success if the proximal part of the bronchial cuff was located directly below the carina. Finally, the PR recorded all inspection results and the time to complete each assessment in supine and lateral position. Examination result of FR was treated as that of standard test.

**Results and Discussion:** The sensitivity (100%), specificity (100%), positive predictive value (63.3%), negative predictive value (0%), and accuracy (63.3%) of ultrasound was as same as that of auscultation in the supine position. The sensitivity (100%), specificity (57.1%), positive predictive value (85.2%), negative predictive value (100%), and accuracy (66.7%) of ultrasound was as same as that of auscultation in the lateral position. The total time for bronchoscopy was significantly longer than that for auscultation (P = 0.002 in supine position, P = 0.001 in lateral position), and slightly longer than that for lung ultrasound (P = 0.035 in supine position, P = 0.234 in lateral position).

**Conclusion:** Lung ultrasound as well as auscultation techniques are effective as much as bronchoscopy for confirmation of DLT position, even though the total time for estimation by auscultation was significantly shorter than that by lung ultrasound.
The association between preoperative hepatic venous flow and the outcome after cardiac surgery

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Background and Goal of Study: The hepatic venous flow reflects to the pressure changes of the right ventricle. Therefore, it starts to appear as a part of the echocardiographic examinations. Moreover, the back and forth link between the cardiovascular state and the liver is well-known for several years. Our objective was to evaluate the association between preoperative hepatic venous flow and the outcome of patients undergone cardiac surgery.

Materials and Methods: Our prospective, observational study included 79 patients who underwent cardiac surgery between January 2018 and October 2019 at our Heart and Vascular Centre. Beside the routine echocardiographic examination we also measured the venous blood flow in the common hepatic vein before the flush into the Inferior Vena Cava with Doppler ultrasound. We recorded the standard four waves (V, D, S, A) maximal speed and velocity time integral (VTI). In our database we recorded the patients’ demographic data, preoperative and postoperative hemodynamic and hepatobiliary markers and the EuroSCORE. We collected the length of stay (LOS), the intensive care unit stay, the vasopressor and inotrope need, and the occurrence of acute kidney injury (AKI). Our primary outcome was AKI. It was defined by the Kidney Disease Improving Global Outcomes (KDIGO) guidelines, which is one of the first signs of circulation problems. We used SPSS 22 program to analyse our data, with descriptive parameters and Cox-regression analyses.

Results and Discussion: Median age was 67.9 (IQR 25-75: 60.6-73.6), none of them had any liver or renal disease in their medical history. Most common surgical procedure was aortic valve surgery (27, 34.1%). During the first postoperative week 14 patients developed AKI (17.8%). Multivariate Cox-regression analysis revealed, that the ratio of the retrograde and antegrade waves: VTI had independent association with AKI (OR: 1.35; 95% CI: 1.03-1.75; p=0.027), the model was adjusted for the EuroSCORE.

Summary: The increment in the hepatic venous retrograde waves, which are related to hepatic stasis, can predict worse outcome among cardiac patients. Therefore, we might include this potentially useful tool in routine echocardiographic examinations.

Echocardiographic outcomes of intraoperative transprosthetic cuff leakage of biological aortic valve replacement in a single centre

Ito H.

Background and Goal of Study: Intraoperative transprosthetic cuff leakage (TCL) which is paravalvular (PVL) or transvalvular leakage (TVL) after biological aortic valve replacement (AVR) has been recently reported. Although some studies have described the incidence of aortic TCL, there is a paucity of evidence regarding their time course of TCL. The aim of this study is to compare the short and long-term echocardiographic outcomes of TCL.

Materials and Methods: The study comprised adult patients undergoing biological AVR between January and November in 2019. TCL were determined whether trivial or greater TCL quantified using intraoperative transeosophageal echocardiography (TEE) and postoperative TTE. TEE performed prior to weaning from the cardiopulmonary bypass, immediately after aortic declamping and follow-up with protamine administration. For each of the patients we recorded the pre-operative echocardiographic data as well as the post-AVR echocardiographic outcomes at day 7 and 1 month.

Results and Discussion: Twenty five patients using four types of aortic bioprosthetic valves (Inspiris, Magna Ease [Edwards Lifesciences, Irvine, CA USA], DUROMEDICS Edwards bileaflet mitral valve, DUROMEDICS Edwards bileaflet mitral valve). Most common surgical procedure was aortic valve surgery (27, 34.1%). During the first postoperative week 14 patients developed AKI (17.8%). Multivariate Cox-regression analysis revealed, that the ratio of the retrograde and antegrade waves: VTI had independent association with AKI (OR: 1.35; 95% CI: 1.03-1.75; p=0.027), the model was adjusted for the EuroSCORE.

Summary: The increment in the hepatic venous retrograde waves, which are related to hepatic stasis, can predict worse outcome among cardiac patients. Therefore, we might include this potentially useful tool in routine echocardiographic examinations.

Pericardial Effusions in Cancer Patients: Anesthetic Management and Survival Outcomes

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Background and Goal of Study: Malignancy is a common cause of pericardial effusion. Previous reports have studied survival and effusion recurrence rates after different surgical interventions for pericardial effusion in cancer populations but no study to date examines effect of intraoperative anesthetic management on long-term survival outcomes in cancer patients. Primary outcome is overall survival. Secondary outcomes are 30-day survival, 90-day survival and in-hospital survival.

Materials and Methods: After IRB waiver, retrospective review of 150 cancer patients between 2011-2015 in a single quaternary cancer center. All patients with malignancy and pericardial effusions requiring drainage were included. Data from electronic health record included preoperative and intraoperative data. Overall survival was measured from date of surgery to date of death in June 2019.

Results and Discussion: Median survival was 5.84 months, with an in-hospital...
mortality of 13.3%, 30-day mortality of 19.3%, and a 90-day mortality of 36.7%. Univariable analysis showed metabolic disease (HR, 1.772; p=0.026), malignant pericardial effusion cells (HR, 1.499; p=0.032) were associated with decreased overall survival. After multivariable analysis, the only statistically significant factors affecting mortality are high initial heart rate (HR, 1.182; p=0.005) and intraoperative sinus tachycardia (HR, 1.862; p=0.012).

Conclusion: Mortality after pericardial wondow on oncologic patients remains high.

High starting heart rate and sinus tachycardia are associated with worse survival. Initial high heart rate and intraoperative sinus tachycardia were only significant factors affecting mortality. The malignancy type and preoperative presence of tamponade physiology are not associated with difference in mortality. Intraoperative factors such as choice of induction agents, paralytics, utilization and timing of arterial line, and time of day surgery took place are not associated with a statistically significant difference in mortality outcome after multivariable analysis.

References:

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Cerebral oximetry changes and postoperative delirium in adult cardiac surgery patients

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Background and Goal of Study: Postoperative delirium is associated with increased morbidity and mortality. We hypothesized that changes of regional cerebral oxygen saturation would influence the incidence of postoperative delirium after cardiac surgery. The aim of this study was to analyse the relationship between intraoperative cerebral oximetry changes and the postoperative delirium incidence after adult cardiac surgery in our setting.

Materials and Methods: This was a prospective observational study. After obtaining institutional Ethics Committee approval and written informed consent; all consecutive adult patients scheduled for elective cardiac surgery with cardiopulmonary bypass (CPB) were enrolled during 3 months (from February to April 2019). Recorded variables were: demographics, preoperative medication, perfusionist cognitive function using Mini-Mental-State-Examination (MMSE), basal educational level, comorbidities, EuroScore, intraoperative data (type of surgery, CPB time, regional cerebral oximetry (rSO2) and desaturations >20% from basal values (1 minute or longer) at different times, ICU and in-hospital length of stay) and postoperative data (intubation time, transfusion, presence of shock, need of vasoactive drugs, etc.). Postoperative delirium was assessed by using the confusion-assessment-method for the intensive care unit (CAM-ICU) during 10 postoperative days. Student’s t-test and Chi-square test were used for analysis.

Results and Discussion: A total of 90 consecutive patients were included (25% women; 100% ASA IV, mean age 67.7±11.3 years, mean body mass index 28.63±4.4 kg.m-2). 6.7% of them developed delirium postoperatively according to the CAM-ICU criteria; none of these patients presented a decrease of baseline rSO2 value >20% intraoperatively (p=0.48). Postoperative noradrenaline requirements in ICU were higher in patients with postoperative delirium (p=0.012). 66% of the patients that presented delirium had a low daily physical activity preoperatively. No other differences were found between patients with or without delirium.

Conclusion: In our setting the delirium incidence was low and no relationship between intraoperative cerebral oximetry changes and postoperative delirium incidence after adult cardiac surgery with CPB was found. The use of noradrenaline in the ICU was associated with a higher incidence of postoperative delirium in our patients. More studies are needed to explore this hypothesis.
Background and Goal of Study: Re-do cardiac surgery carries certain risks of myocardial injury especially during exploration. Damages to the mycardium may be life threatening and consequences may increase the hospital costs. The aim of the current research is to investigate the safety and cost-effectiveness of preoperative cannulation and conventional approach techniques.

Materials and Methods: In total of 63 patients whom underwent re-do open cardiac procedures between September 2015 and September 2017 are grouped into two groups as; Group A (n:31): conventional cannulation after sternotomy and Group B (n:32), cannulation before sternotomy group. Patients were evaluated retrospectively for general complication rates and total hospital costs.

Results and Discussion: Mortality occured in 4 patients in Group A and in 1 patient in Group B. Four patients required ECMO in Group A where as 2 in Group B. Duration of total operation, cardiopulmonary bypass and cross clamp time were longer in the conventional surgery group than pre-sternotomy cannulation group (420.29±188.84 vs 314.77±187.36, p: 0.036; 171.87±85.59 vs 141.7±82.47, p: 0.089; 102.9±47.6 vs 60.97±52.81, p: 0.009; respectively). Total blood and blood product use were higher in Group A when compared with Group B. Postoperative intensive care unit stay was 62.77±145.3 hours vs. 25.13±73.11, ventilation time 5.16±5.09 hours vs. 3.03±2.78 hours; duration of ward stay was 5.23±2.52 days vs. 5.57±2.16 days and hospital stay was 9.58±5.31 days in conventional sternotomy and pre-sternotomy cannulation groups. Total hospital costs were calculated as patients who are underweight has worse reserves after cardiac surgery. Rather than the obesity paradox, one might call it the Lean paradox underweight and obese patients, but the obese patients have less postoperative complications. Therefore, rather than the obesity paradox, we might call it the Lean paradox.

Conclusion: Arterial and venous cannulations before sternotomy decreased myocardial injury and complication rates, blood and blood product use, hospital stay and in the end hospital costs in our modest cohort.

Comparison of the ultrasound sonorheometry based Quantra® System with rotational thromboelastometry (ROTEM ® Sigma) in cardiac surgery

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Background and Goal of Study: In cardiac surgery point of care coagulation monitoring is commonly used for detection of severe coagulopathy enabling goal-directed and timely treatment. Measures of the novel sonorheometry based Quantra Viscoelastic Hemostatic Analyzer (HemoSonics, Charlottesville, VA, USA) were compared with corresponding results of the ROTEM sigma device (Instrumentation Laboratory, Bedford, MA, USA).

Materials and Methods: In elective cardiac surgery patients, blood samples were taken after induction of anesthesia (sample 1) and after termination of cardiopulmonary bypass and heparin neutralization (sample 2). Samples were measured on Quantra (QPlus cartridge) and ROTEM sigma device with recording of time-to-results (first available and complete), clot times and clot stiffness values. For comparison of clot stiffness values, ROTEM amplitudes (A in mm) were converted to shear modulus (G) in hectoPascal (hPa): G (hPa) = (500xA) / (100-A). Correlation was evaluated by Spearman rank test. Bland Altman analysis was performed to determine agreement of methods. P-value <0.05 indicated statistical significance.

Results and Discussion: A total of 1337 patients were included in the study. 45 (3.4%) were underweight while 342(25.6%) are obese. Although there were less 30-day mortality in obese group vs normal weight group (Adjusted HR (95% CI): 0.50 (0.14-1.23), p=0.014), there was no difference in Underweight vs Obese (Adjusted HR (95% CI):0.96 (0.74-0.83), p=0.92). The 1-year mortality is significantly more in underweight (Underweight vs Normal, Adjusted HR (95% CI): 0.66 (0.59-0.75), p=0.039), but there was no difference between underweight and obese groups (Adjusted HR (95% CI):1.06 (0.6-0.88), p=0.32). Exploratory analysis shows obese patients and more protected from pulmonary complications, re-operations, re-admissions to Intensive care unit (ICU), length of stay in both ICU and hospital, and there was difference in risk of acute kidney injury and cardiac complications (figure 1).

Conclusion: There was no difference in 30-day and 1 year mortality between the underweight and obese patients, but the obese patients have less postoperative complications. Rather than the obesity paradox, one might call it the Lean paradox as patients who are underweight have worse reserves after cardiac surgery.
Burnout syndrome among healthcare professionals of Centre of Cardiac Surgery

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Background and Goal of Study: Healthcare professionals with high occupational load work under a stressful environment which can lead to burnout syndrome. The purpose of the study was to investigate the degree of burnout syndrome experienced by anesthesiologists in comparison with surgeons and cardiologists in Cardiac Surgery Centre of Kaliningrad and justify the need for education in stress management.

Materials and Methods: Forty-eight health professionals were surveyed. The sample was divided into three groups: anesthesiologists (n=16), surgeons (n=17) and cardiologists (n=15). There were 18 female and 30 male respondents. The questionnaire of burnout by V. Boyko was used to measure symptoms, phases, and degree of burnout syndrome.

Results and Discussion: We observed symptoms of burnout in all participants of the study. Comparative analysis showed lower degree of burnout among anesthesiologists in comparison with surgeons and cardiologists (p<0.05). In the group of anesthesiologists, the burnout symptom - reduction of professional accomplishment (p≤0.01), personal accomplishment (p<0.01), psychosomatic and psycho-vegetative problems (p<0.05), and experience of posttraumatic events (p<0.05). Our results revealed significant differences between anesthesiologist, cardiologists, and surgeons in the following symptoms: depersonalization (p<0.01), personal accomplishment (p<0.01), psychosomatic and psycho-vegetative problems (p<0.05), and experience of posttraumatic events (p<0.05).

Conclusion: Specialisation based strategies in stress management education are needed to overcome the difficulties of emotionally charged issues of health professionals.

Acknowledgements: A. Vygovskiy, Yu. Shnedyer, Federal Centre of High Medical Technologies, Kaliningrad, supported this research.
Background and Goal of Study: The UK National Quality Improvement Programme for the management of Abdominal Aortic Aneurysm (AAA) identified multi-disciplinary team (MDT) meetings including anaesthetic assessment to be key to effective care. Studies in cancer suggest that 15% of MDT decisions are not implemented.(1) This service evaluation reviewed decision implementation following a vascular MDT and the factors affecting the decision-making process.

Materials and Methods: Consecutive AAA patients discussed at the vascular MDT at a large UK teaching hospital between October 2017 and August 2018 were identified. Data on MDT decision and clinical management were collected from the electronic health record. Actual management was compared to the MDT decision and coded as concordant, discordant or undecided. Cases coded as discordant or undecided were reviewed to identify contributing themes. Data are reported as number[%] and median[IQR].

Results and Discussion: 530 patients, (age 78[59-96] years, 85[80%]) male, were discussed in 421 meetings. Meetings were attended by 3[1-6] interventional radiologists, 6[4-11] surgeons, and 1[0-1] anaesthetists. Aneurysm size was 6.0[5.0-9.5]cm. 52(7%) patients were discussed at one MDT, 20(15%) at two, and 4(4%) at three MTDs. Following the first MDT 23(22%) patients did not have a settled management plan; this reduced to 12(11%) by the end of the MDT process. 18 of the 24 repeat discussions were prompted by the absence of key clinical information, including anaesthetic or cardiopulmonary assessment, at a prior MDT. Planned management was not implemented in 11(10%) of the 94 patients who had a settled management plan. Reasons for deviation from the MDT decision were multifactorial. An incomplete assessment of the severity of comorbidity was important in 3 cases. Patient preference was a key factor in 8 cases.

Conclusion: Our data suggest that failure of information from preoperative investigations and anaesthetic assessment to be transmitted to the MDT played a role in the need for multiple MDT discussions and may have contributed to delays in care. Complete assessments of co-morbidity or patient choice were important in the majority of patients who did not receive planned care. These may be addressed by changes to the preassessment process. We are now conducting qualitative work to inform process improvement for our MDT.


6182

Dynamics of neuropsychological testing results as a response of patients with surgical aortic pathology to surgery using cardiopulmonary bypass

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Background and Goal of Study: The aim of the work was to analyze the dynamics of the results of neuropsychological testing as a reaction of patients with surgical aortic pathology to the surgical intervention using cardiopulmonary bypass (CPB). Materials and Methods: In 118 patients with surgical pathology of the aorta (SPA) against the background of general anesthesia in the context of CPB, a comprehensive medical and psychological study of cognitive function was performed the day before the operation, on the third, seventh and fourteenth day of hospital stay. Patients were divided into 2 groups: group 1 included 46 patients who were additionally assigned a solution of D-fructose-1,6-diphosphate sodium hydrate (esophosphine). The cognitive abilities of patients were determined by the MMSE scale, by the 5-word test, by the Doskin well-being scale, and by the correction test using the Anfimov tables.

Results and Discussion: Statistical analysis of changes in cognitive abilities on the MMSE scale in the postoperative period in patients of groups K, I and II with SPA showed that surgery itself - operational stress, as well as general anesthesia and the use of the CPB device during surgery adversely affect almost all indicators of PCD. It can be noted that the indicator of PCD depends on the severity and the type of CPB device used during surgery, as well as on the patient's preoperative condition.

Conclusion: It can be noted that the indicator of PCD depends on the severity and mechanisms of the effect of hypoxia on the background of artificial brain perfusion, the most influential factor in assessing the patient's condition in the postoperative period.
Acute and Chronic Pain Management and Palliative Medicine

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Prolotherapy for the patients with chronic pain: Systematic review and meta-analysis

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Background and Goal of Study: Chronic pain (>3 months) involved in musculoskeletal system is usually due to the laxity of ligaments or tendons by strains, tearing of the fibers after trauma. Nonsurgical treatment such as prolotherapy can provide a cost-effective, reduced risk, and rapid healing, which is an injection treatment to stimulate healing process for the loosened ligament and tendon. Dextrose is currently most common being used. Recently many literatures about the effect of prolotherapy with dextrose including randomized controlled trials (RCTs) have been published. However, the real benefits may be affected by differences in injection protocols, comparative regimens, and evaluation scales. The aim of this systematic review and meta-analysis is to determine the effectiveness of prolotherapy for long-term treatment of chronic musculoskeletal pain and osteoarthritic pain.

Materials and Methods: We searched Medline (n=250), Embase (n=64), Cochrane Central (n=168), KoreaMed and KMbase (n=198) databases through March 2019 to identify relevant RCTs. We conducted a systematic review and meta-analysis according to the Cochrane Collaboration guidelines. The primary outcome of interest was pain score change during daily life. Effects were summarized using standardized mean differences (SMD) compared to other therapies such as exercise, saline, platelet-rich plasma and steroid injection.

Results and Discussion: Ten RCTs involving 608 participants were included in qualitative and quantitative synthesis. The prolotherapy with dextrose compared to saline significantly reduced the pain score from 6 months to 1 year [SMD=-0.44 (-0.76,-0.11)] and compared to exercise [SMD=0.42 (0.77,0.07)]. However, dextrose injection did not showed significant difference compared to 0.1% capsaicin-rich plasma [SMD=0.19 (-0.20,0.59)] and steroid injection [SMD=0.45 (0.57,1.47)].

Conclusion: Overall, prolotherapy using dextrose provide a positive and significant beneficial effect in the treatment of chronic pain followed from 6 months to 1 year. There is an evidence of better therapeutic effect than exercise, and showed a corresponding effect over platelet-rich plasma or steroid injection. Adequately powered, long-term trials with uniform end points are needed to better elucidate the efficacy of prolotherapy.

4619

Facial neuropathic pain: a successful clinical case with 8% capsaicin patch

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Background: Neuropathic pain is defined as a direct consequence of an injury or disease that affects the somatosensory system and may affect 7-10% of the world population. It is often described as disabling, chronic, difficult to treat and with a noticeable impact on patients’ quality of life.

Case Report: Female patient, 37 years old, is referred to the Chronic Pain consultation on after 5 years of medical follow-up with marked unsuccessful of the therapy instituted for neuropathic pain. In the early beginning, the patient described a two-week history of left maxillary pain with progressive, constant worsening, with exacerbating factors such as temperature variations or wind. She turned to the doctor when her symptomatology culminated in the sudden onset of paralysis of the left hemifacial mimic muscles. Approximately one month after this clinical scenario, a vesicular rash in the left mandibular zone and upper left cervical platysma appeared, with resolution after the applied therapy. The pain, however, remained to this day. Regardless of the specific underlying etiology, either left peripheral facial paralysis associated with trigeminal neuralgia, with later onset of herpes zoster, or, left peripheral facial paralysis with associated ipsilateral post herpetic neuralgia, the patient underwent extensive classical therapy covering both diagnostics, always showing, however, a markedly ineffective pain control. The therapeutic success was only obtained after the first application of 8% capsaicin facial patch, with an extended pain-free interval and a consequent significant increase in quality of life.

Discussion: Not only for this case report, but also the successful clinical case recorded at our institute, patients with facial neuropathic pain showing poor adherence to therapy or treatment ineffectiveness, might be candidates for the 8% capsaicin patch facial application, which, we believe, will become a valid option in such patients in the near future.


4766

Different patterns of opioid interactions on oxidative-antioxidative balance in chronic non-cancer pain

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Background and Goal of Study: The oxidative - antioxidative balance is the crucial mechanism of opioid-induced immunomodulation. This phenomenon was clearly described in opioids abuse. This is interesting to evaluate the importance of this subject in chronic pain. The aim of the study was to investigate the oxidative – antioxidative homeostasis using serum total oxidative capacity (TOC) and total antioxidative capacity (TAC) tests in patients with chronic non-cancer pain treated with opioids.

Materials and Methods: The project was approved by Ethical Committee and supported by Medical University in Białystok (Poland). The serum TOC and TAC measurements were performed in total group of 50 adult patients: Study Group - 36 patients with chronic Low-Back Pain with opioids pharmacotherapy and Control

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Traction therapy For Post Neck Pain with Disc Herniation traction® (Pilot study)

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Background and Goal of Study: ‘Disc Herniation traction’ is developed to perform the role of expanding the interspinal space by traction around the cervical spine. Spinal cord traction therapy is widely used because its efficiency and efficacy are widely recognized in clinical practice. The purpose of this pilot study is to apply the developed device (Disc Herniation traction®) to the actual clinical environment and to understand its effects and side effects.

Materials and Methods: Ten patients, American Society of Anesthesiologists physical status I or II, aged 20-65 years, scheduled for orthopedic surgery or pain clinic outpatient follow up, due to post neck pain. Group A - 5 patients who applied Disc Herniation traction®. Group B - 5 patients who not applied any traction therapy. Group A received 3 minute traction therapy of 2 times a day objectively with Disc Herniation traction®. ROM (range of motion), NRS (numeric rating scale), SAT (patient satisfaction), and side effects were checked at 15, 30, 60 minutes after procedure and 7 days after each therapy.

Results and Discussion: The ROM was different between the two groups. The NRS in Group B were higher than in Group A at 15, 30, 60 minutes and 7 days after each procedure. The traction pain was detected in Group A. The SAT in Group A were higher than in Group B at 15, 30, 60 minutes and 7 days after each procedure. Side effects were not seen.

Conclusion: We conclude that traction therapy can be a good substitutive treatment or adjuvants for post neck pain management of disc or spinal stenosis disease with Disc Herniation traction®. Compared to a long period of pain, traction therapy with Disc Herniation® Immediate treatment was also instantaneous and effective. This allows effective early treatment and prevents the post neck pain of neuroaxial spine origin.

Severe atrophy of the ipsilateral psoas muscle associated with hip osteoarthritis

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Background: It is difficult to diagnosis the origin of lower leg pain in patients with both psoas muscle atrophy and hip joint osteoarthritis. However, hip arthritis is usually an uncomplicated diagnosis by itself that should not be overlooked as this could lead to inappropriate spine surgery. Case Report: We report a patient with lower leg pain who did not respond to spinal blocks, but in whom hip osteoarthritis was considered since severe atrophy of the ipsilateral psoas m. was identified on MRI. The patient was a 54-year-old female with chronic rt. anterior hip pain with radiation above the knee and mild back pain. Prior to visiting our clinic, she had been diagnosed multilevel lower lumbar degenerative changes, including a disc bulging and foraminal stenosis at L2-3, L3-4 and L4-5 on MRI, and received transforaminal epidural blocks. The blocks were not effective for her anterior hip pain, and so surgery was planned. But she refused to have surgery and visited our clinic. On physical examination, she showed a positive result for Patrick’s test. She was unable to extend fully her right hip joint to neutral because of reproducing the hip pain and a sensation of tightness. We had a clinical suspicion that her right hip pain had been caused by other problems, and so rechecked her MRI and were able to identify a severe atrophy of rt. psoas m. (Figure 1). And x-ray showed rt. hip joint osteoarthritis with narrowing of joint space. We performed US guided intra-articular injection of the rt. hip. Her pain was 70~80 % reduction after injection. But the limitation of range of motion of rt. hip joint was remained. After 1 week, the anterior hip pain aggravated gradually, and then the patient was referred to orthopedic surgery for consideration of hip joint arthroplasty.

Discussion: Weakness of the psoas m. related to compression of 2-4 spinal roots has been reported as a clinical feature of lumbar spinal stenosis. Report shows that in as many as 50% of elderly patients, MRI could give a false positive diagnosis of spinal stenosis.

References:

Learning points: It is necessary to have attention of excluding the presence of osteoarthritis of the ipsilateral hip because degenerative disease of the hip also can be associated with reduction of strength in the psoas m.

5601

Case report: transcranial magnetic stimulation to control refractory central pain; with evaluation by the Qualitative Sensitive Test (QST)

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Background: Classified as a neuropathic pain, the central pain is usually caused by a structural injury of the central nervous system (CNS). It is considered one of the most complex and intriguing painful syndromes; its intensity varies from moderate to disabling. It demonstrates a mood change in 87% of cases and sleeping disorder in 50%. The Qualitative Sensory Testing (QST) evaluates small sensitive nerve fibers, in a controlled way, quantifying the threshold of sensitivity and pain; being a noninvasive method to access the sensory function. With a challenging diagnosis and difficult treatment, full control of the pain is improbable; aiming the balance between the best analgesia and maintenance of a desirable cognitive and functional ability.

Case Report: We report the case of a 59-year-old woman with central pain in left dimid after a stroke in 2016, presenting hypodense, cortical and subcortical region, right parieto-temporal, on CT scan. Accompanied by the neurology service and Pain Management Clinic of Hospital Universitário Pedro Ernesto (RJ). She received optimized pharmacological therapy, psychosocial and physiotherapy support; with no satisfying improvement of the pain and humor. Being proposed then a Repetitive Transcranial Magnetic Stimulation (RTMS), Protocol attack with ten sessions in three weeks and a maintenance monthly session; with evaluation by QST before and after the treatment.

Discussion: The difficulty of diagnosis of symptom quantification interfere in the treatment, presenting poor results in monotherapeutic approaches. The association of techniques with pain description suggests benefits for improving quality of life. Some previous studies demonstrate positive effect of RTMS in motor cortex to control the central pain after ischemic cerebrovascular accident, and the permanence of this effect for approximately 2-4 weeks. Hasan & cols (2013); Saitoh & cols (2013); de Oliveira & cols (2014).

References:

Learning points: Central pain as a syndrome that is difficult to control and often disabling. Difficulty of measuring the pain (subjectivity). Frustrating treatment for both professional and patient.
pain attack frequency was 6.7±2.0 and 6.2±1.9 days per month, total PCS score – 22.4±8.1 and 19.8±9.2 points in the study and control groups, respectively. After the 3-months treatment, VAS score was significantly lower in the study group (1.5±0.4) than in control group (2.7±0.7; p<0.05), as well as total PCS score (12.4±8.1; 15.7±10.6 respectively; p<0.05).

Conclusion: Art therapy may be a safe and cost effective intervention as an adjunct to traditional medical management in chronic migraine patients.

References:

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Prosopalgia As One Of The Syndromes Of Fibromyalgia

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Background: Fibromyalgia(FM) is one of the most persistent chronic pain syndromes and is common with a prevalence of 6% in the population. Patients with FM often go to doctors of various specialties and do not always receive proper therapy.

Case Report: Patient E., 43 years old, came to the Pain Clinic in September 2018 complaining of constant aching, pressing, bursting pain in the upper jaw and cheeks, articulation and chewing disorders, symmetrical pain in neck, shoulders and back, intensity of 7-8 points on the Visual Analogue Scale (VAS); night awakenings, tiredness in the mornings. The patient first contacted a neurologist in 2013 with complaints of severe pain in the right shoulder’s muscles and back. She received treatment: lidocaine blockades of trigger points, pregabalin 150 mg/day, injections of botulinum toxin type A (BTA)/Stifund with a positive effect. In May 2016, after the right molar of the upper jaw extraction there was an aching pain in the right side of the face, and later intense (8-9 by VAS) throbbing pain in the face. From 2016 to 2018, the patient was consulted by neurologists, dentists, orthodontists, maxillofacial surgeons with the following diagnoses: chronic trigeminal neuralgia, myofascial facial pain syndrome, chronic subluxation of the lower jaw heads, somatoform disorder. She regularly received treatment with a change of methods: orthopedic correction with a relaxing mouth guard, constant wearing of a corrective mouth guard to position the jaw, analgesics, anticonvulsants, tricyclic antidepressants in short courses, BTA, alternative medicine. Nevertheless, pain syndrome persisted and significantly impaired the patient’s quality of life. Objectively no data for focal tenderness were obtained. In the pain clinic patient was diagnosed with fibromyalgia, bilateral myofascial facial pain syndrome. Duloxetine 60 mg/day for 6 months, clonazepam 0.5 mg/night for 2 weeks, a course of reflexology were prescribed. After 2 months of treatment pain decreased to 4 points, and after 6 months to 2 points according to VAS; mood and sleep returned to normal.

Discussion and learning points: The presented clinical case demonstrates a lack of awareness among specialists of various specialties about the possible variations of the course of FM.

References:

5932

Acupuncure analgesia in chronic pelvic pain treatment

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Background and Goal of Study: Chronic pain affecting the pelvic and urogenital area is a major clinical problem with heterogeneous etiology, affecting both male and female patients and severely compromising quality of life. [1] Concerning the pharmacological treatment it is associated with adverse events as well as delayed effect due to dose titration. This indicates the need of complex pathogenic treatment plan organization to help patients in short terms. [2] The goal of study is to evaluate the effectiveness of acupuncture analgesia in patients with chronic pelvic pain.

Materials and Methods: A randomized double-blinded placebo-controlled study, approved by local Institution Review Board, involved 58 patients with chronic pelvic pain, who attended the Pain clinic in Sept. 2018 – Sept. 2019 and were randomized into two comparable groups (29 patients each) by the sealed envelope method. The study group completed a classic acupuncture treatment course (15 sessions every other day), the control – a sham-acupuncture course using the same characteristics but with needles placed not deep enough. The treatment effectiveness criteria included pain severity by visual analogue scale (VAS), the pain attack frequency and duration, evaluated prior to and 3 months after treatment. The data was analyzed with IBM SPSS Statistics and MS Excel software.

Results and Discussion: The majority of participants were women (21 and 18, respectively). The mean age was 35.4±8.2 and 29.1±9.3 in the study and control group, respectively. At admission the VAS score was 7.2±0.9 and 6.9±1.2 points, pain attack frequency was 6.1±1.8 and 6.5±2.1 days per month with its duration 18.8±5.4 and 16.6±3.1 hours in the study and control groups, respectively. After the 3-months treatment pain severity decreased to 1.9±0.5 points in the study group, whereas in the control group it was statistically significantly higher (p<0.05) – 4.8±0.9 VAS points. The pain attack frequency was also significantly lower in the study group than in control (2.5±0.4 and 6.1±1.2 attacks; p<0.05) as well as its duration (6.7±1.3 and 14.7±4.9 hours; p<0.05).

Conclusion: Classical acupuncture in chronic pelvic pain treatment helps to reduce the severity, frequency and duration of pain attacks.

References:
Intrathecal vs intravenous morphine chloride for postoperative analgesia after hysterectomy with adnexectomy

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Background and Goal of Study: The efficient pain control after surgery leads to the earlier mobilization of patients and their faster recovery, thus leading to shorter hospitalization and lower treatment expenses. The aim of the study was to compare the effects of intrathecal and intravenous administration of morphine chloride after hysterectomy with adnexectomy.

Materials and Methods: This prospective, randomized study consisted of 50 patients (≥18 years, ASA I/II) who were to undergo hysterec tomy with adnexectomy. They were divided into two groups of 25 each. The group T patients were given the combination of 0.3 mg of morphine chloride with 1.7 ml of 0.5% levobupivacaine intrathecal, immediately before surgery, whereas the group V patients were administered 5 mg of morphine intravenous before the end of surgery and after the surgery at certain time intervals. The postoperative pain was assessed by Numerical Rating Scale (NRS) at 1, 6, 12 and 24 hours. Side effects, such as nausea, vomiting, itching, and respiratory depressions were followed as well. All patients had urinary catheter so we could not follow urinary retention. In addition, the patients were asked to keep records of their subjective feeling of satisfaction with analgesia.

Results and Discussion: There were no statistically significant differences in age, body weight, ASA classification and the length of surgery between the group T and the group V. The postoperative pain was less pronounced in group T at all assessment intervals (p<0.001) and consequently the additional need for analgesia 1h after the end of surgery was less in that group (p<0.001). There was no statistically significant difference in the incidence of nausea and vomiting. No patients complained of itching and there was no respiratory depression. The subjective feeling of satisfaction with postoperative analgesia was statistically significant in group T (p<0.001).

Conclusion: Intrathecal administration of morphine chloride combined with levobupivacaine ensures better postoperative analgesia after hysterectomy than intravenous morphine chloride, their side effects being equally frequent.

Implementation of opioid-free anesthesia during abdominal surgery: a retrospective study

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Background and Goal of Study: Opioids are potent analgesics but they have been linked to perioperative morbidity (e.g., post-operative nausea, paralytic ileus, respiratory insufficiency, and death). Opioid free anesthesia has shown potential in increasing perioperative comfort most notably by decreasing postoperative nausea and vomiting. Anesthesiologists in our institution thus decided to progressively switch from an opioid based to an opioid free analgesic strategy during abdominal surgery. The aim of this study was to examine the amount of prescribed drugs during the three main periods of this transition (i.e., opioid-based anesthesia (OBA), opioid-reduced anesthesia (ORA), and opioid free anesthesia (OFA)).

Materials and Methods: This retrospective study was approved by the French National Ethics Committee. Three periods were studied: OBA (2011-2012), ORA (2014-2015), and OFA (2017-2018). Single year transitions were performed between each period. The amount of vials per patient of administered drugs was calculated by six month samples, the potential protective effect of ≥2 ng/ml and 5 ng/ml plasma concentrations at buprenorphine concentrations ≥2 and 5 ng/ml. Although this is a small patient sample, the potential protective effect of ≥2 ng/ml and 5 ng/ml plasma concentrations against fentanyl-induced respiratory depression warrants additional investigation.

Conclusion: Opoid free anesthesia was associated with decreased postoperative morphine use and antiemetic requirements.

Acknowledgements: The authors thank the medical and nursing staff of the Rennes Hospital Operating Theatre as well as Euroanaesthesia 2020.
The Network of Formulæ and Crude Drugs Follows the Power Law and Has Scale Freeness in the Japanese Herbal Medicine System

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Background: Japanese herbal medicine is a representative alternative complement therapy and is widely used not only in pain treatment and perioperative management but also in general clinical practice. The network has been formed by sorting out a large number of crude drug over a period of about 1500 years. It consists of about 150 formulæ. Each formula consists of two to dozens of crude drugs. However, the network of the combination of formulæ and crude drugs is not known. In this study, we mathematically investigated whether the network of the formulæ and crude drugs fits the power law.

Methods: We targeted 118 crude drugs that constitute 148 formulæ of Japanese herbal medicine. The number of times each crude drug is selected as formulæ is plotted on the vertical axis, and the rank of crude drugs sorted by number of selections (X) is plotted on the horizontal axis. This was graphed into a double logarithmic graph, and its slope was calculated.

Results: The highly linked nodes (hub) considered to be the head part were licorice (94 formulæ), ginger (51 formulæ), agate (46 formulæ), and glaze (39 formulæ). In the long tail, 18 crude drugs selected in 2 formulæ and 34 crude drugs selected only in one formula were located. In the double-logarithmic plot, the regression function was logY = 2.622 - 1.234 logX. The power exponent was 1.234 ± 0.33. The adjusted degree of freedom determination coefficient was 0.912, p <0.0001, and the fitness was significant. This connectivity shows that this network has topology consistent with scale-free networks.

Discussion: This result indicates that the network of the formulæ and crude drugs has scale freeness in the Japanese herbal medicine system. This connectivity shows that this network has topology consistent with scale-free networks. Scale-free means system redundancy and robustness. The conditions for the power law to appear include (1) continuous input and growth into the system, and (2) accumulation of strengths and preferential selection within the interior. Japanese herbal medicine is the result of a trade-off based on prior choices at the clinical site in the past. It may achieve further adaptation and evolution in the future.

Conclusion: The network of formulæ and crude drugs follows the power law and has scale freeness in the Japanese herbal medicine system.

References:

Opioid free anaesthesia (OFA) versus balanced anaesthesia: impact on early and late postoperative outcomes after knee arthroplasty

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Background and Goal of Study: Opioid free anaesthesia (OFA) has gained in popularity. Whether OFA feasibility and safety have been shown, benefits remain to be established (1). We here assessed whether OFA compared to balanced anaesthesia affected early and late outcomes after major orthopaedic joint surgery. Materials and Methods: After IRB approval, retrospective analysis (January 2017-December 2018) of medical records of patients included in an enhanced recovery programme who underwent knee arthroplasty by a single surgeon was performed. Preoperative and postoperative management were standardized. All patients received general anaesthesia and LIA. Records of 102 OFA patients were matched with 99 patients who received intraoperative balanced anaesthesia. Postoperative opioid consumption in PACU and from day1 to day4, adverse events, pain and functional outcome using the Forgotten Joint Score (2) at 3 and 12 months after surgery were recorded. Statistics used unpaired t-test and Fisher exact test, P<0.05 was significant.

Results and Discussion: Demographic data did not differ (age, BMI, gender, preoperative pain scores and opioid intake). Intraoperative ketamine was 0.8mg/kg (IQR 0.7-1.0) vs 0mg/kg (IQR 0.3-0.5), clonidine 150µg (IQR 75-150) vs 0µg (IQR 0-60) respectively in OFA and balanced anaesthesia groups (p<0.001). Average sufentanil dose was 7.5 to 20µg in balanced anaesthesia group. OFA patients had less pain at PACU arrival (p<0.001). PACU morphine dose was similar between groups but OFA patients had significantly less episodes of desaturation (p=0.0059). Confusion, urinary retention, nausea and vomiting were lower in OFA group (n.s.). OFA patients used significantly less postoperative oral morphine, specifically at day2 and day3 (p<0.01). At 3 and 12 months, functional outcome (FJS), knee pain at mobilization and at night did not differ between groups.

Conclusion: Compared with balanced anaesthesia, OFA use in patients undergoing knee arthroplasty with enhanced recovery programme only demonstrated early benefits in term of pain and opioid sparing effects. Later functional outcomes and knee pain at 3 and 12 months were not improved.

References:

Can medical hypnosis or Virtual Reality Glasses reduce the amount of additional analgesodatives needed to alleviate pain and anxiety in patients undergoing medical procedures?

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Background and Goal of Study: Patients undergoing medical procedures benefit from distraction techniques to reduce the need for drugs alleviating pain and anxiety. Aim of this study to investigate if medical hypnosis or virtual reality glasses (VR glasses) as an adjuvant tool to standard pharmacology treatment.

Materials and Methods: In a prospective, randomised, interventional trial, after getting informed consent, patients undergoing procedures were stratified in four groups. There was no advantage of one index group over the other.

Results: The number of times each crude drug is selected as formula is plotted on vertical axis, and the rank of crude drugs sorted by number of selections (X) is plotted on horizontal axis. This was graphed into a double logarithmic graph, and its slope was calculated.

Discussion: This result indicates that the network of the formulæ and crude drugs has scale freeness in the Japanese herbal medicine system. This connectivity shows that this network has topology consistent with scale-free networks. Scale-free means system redundancy and robustness. The conditions for the power law to appear include (1) continuous input and growth into the system, and (2) accumulation of strengths and preferential selection within the interior. Japanese herbal medicine is the result of a trade-off based on prior choices at the clinical site in the past. It may achieve further adaptation and evolution in the future.

Conclusion: The network of formulæ and crude drugs follows the power law and has scale freeness in the Japanese herbal medicine system.

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Detecting hyperventilation on the hospital floor using respiratory volume monitoring and pulse oximetry

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Background and Goal of Study: Pulse oximetry is used to assess respiratory status but does not directly measure ventilation, leading to delayed response. Supplemental O2 can further delay detection of respiratory compromise by misleading effects of hyperventilation. We used respiratory volume monitoring (RVM) and pulse oximetry to detect hyperventilation and desaturation following abdominal surgery.

Materials and Methods: This observational study monitored minute ventilation (MV) (ExSpiron 1X, Respiratory Motion, Watertown, MA) and SpO2 (VisiMobile, Sotera, San Diego, CA) in the post anaesthesia care unit (PACU) and up to 48 h on the general hospital floor (GHF). Low minute ventilation events (LMEs) were defined as MV< 40% predicted MV for ≥ 2 min and desaturation events (DSe) as SpO2 < 90% for ≥ 5 min. Patients with ≥ 1 LMEs in the last 1 h of PACU were identified as At Risk. MV, SpO2 and % of patients with LMEs and DSe were quantified for each hour on the GHF. Statistical comparisons were performed with mixed effects models.
Low-level light therapy (LLLT) is an effective treatment for neuropathic pain. We used data of an ongoing prospective observational study aimed to evaluate the effect of LLLT on primary hyperalgesia as an indication for a peripheral mechanism in a human pain model with a view to a possible role of targeted solutions. A promising tool in pain management.

Background and Goal of Study: Low-level light therapy (LLLT) is an effective analgesic treatment, although the mechanism of action by which LLLT relieves pain is not yet finally clarified. An unanswered question is, in particular, whether peripheral or central mechanisms contribute to the analgesic effect of LLLT. This study aimed to evaluate the effect of LLLT on primary hyperalgesia as an indication for a peripheral mechanism in a human pain model with a view to a possible nonpharmacological analgesic therapy method.

Materials and Methods: In a randomized controlled double-blinded trial with 10 healthy volunteers, a 3cm x 3cm cutaneous capsaicin patch 8% (Qutenza, Grünenthal, Aachen, Germany) with 640 micrograms of capsaicin per cm2 (corresponding to 5.76mg of capsaicin in total) was applied in the middle of both distal forearms of the test persons to produce a neurogenic inflammation. One of the two forearms was irradiated with pulsatling, cold red light of 660 nm wavelength (Repus7, Repuls Lichtmedizinzentrum GmbH, Vienna, Austria) for 12 minutes. The second arm received no irradiation and served as control area.

Results: The comparison of the LLLT treated side vs. the no-treatment side for every single patient is presented in figures 1. The effect size was 1.54 (95% CI: 0.544-2.541) for HPT.

Conclusion: The data presented in this study, indicates that LLLT using red LED light has a significant modulating effect on the peripheral sensitization, gaining a better understanding of the underlying action mechanisms, although there is lack of information about the central effect and a possible modulation of the central sensitization. Effective at reducing the heat pain threshold in a human pain model, the results point to a promisingly therapeutic modality in the treatment of acute pain.

Persistent postoperative opioid use in a Swiss university hospital: do we have to worry about an opioid epidemic in Switzerland?

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Background and Goal of Study: Worldwide use of opioid analogues is increasing, including Switzerland (1). The rising number of drug overdose deaths has triggered warnings (2), suggesting a link between postoperative opioid prescriptions and the "opioid epidemic". No data on postoperative opioid continuation are available for Switzerland. Therefore, we analyzed data of an ongoing study on chronic post-surgical pain (CPSP) to answer the following questions: How many patients use opioid analogues 6 months after a surgery, and how many of those did not use opioids before surgery?

Materials and Methods: We used data of an ongoing prospective observational trial (ClinicalTrials.gov ID: NCT03164954), for which opioid use is a secondary outcome. Inclusion criteria are adults having surgery with high risk of CPSP such as thoracic surgery, spine surgery, laparotomy, herniorrhaphy, total knee arthroplasty (TKA) or breast surgery. Patients are given questionnaires before surgery and 6 months after surgery with questions concerning general and pain control.

Results: We obtained results from 200 patients with completed follow-up at 6 months after having included 240 patients (83% response rate). Of the 200 patients, 14 patients (7%) were still using opioids 6 months after surgery. 11 of these 14 patients had spine surgery, and 3 TKA. 10 of these 14 patients used tramadon, and 7 of 14 strong opioids. Only 2 of these 14 patients were not using opioids before surgery.

Conclusion: 33/200 patients (16,5%) were taking opioids before the surgery and 21/33 (64%) gave up using opioids 6 months after surgery. 12 of these 33 patients were still opioid users at 6 months. Patients using opioids 6 months after surgery had a higher mean pain intensity (4.2±2.7) than those not using opioids (2.4±1.7) and a higher BPI interference score (5.3±1.9 vs. 3.1±1.5). 7 of the 14 persistent opioid (50%) users had a positive DNA, versus 15 of 17 non-opioid users (9%). At 6 months, of the 14 persistent opioid users, 57% had not seen a pain specialist.

Learning points: In our centre, we found a rate of 1,2% of new persistent use for surgery of high risk of CPSP, which seems to be less than what is reported from the US surgery settings. Persistent opioid use was more frequent (7%) when including patients already using opioids before surgery, and it was limited to spine surgery and TKA. Persistent postoperative use is correlated with more intense pain, but also with neuropathic pain characteristics.

References:

Post-surgical chronic pain – different problems requiring targeted solutions: a case report

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Background: The incidence of post-surgical chronic pain varies with the type of surgery, but can be as high as 85%. A careful and systematic diagnostic approach must always be employed as several pain syndromes may occasionally overlap.

Case Report: We present a 51-year-old male patient, with no relevant past medical history. In October 2013 he suffered a cervical spine fracture resulting from an accidental fall. He was submitted to cervical arthrodesis with right iliac bone graft. He had no complications in the immediate postoperative period. In March 2018 he is referred to chronic pain consultation. He complained of lower back pain [numeric rating scale (NRS) 6] and pain in the anterior right upper leg (NRS 7) since the postoperative period. Physical examination showed hyperalgesia and allodynia in the inguinal region and right anterolateral thigh. Several myofascial trigger points at the right side (quadratus lumborum and erector spine) were detected, triggering lower back pain. Auxiliary diagnostic tests revealed herniation of L3/L4 and L4/L5 discs without radiculopathy. Electromyography confirmed meralgia paresthetica. We performed an ultrasound guided block of the right lateral cutaneous nerve of thigh, erector spinae plane block and quadratus lumborum block. Pharmacological therapy was optimized. Four months after first contact, pain resolved on the anterolateral region of the thigh and improved on the lower back (NRS 3), but localized pain persisted in the inguinal region (NRS 6). It was decided to use a 179 mg capsaicin skin patch that was repeated 3 months later. Twelve months after the first contact, all leg and groin pain were resolved and the patient only complained of occasional lower back pain (NRS 3).

Discussion: We present a patient with persistent postoperative neuropathic pain resulting from the harvesting of iliac bone graft (meralgia paresthetica and ilioinguinal
nerve territory contribution). The patient developed progressive myofascial lower back pain probably due to persistent long-term neuropathic pain. We were able to distinguish the different pain etiologies and act accordingly.


Learning points: Persistent postoperative pain can be complex and of multifactorial etiology. It usually has a neuropathic component and therapeutic strategies are similar to those used to treat neuropathic pain. Capsaicin skin patch may be a useful weapon in the treatment of postoperative neuropathic pain.

All patients were under spinal anesthesia and all patients were given intracuticular injection with a dilution of 100mL N/S 0.9% with 300mg ropivacaine and 0.5mg epinephrine. Population study was divided into 2 groups: Group A (n = 58) was given dexteketoprofen/tramadole (25mg/75mg) 2h after surgery every 8h for 72h and group B (n = 68) was given 2h after surgery pethidine IM 50mg and paracetamol 1g every 6h. Pain intensity (VAS score) and analgesic consumption were evaluated within the first 72 hours after surgery for all participants in the study.

Results and Discussion: There were no statistically significant differences between the two groups, with respect to age, sex, BMI, ASA score and surgical duration (p> 0.05). Pain intensity in group A was significantly lower than group B at 8,24,48,72 hours post-operative (p-value <0.05). For the first 24 hours after surgery, analgesic consumption in group A was significantly lower than group B (p-value = 0.01).

Conclusion: Fixed-dose combination of dexteketoprofen (25 mg) and tramadol (75 mg) provides a comprehensive multimodal approach for moderate to severe acute pain in patients undergoing unilateral total hip arthroplasty AMIS thanks to central analgesic effect, peripheral analgesic action and anti-inflammatory activity. Together with an effective analgesic efficacy, the combination shows a good tolerability profile.

4521

Dexamethasone administration reduces the frequency of analgesic use in the first 24 hours after laparoscopic cholecystectomy

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Background and Goal of Study: A common complaint who underwent surgery is postoperative pain, which causes prolonged hospital stay and lead to postoperative ileus, nausea, vomitting, and urinary retention, thus increasing morbidity. We usually administrate single perioperative dose of dexamethasone to patients in laparoscopic cholecystectomy in order to prevent postoperative nausea and vomiting (PONV). At the same time, corticosteroid is known to decrease inflammation and may provide postoperative analgesia. In this study, we evaluate the efficacy of dexamethasone in decreasing the frequency of analgesic use after laparoscopic cholecystectomy.

Materials and Methods: This study was a single-center retrospective observational study conducted from May 2019 to October 2019. All patients who underwent elective laparoscopic cholecystectomy under general anesthesia were included (n = 108). Patients with diabetes mellitus and patients who had been received steroid before surgery were excluded. Patients were divided into two groups according to the use of dexamethasone during surgery. The dose of dexamethasone administered during surgery were between 3.3 – 6.6 mg. Postoperative pain intensity was assessed using a 0 – 10 numerical rating scale (NRS). The primary outcome was the frequency of analgesic use during the first 24 hours after surgery. The secondary outcome was the maximum of NRS during the first 24 hours after surgery. Univariate analysis was performed using t-test and Chi-square test. Linear regressions were performed to analyze the relationships between variables (age, sex, and dexamethasone administration) and the intensity of postoperative pain.

Results and Discussion: A total of 88 patients were included in the analysis. There were no significant differences between the groups in age, the frequency of analgesic use, and the maximum of NRS, except the sex (p = 0.008) with t-test and Chi-square test. However, the frequency of analgesic use during the first 24 hours after surgery in dexamethasone given group was lower than the non-dexamethasone group (95% CI 0.010 – 1.511, p = 0.047), and the maximum of NRS was not (95% CI -0.573 – 1.569, p = 0.358) with linear regression analysis. Conclusion: Our study suggests that dexamethasone administration during surgery is associated with the decrease in the frequency of analgesic use during the first 24 hours after laparoscopic cholecystectomy.

4556

The effect of Patient Controlled Analgesia containing opioid with and without basal infusion on postoperative pain, Nausea and Vomiting

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Background and Goal of Study: Studies comparing the efficacy of PCA with and without a basal infusion for postoperative analgesia vary considerably in terms of dosing and methodologic quality, making it difficult for practitioners to derive clinically useful information. The purpose of this study was to assess whether the addition of a basal infusion to PCA bolus administration of an opioid analgesic is more effective (defined as lower pain scores) than PCA bolus alone in the patients underwent gynecologic surgery.

Materials and Methods: Sixty patients aged 20-60 undergoing gynecologic surgery were randomly to receive postoperative i.v. fentanyl by a patient-controlled analgesia (PCA) system (bolus dose 1 ml with a lockout interval of 15 min) (experimental group) or the same PCA with a basal infusion of 2 ml (control group) for 48 hours postoperatively. Pain intensity with visual analogue scale (VAS) at 1h, 24h and 48h after surgery, postoperative nausea and vomitting, nurses and patients' satisfaction.

Results and Discussion: There were no significant differences in the pain scores of the two groups. ONPV in experimental group was significantly less than control group (P = 0.02), however rescue antiemetic administered was not significant between two group. Nurses' satisfaction in experimental group was significantly higher than control group. (P = 0.028). Patients' satisfaction was negatively associated with postoperative 48 h pain VAS (r = -0.38, P = 0.004) and Nurses' satisfaction was positively associated with patients' ONPV (r = -0.27, P = 0.034). Conclusion: Experimental group with patients with PCA+basal infusion suffered more ONPV. Because nurses' satisfaction was positively associated with patients' ONPV, PCA without basal infusion is recommend to enhance nurses' satisfaction and appropriate patient analgesia without side effect.

4524

Evaluation of oral use of dexketoprofen/tramadol in acute postoperative pain in patients undergoing total hip replacement with a minimally invasive anterior approach (amis)

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Background and Goal of Study: Pain is a global public health issue and represents the most common reason for both physician consultation and hospital admissions . When unrelied or poorly controlled, it is associated with medical complications, poor patient satisfaction and increased risk of developing chronic pain. Dexketoprofen is a new NSAID treating acute postoperative pain when it combined with tramadol may have a better effect. The purpose of this study is to evaluate the analgesic effect of the oral use of the combination of dexketoprofen/tramadol on the reduction of postoperative pain after total hip arthroplasty with minimal invasive anterior approach (AMIS).

Materials and Methods: This prospective, randomized study included 126 patients, with a mean age 67.6 years, who underwent AMIS total hip arthroplasty.

All patients were under spinal anesthesia and all patients were given intracuticular injection with a dilution of 100mL N/S 0.9% with 300mg ropivacaine and 0.5mg epinephrine. Population study was divided into 2 groups: Group A (n = 58) was given dexteketoprofen/tramadole (25mg/75mg) 2h after surgery every 8h for 72h and group B (n = 68) was given 2h after surgery pethidine IM 50mg and paracetamol 1g every 6h. Pain intensity (VAS score) and analgesic consumption were evaluated within the first 72 hours after surgery for all participants in the study.

Results and Discussion: There were no statistically significant differences between the two groups, with respect to age, sex, BMI, ASA score and surgical duration (p> 0.05). Pain intensity in group A was significantly lower than group B at 8,24,48,72 hours post-operative (p-value <0.05). For the first 24 hours after surgery, analgesic consumption in group A was significantly lower than group B (p-value = 0.01).

Conclusion: Fixed-dose combination of dexteketoprofen (25 mg) and tramadol (75 mg) provides a comprehensive multimodal approach for moderate to severe acute pain in patients undergoing unilateral total hip arthroplasty AMIS thanks to central analgesic effect, peripheral analgesic action and anti-inflammatory activity. Together with an effective analgesic efficacy, the combination shows a good tolerability profile.

4561

Prediction of early pain score at the post-anesthesia care unit with heart rate variability by the end of surgery

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Background and Goal of Study: Postoperative pain is highly subjective and distressful, and it imposes adverse effects on multi-systems. To facilitate early intervention and improve pain management, establishing a prediction model of postoperative pain severity would be helpful. Heart rate variability(HRV) is an indirect measure of autonomic nervous system activities that has been used as indirect measure of autonomic nervous system activities that has been used as
number: 10703-005). We conducted an observational study that enrolled 80 patients scheduled for gynecological surgeries under general anesthesia. Of all, 28 patients received traditional surgery and the others received laparoscopic surgery. All the participants were ASA class 1 to 3 without using drugs affecting HRV. Blood pressure (BP), electrocardiography (ECG) and other physiological signals were collected across the perioperative period. After patients were sent to the post-anesthesia care unit (PACU), the numeric rating scale (NRS) was recorded within 5 minutes upon arrival for evaluation of the pain severity in the early recovery phase. Offline we extracted 10-minute data during the wound-closure period. Time-domain and frequency-domain analyses of HRV were done using Matlab software. Then we compared results between different surgical types and generated a linear regression model for prediction of the NRS in the early recovery phase.

Results and Discussion: There were significant differences in blood pressure, low-frequency power spectrum (LF) of HRV, very low-frequency power spectrum (VLF) of HRV between the laparoscopic group and the traditional group, and this indicated higher sympathetic activities in patients of the traditional group near the end of surgery. However, there were no differences in heart rate, surgical pleth index, opioid consumption between groups. After adjustment for systolic blood pressure (SBP) and surgical type, we could predict the NRS on the arrival of PACU. NRS=0.371*VLF-0.171*Lapach-SBP (Lapa: 1 for laparoscopic surgery, 0 for traditional surgery).

Conclusion: VLF of HRV in the wound-closing period could predict the NRS on the arrival of PACU after adjustment for surgical type and SBP.

4391

Pre-emptive and preventive NSAIDs for postoperative pain in adults undergoing all types of surgery: a Cochrane review

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Background and Goal of Study: Postoperative pain is a common consequence of surgery and pre-emptive or preventive analgesia has been suggested to help reduce this. We have previously demonstrated little efficacy for preventive opioids [1]. This review aimed to assess whether NSAIDs have a pre-emptive or preventive effect in all types of surgery.

Materials and Methods: We used standard Cochrane methodology [1]. This included searches for published and unpublished studies, risk of bias assessment, assessment for publication bias and investigation of heterogeneity. The quality of evidence was assessed using GRADE methodology.

Results and Discussion: We included 67 randomised controlled trials. Pre-emptive NSAIDS reduced early pain (MD -0.68, 95% CI -0.97 to -0.39; moderate quality) and 24-hour morphine consumption (MD -5.62mg, 95% CI -9.00mg to -2.24mg; low quality). Preventive NSAIDs reduced late pain (MD -0.37, 95% CI -0.65 to -0.09; low quality) and 24-hour morphine consumption (MD -2.42 mg, 95% CI -4.46 mg to -0.39 mg; low quality). However, there was no reduction in opioid adverse events and effects were not clinically significant. There was some evidence of an influence of baseline risk in agreement with previous studies [2].

Conclusion: Pre-emptive and preventive NSAIDs may reduce acute pain and opioid consumption, which may be more effective in more painful surgeries. Although we could not identify any reduction in opioid adverse effects but data was limited. “This abstract is based on a draft and pre-peer review version of a Cochrane Review. Upon completion and approval, the final version is expected to be published in the Cochrane Database of Systematic Reviews (www.cochranelibrary.com).”

References:

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Efficacy and safety of interventions to prevent acute and chronic postoperative pain following breast surgery: a systematic review with meta-analyses and trial-sequential analyses

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Background and Goal of Study: Breast surgery is a common surgical procedure, often followed by the emergence of chronic pain. This systematic review compares the efficacy and safety of different interventions to prevent acute and chronic pain after breast surgery.

Materials and Methods: We searched in Pubmed, Medline, Embase, Google Scholar and the Cochrane Library for all RCTs (randomised controlled trials) comparing the prophylactic use of pharmaceutical or regional anesthesia interventions to placebo or standard care in the setting of breast surgery. We excluded studies including other types of surgery. Primary outcome was pain intensity up to 6h postoperatively. Secondary outcomes were morphine consumption at 24h, postoperative nausea and vomiting (PONV) and chronic pain 3 to 12 months postoperatively. Random-effects meta-analyses and trial sequential analyses were performed when at least 3 studies were identified for an intervention.

Results and Discussion: We included 73 trials. The overall quality of evidence was rated low to high according to GRADE guidelines. Paravertebral blocks, PECs (pectoral nerves) and serratus plane blocks, glucocorticoids, intravenous lidocaine, alpha2-agonists and gabapentinoids reduced pain up to 6h postoperatively, whereas local anaesthetic infiltration and NMDA antagonists had no clinically useful impact on pain reduction at 6h postoperatively. PECs and serratus blocks and gabapentinoids reduced morphine consumption at 24h, and paravertebral blocks and glucocorticoids reduced risk of PONV. No conclusive evidence was found regarding chronic pain. Only limited and non-conclusive safety data were found.

4654

An investigation of factors associated with postoperative pain trajectories and morphine consumption after hepatic cancer surgery

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Background and Goal of Study: Suboptimal pain control after hepatic cancer surgery is an important issue in clinical practice. This retrospective study aimed to investigate the influential factors of postoperative (post-op) pain trajectories and morphine consumption in patient undergoing hepatic cancer surgery and intravenous patient-controlled analgesia (iVPCA) with particular interest in multimodal analgesic regimens.

Materials and Methods: Patients with hepatic cancer receiving tumor resection and post-op iVPCA at a tertiary medical center in Taiwan between January 2011 and December 2016 were collected from our electronic medical records system. Mean numeric rating pain scores and other potentially influential factors were gathered. Linear regression model was used to explore factors associated with morphine consumption after surgery. Latent curve analyses using two latent variables, intercept and slope, were developed to model the variations in post-op pain scores over time. Goodness of fit was assessed using comparative fit index.
This prospective double-blind study included 123 C3001a selectively and efficaciously activated TREK-1. We performed the in-house experimental screenings post-operative pain after off-pump coronary artery bypass surgery: a randomized, 2. Joshi SS, Jagadeesh AM. Efficacy of perioperative pregabalin in acute and chronic References: 1. Moore RA, Straube S, Wiffen PJ, Derry S, McQuay HJ. Pregabalin for acute and 2. The majority of cases of primary hyperparathyroidism (PHPT) due to solitary adenoma and require the target surgery. Research of new anaesthesia/analgesia methods, which afford to have an opioid-sparing effect, is going. The Goal: Assessment of using combine method anaesthesia with co-analgesics on the intra- and post-op opioid requirement in parathyroidectomy patients. Materials and Methods: 124 patients with PHTP were divided into 3 groups: the group STI-BCSPB (n=26) was used combined general anaesthesia (GA) with sevoflurane (SEV), the tracheal intubation (TI) with the myorelaxant introduction and bilateral cervical superficial plexus blockade (BCSPB); the group STI (n=62) was used SEV anaesthesia with IT and no BCSPB; the group PLM-BCSPB (n=16) was provided propofol (P) GA with protection air-ways by laryngeal mask (LM) and BCSPB. In both groups (STI-BCSPB and PLM-BCSPB) were used co-analgesics, such as dexamethasone (DXM) 8 mg IV, 2% lidocaine (L) 1,0-1,5 mg/ kg IV, metamizole (M) or paracetamol (P) 1 g IV, dexketoprofen (DKTP) 50 mg IV as pre-emptive analgesia 30 min before surgery. Ketamine 25 mg IV was used for induction anaesthesia in these groups. The group STI group only opioid with P were used for induction of GA. Duration of surgery (DoS), anaesthesia (DoA), opioid consumption, time from the operation ending until the eyes opening (EyOp), desaturation were measured. All data M±σ.

Results and Discussion: DoS for STI, STI-BCSPB and PLM-BCSPB was respectively 37.8±13.9, 38.2±14.4 and 35.6±12.6 min (NS). DoA was respectively 59.4±17.9, 63.8±18.5 m and 48.1±16.5 min (p< 0.028 STI vs PLM-BCSPB, p= 0.024 STI-BCSPB vs PLM-BCSPB, the difference is significant (DS)). EyOp was 15.4±3.6, 15.6±4.0 and 11.2±2.6 min respectively for STI, STI-BCSPB and PLM-
Endoscopic surgery is associated with lower incidence of chronic postsurgical pain: a nationwide population-based study in Taiwan

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Background and Goal of Study: Chronic post-surgical pain (CPSP) impairs patients' long-term quality of life and causes significant economic burden. However, compared to acute postoperative pain, CPSP is often neglected by clinicians. Most studies on CPSP have collected data in a single institution with a limited number of patients which provide limited power. The reported incidences of CPSP varies between studies and ethnic variation also makes generalization of aforementioned studies to the population in Taiwan not feasible. Thus, we aim to investigate the epidemiology of CPSP in Taiwan and to determine the association between different surgical approaches and its incidence.

Materials and Methods: The data was collected from Longitudinal Health Insurance Database (LHID), a sub-dataset of the National Health Research Dataset (NHIRD) in Taiwan, which contains claim-data of 2 million randomly selected beneficiaries. In-patients older than 15 who underwent surgery were identified using the ICD-9-CM code. Prescriptions after operation in out-patient clinics was traced. We evaluated the incidence of prolonged post-operative opioid use more than 3 months and accordingly the incidence of severe CPSP. We compared the incidences for traditional and endoscopic surgery, including thoracoscopic and laparoscopy, using adjusted odds ratios (aOR) with 95% confidence interval.

Results and Discussion: Between 2005 and 2015, we identified 121422 patients who underwent surgery with general anesthesia. 1331 (1.10%) of them developed severe CPSP 3 months after operation. Among different surgical procedures, thoracic surgery (3.26%), hepatectomy (2.80%), renal surgery (1.92%), gastric surgery (1.43%), and cholecystectomy (1.13%) were associated with higher incidence of prolonged opioid use, whereas herniorrhaphy (0.70%), appendectomy (0.50%) and gynecological surgery (0.44%) were associated lower incidence. Compared to traditional surgical approach, endoscopic approach for thoracic surgery (aOR 1.47, 95% CI 1.09-1.99), cholecystectomy (aOR 1.86, 95% CI 1.38-2.52), gastric surgery (aOR 1.91, 95% CI 1.50-2.34), herniorrhaphy (aOR 1.83, 95% CI 1.13-2.98), and renal surgery (aOR 3.00, 95% CI 1.08-8.37) was associated with significantly lower incidence of severe CPSP.

Conclusion: Thoracic and upper abdominal surgery were associated with higher incidence of CPSP. Compared to traditional approach, endoscopic surgery was associated with lower incidence of severe CPSP.

An Investigation of Factors Associated with Postoperative Pain Trajectories after Abdominal Surgeries Using Latent Curve Model

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Background and Goal of Study: Although intravenous patient-controlled analgesia (IVPCA) is commonly used to relieve acute pain after abdominal surgeries, few studies have ever evaluated the influential factors of the variations in postoperative pain trajectories over time in these patients. This study aimed to fill this gap by using latent curve models to analyze postoperative pain trajectories and explore their potential predictors.

Materials and Methods: This retrospective study was conducted in a medical center in Taiwan and we collected data from patients receiving abdominal surgeries and postoperative IVPCA between Jan and Dec 2012 by reviewing our electronic medical recordings. We also collected daily mean numeric rating pain scores in the first postoperative week and other potentially influential factors of postoperative pain trajectories. Latent curve analyses using two latent variables, intercept and slope, were employed to model the changes in postoperative pain scores over time. We also evaluated the effects of collected variables on these two latent variables and conduct the backward model selection processes to determine the final multiple predictors model which best account for the variations in postoperative pain trajectories over time.

Results and Discussion: There were 1243 patients collected in this study and among them, 542 (43.9%) received upper abdominal surgeries and the others underwent lower abdominal surgeries. The mean daily pain scores during the first postoperative week ranged from 2.0 to 2.7. The latent curve analysis identified four influential factors of postoperative pain trajectories over time, including age, weight, sex and surgical sites. Body weight and age were negatively associated with baseline pain trajectories and age and analgesic methods were related to the trend of pain resolution over time after surgery for gastric cancer. Our analytical approach provided valuable information to elucidate the complex and dynamic changes in postoperative pain scores over time.

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An investigation of influential factors of postoperative pain trajectories after surgery for gastric cancer

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Background: Pain is common after upper abdominal surgery for gastric cancer and this retrospective study aimed to investigate the influential factors of postoperative pain trajectories for patients receiving gastric cancer surgery.

Methods: After the approval of our Institutional Review Board, we performed electronic medical chart review to retrieve data from patients undergoing tumor resection for stage I through III stomach cancer at Taipei Veterans General Hospital in Taiwan from 2012 to 2018. Numeric rating pain scores in the first postoperative week were gathered and mean values were calculated on a daily basis. We also collected patients' demographics, ASA physical status, analgesic methods, anesthetics time, etc. Linear mixed models were employed to evaluate the effects of collected variables on postoperative pain scores over time and potential interactions with time were also assessed. A backward elimination strategy was used to select independent factors significantly associated with the changes in postoperative pain over time.

Results: A total of 497 patients were included in the analysis and on average, daily pain scores during the first postoperative week ranged between 1.9 and 3.2. Linear mixed model analysis identified that ASA class > 3 (p = 0.012), analgesic methods (p = 0.023), age (p = 0.04), anesthesia time (p = 0.005) and postoperative day (POD, p < 0.001) were associated with postoperative pain trajectories and an interaction was noted between POD and analgesic methods or age (p <0.001 and <0.001, respectively). Sex, body weight and body mass index were not related to the variations in postoperative pain scores over time.
Vaso-occlusive Crisis in Sickle Cell Disease: An Acute Pain Challenge

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Background and Goal of Study: Sickle cell anemia is an inherited hemoglobinopathy, multisystemic, chronic and debilitating condition characterized by vaso-occlusive crisis which result in severe acute pain. In this context acute pain units play a leading role in the proper control of painful symptoms, since they are the most common reason for resorting to medical care. This study aims to analyse our hospital protocols and compare them to the most recent scientific evidence, aiming to test effective treatments.

Materials and Methods: Through an observational, descriptive and retrospective analysis we identified all patients with vaso-occlusive painful episodes managed by the acute pain unit, from 2017 to 2019. The therapeutic protocols used, and the respective evolution of pain intensity were investigated, as well as other clinical issues, such as adverse effects and complications that may have resulted from the given analgesic and adjuvant therapy.

Results and Discussion: Among the 4,240 patients managed by the acute pain unit, during this time period, 11 met our inclusion criteria: patients with hospital admissions during vaso-occlusive crisis. Patient Controlled Analgesia (PCA), with intravenous opioids, was used in all the cases, morphine being the most commonly used, and others such as nonsteroidal anti-inflammatory drugs (NSAIDs) and paracetamol. The average length of stay in hospital, for pain control, was 7.63 days. Regarding the symptoms, we registered a favourable evolution with minimal side effects.

Conclusions: We highlight that our hospital protocols meet the criteria of the best scientific evidence. However, and despite well-defined strategies for pain management, they are still insufficient in their current state. Little progress has been made in this field, even with recent investigations into new drugs, such as ketamine or gabapentin. We hope for new trials on the latest findings and a better definition about the standard opioid-dosing for these cases.

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Postoperative analgesia techniques in major pancreatic surgical resection – Is subarachnoid morphine an effective alternative to thoracic epidural?

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Background and Goal of Study: Pancreatic surgical resection remains the only curative treatment for pancreatic cancer. As a major abdominal procedure, thoracic epidural (TE) is considered the analgesic gold standard. However, there are important limitations described such as high failure rates and postoperative hypotension. Hence, subarachnoid morphine (SM) has been hypothesized as an equally effective and simpler approach. This study aims to compare the post-operative analgesic efficacy between SM and TE with opioids and local anaesthetics administration in patients undergoing open pancreatic surgical resection.

Materials and Methods: We retrospectively investigated medical records of patients who underwent open pancreatic surgical resection between September 2017 and September 2019. Demographic data, perioperative variables, anesthesiologic techniques and post-operative numerical pain scale (NPS) were analysed. Descriptive and comparative statistics were performed using SPSS Statistical software, to compare the analgesic performance of SM with TE, NPS scores during the first three post-operative days were studied using Mann-Whitney U test.

Results and Discussion: A total of 66 patients were included. The majority were males (57.6%), and were older than 60 years (69.2%). More than two-thirds of patients were classified as ASA II. TE analgesia was performed in 16 (24.2%) patients and SM in 24 (36.4%). NPS information from the first three post-operative days was available in 25 patients (8 for TE and 17 for SM). Along the three days, scores, around 90% of patients scored ≤ 3 in NPS with both techniques. Median pain score along the three days was available in 25 patients (8 for TE and 17 for SM). Along the three days, patients showed a median pain score of 0 (IQR 2) on the first day with an increase to 2 (IQR 2) on the second day; day three showed median alleviation to 0.5 (IQR 3). Pain reports showed no significant differences during the three days of analysis (p>0.05).

Conclusion: Both techniques showed good analgesic results along the first three post-operative days, with no significant differences between them. Despite the small sample size, these findings combined with its lesser technical complexity, support subarachnoid approach with morphine as a possible viable option to TE. The promising results should motivate further investigation.

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Laser acupuncture after cesarean section: a prospective, double-blind, randomized, placebo controlled study

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Background and Goal of Study: The aim of our prospective, randomized, double-blind, placebo-controlled study is to investigate whether active laser acupuncture treatment is superior to placebo laser treatment in postoperative pain control of women undergoing cesarean section. The study was approved by the ethical committee of the University of Saarland and is registered with the number 133/17.

Materials and Methods: Patients were randomized to receive a course of 3 treatments over 3 days with either active or placebo laser. The treatment was highly standardized, each acupuncture session treated Di-4 at the hand and Shen-men of the ear on both sides, for one minute each. The primary outcome measure was a difference in pain severity in rest on the first postoperative day measured with Numeric Rating Scale (NRS) between the placebo group and the active laser treatment group. Furthermore we analyzed pain on movement and worst pain on each postoperative day. Secondary outcome measures included changes in analgesic medication consumption and time to mobilization and hospital
discharge. Treatment occurred on the operation day and on the following two days. Measurements were taken on the day before the operation as well as on the first and the second postoperative day and on the day of discharge.

Results: The mean pain severity in rest on the first postoperative day after cesarean section showed no significant difference (p=0.850) between the treatment groups (mean pain 3.32±2.07) and the placebo group (mean pain 3.24±1.98). We obtained similar results for pain in the second postoperative day (p=0.525) and on the day of discharge (p=0.227). Secondary outcome measures regarding anesthetic medication consumption was not significantly different in NSAR use in postoperative time. Opioid use between treatment and placebo group. Laser acupuncture showed no effect on the mobilization of the patients. The day of hospital discharge was also no significantly different between the two groups (p=0.162).

Conclusion: Our analysis showed no additional pain control effect through laser acupuncture on patients with postoperative pain after cesarean section. Further studies are needed to investigate the role of laser acupuncture in postoperative pain therapy.

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Benefits of intraoperative intravenous infusion of lidocaine for acute pain management after laparoscopic gastric sleeve
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Background and Goal of Study: Postoperative pain treatment after laparoscopic bariatric surgery is a challenging task for the anesthesiologist because bariatric population is highly sensitive to cardiorespiratory depressant effects of opioid usage. Our prospective randomized double blind placebo controlled study analyzes the impact on the quality of postoperative analgesia after laparoscopic gastric sleeve of lidocaine, intravenously infused during surgery versus saline.

Materials and Methods: After institutional approval and informed written consent were obtained, 42 patients (BMI=36.4±5.4kg/m2) scheduled for laparoscopic gastric sleeve under standard general anesthesia were recruited for the study. They were randomly assigned to one of the two groups: group S (n=22 patients), that received 1mg/kg lidocaine as iv bolus, followed by a continuous infusion of 2mg/kg/h during surgery and group C (n=20 patients), treated with the same volume of a saline placebo, administered according to the above mentioned protocol. The primary outcomes were pain intensity assessed by VAS every 6 hours and total morphine consumption by PCA during first 24 hours postoperatively. The secondary outcomes were the incidence of nausea/vomiting and sedation documented during the same period. Data were analyzed by means of ANOVA and Fisher's exact test, the statistical significance being considered for p<0.05.

Results and Discussion: No differences between groups were found in terms of demographics and duration of surgery. Statistically lower VAS scores were documented in lidocaine group versus placebo (p=0.05). Patients in group S required significantly less morphine compared to those from group C during study period (p=0.05). Concerning the adverse events, the advantage of group S was remarkable, too. Thus, we reported for both nausea/vomiting and sedation significantly lower incidence in the group S compared to group C (p=0.05).

Conclusion: Lidocaine, intravenously infused during laparoscopic gastric sleeve seems to be a cheap, efficient and safe agent that improves the quality of postoperative recovery comparing to placebo, by a significant decrease of acute postoperative pain intensity and reduction of opioid request.

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Ketamine added to morphine patient-controlled analgesia for acute postoperative pain in patients suffering from sickle-cell disease: a retrospective study
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Background and Goal of Study: Sickle cell disease is an autosomal recessive inherited hemoglobinopathy. The main clinical expression is the vaso-occlusive crisis (VOC) which leads to intense pain syndromes. Treatment is challenging due to its episodes of unpredictable severe pain, managed mainly with an opioids based patient-controlled analgesia (PCA). Ketamine added in morphine PCA has shown its efficacy in improving postoperative analgesia. It has never been investigated in the context of sickle cell disease. The aim of this study was to evaluate whether the addition of ketamine to morphine PCA could be effective in the treatment of vaso-occlusive event related acute pain.

Materials and Methods: After approval of institutions ethics committee (CE/19/12/24), we retrospectively analysed medical records from patients suffering from sickle cell disease, referred to the acute pain service, from Jan. to Nov. 2019. Patients who benefited from morphine (M gr.) or morphine and ketamine (MK gr) PCA were compared for the following parameters from day 1-6: demographics, ketamine and morphine total doses, VAS pain scale in rest and the second postoperative day and on the day of discharge. Treatment occurred on the operation day and on the following two days.

Results: Data from 43 patients, (21 M gr. And 23 MK gr.), were analysed. 20 males and 23 females, aged 30.71±10.00, were enrolled in the study. Patients in M gr. presented lower VAS max at rest on D1 (5.18 ± 2.20 vs 3.57 ± 2.00), statistically lower in MK gr. (p=0.023) and lower VAS max at rest on D2 (4.72 ± 3.03 vs 3.31 ± 2.00, p=0.046). The total dose of ketamine administrated was significantly higher in the MK than in M gr. (207 vs 104 mg; p<0.001). No correlation was found between PCA duration and total ketamine bolus were 52 in M gr. comparing to 101.5 in MK gr. (p<0.001). PCA use was shorter for the M gr. comparing to MK gr. (4 [2-5] vs 4[4-5.75], p= 0.04). The total dose of morphine administrated was significantly higher in the MK than in M gr. (207 vs 104 mg; p<0.001).No correlation was found between PCA duration and total ketamine dose or VAS.

Conclusion: Our results suggest that ketamine co-administered with morphine PCA, does not seem to be beneficial in controlling VOC related acute pain.
Potassium- and pH-dependent controlled release of local anesthetics (LAs) from nanometric metal-organic frameworks (nMOFs) to achieve favourable pharmacokinetics

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Background and Goal of Study: Some of the pharmacokinetic properties of LAs (i.e. lower activity in acidic extracellular environments and poor cell penetration) can often limit their efficacy and safety. nMOFs are a novel class of nanomaterials (e.g. ZIF-8, ZIF-90, UiO-68) used in an expanding array of applications, including as smart drug carriers. The goal of this study was to develop and characterise novel nMOF drug carriers for LAs and thus improve their pharmacokinetic properties and bypass current limitations.

Materials and Methods: We synthesized ZIF-8 particles loaded with either lidocaine or bupivacaine. These particles degrade faster when exposed to a more acidic environment. Similarly, we created pH-sensitive UiO-68 particles loaded with doxorubicin (DOX), as a model for LAs, by capping them with pH-responsive i-motif DNA strands. We measured the release of DOX using fluorometry and the release of LAs using HPLC, after exposure to solutions containing different pHs. We measured the release of DOX using fluorometry and the release of LAs using HPLC, after exposure to solutions containing different pHs.

Results and Discussion: We were able to show faster release of lidocaine from ZIF-8 particles at a lower pH, simulating the conditions around hypermetabolic tumors and infections. The same effect was not seen with the release of bupivacaine, which was pH-independent and several theories are proposed for this discrepancy. The UiO-68 particles also released their payload faster when exposed to a lower pH, by a different mechanism. The ZIF-90 particles released DOX faster when exposed to higher concentrations of potassium, simulating the intracellular environment. The nMOFs are known to be able to penetrate eukaryotic cellular membranes and can thus bypass its chemical barrier, preferentially releasing the LAs in the potassium-rich intracellular environment. Faster release in acidic environments can create a different mechanism. The ZIF-80 particles released DOX faster when exposed to a lower pH, by a different mechanism.

Conclusion: We have shown that it is possible to use certain nMOFs as novel drug carriers for LAs, to modify their pharmacokinetic properties, and potentially, to introduce better therapeutic options for patients in pain.

References:

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Polydeoxyribonucleotide ameliorates the pain by diminishing the inflammation and apoptosis in the Achilles tendon injury rats

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Background: Achilles tendon disorders including tendinopathy and rupture frequently cause pain and disability in athletes and non-athletic individuals. These injuries are difficult to treat, require prolonged rehabilitation and have a high frequency of recurrence. Polydeoxynucleotide (PDRN), an A2A receptor agonist, has been suggested for the treatment of various diseases and broadly studied for its anti-inflammatory effect. In the present study, the effect of PDRN on Achilles tendon injury using rats was investigated.

Materials and Methods: Achilles tendon injury was induced by cutting half of the Achilles tendon with surgical scissors after anesthesia. One day after Achilles tendon injury, PDRN in 100 μL respective dose (2 mg/kg, 4 mg/kg, and 8 mg/kg) was directly applied to the injured Achilles tendon, once a 2 days for 16 days (total 6 times). Von Frey test and plantar test for the pain threshold were conducted. For this study, histological analysis was performed by hematoxylin and eosin staining. Enzyme-linked immunoassay (ELISA) for tumor necrosis factor-α (TNF-α), interleukin (IL)-6, and cyclic adenosine-3',5'-monophosphate (cAMP) were performed. Additionally, immunohistochemistry for cleaved caspase-3, -9, and western blotting for cAMP response element-binding protein (CREB), protein kinase A (PKA), Bax, Bcl-2.

Results and Discussion: In the present results, Achilles tendon injury increased pain susceptibility. In addition, Achilles tendon injury was found to remarkably up-regulate the inflammation and apoptosis. In contrast, PDRN treatment significantly reduced inflammation and apoptosis, resulting decreased pain susceptibility. These results showed that PDRN facilitated inhibited pain susceptibility, inflammation, and apoptosis from Achilles tendon injury.

Conclusion: Here in this study, it can be suggested that PDRN can be used a new therapeutic intervention for pain control from Achilles tendon injury.

Selective activation of TASK-3 K+ channels in trigeminal ganglionic attenuates chronic migraine

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Background and Goal of Study: Migraine is one of the most prevalent headache disorders, chronic migraine (CM) is more disabling, and for which the treatments is limited and also induces adverse side effects. The sensitization of trigeminal ganglion (TG) neurons plays an important role in the pain transmission of migraine, and activation of two-pore-domain potassium (K2P) channels inhibits sensory neuron excitability. TWIK-related acid-sensitive K+ 3 (TASK-3, Kcnk9) channel, a member of K2P channel family, has been detected in dorsal root ganglion (DRG) and TG. We recently discovered a selective TASK-3 agonist which has shown therapeutic potential in treating chronic neuropathic and inflammatory pain that involves DRG1. But it is not known if selective activation TASK-3 in TG is effective against migraine. In this study we hypothesized that CHET3 may contribute to CM related pain and TASK-3 channel in TG serves as a therapeutic target for migraine.

Materials and Methods: The nitric oxide (NO)-induced CM model of C57BL/C mice was used in this study. Mechanical allodynia and cold hyperalgesia were measured by Von-Frey and acetone stimulus, respectively, in periorbital area, after intraperitoneally injecting CHET3 (10 mg/kg) or topiramate (30mg/kg) or vehicles. In situ hybridization (ISH) (RNAseq technique) was applied to map the mRNA expression of TASK-3 in TG.

Results and Discussion: Mechanical allodynia and cold hyperalgesia were reduced following both CHET3 and topiramate injection. Compared to topiramate, CHET3 has similar analgesic effect during 30 minutes to 90 minutes. ISH revealed that Kcnk9 was identified in a subset of neurons in TG, and was down-regulated in CM mice. TRPV1 and TRPM8 were abundantly expressed in Kcnk9+ neurons, respectively. Furthermore, more than 50% of Kcnk9+ neurons express TH, whereas Kcnk9 rarely colocalized with P2x3 or Nlk4.

Conclusion: CM down-regulation of the expression of TASK-3 channel in TG neurons, which may contribute to the hyper-excitability of the nociceptors neurons, leading to the occurrence of CM. Enhancing TASK-3 mediated K+ conductance in nociceptors neurons effectively relieves pain behaviors in a mouse model of CM.

References:
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Effects of N-type calcium ion channel function on the neuronal activities of the primary somatosensory cortex in inflammatory pain model

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Background and Goal of Study: Accumulated evidence suggests that plastic changes of neuronal circuits in the primary somatosensory cortex (S1) are essential for the transition of acute to chronic pain. In this study, we focused on calcium ion (Ca2+) channel expression in S1 of inflammatory pain model, and investigated the effects of antagonists on neuronal activities and pain threshold.

Materials and Methods: This study was approved by the Animal Research Committees of Kobe University and the National Institute of Neural Science (Permission number: P170801). We used C57BL6 male (6-8 weeks) mice for all experiments. We used inflammatory pain model received the injection of Complete Freund's adjuvant (CFA) into the right hind paw. Three days after the injection of CFA, S1 brain tissue was dissected, and the expression of each Ca2+ channel (L-type, P/Q-type, N-type) was analyzed by flowcymetry compared to wild type (WT) mice. In addition, intraventricular administration of N-type Ca2+ channel blocker (PD173122) and local administration to S1 of slow release drug of PD173122 were performed, and the pain threshold and S1 neuronal activity were analyzed. Behavioural responses to mechanical stimulation (von Frey filament) and thermal stimulation (hot-plate) were evaluated in this study. To visualize neuronal activity, the adeno associated virus encoding the synopsis promoter driven calcium indicator protein GCaMP6f was expressed in excitatory neurons of S1 hind paw region. Then, in vivo two-photon calcium imaging was repeated and traced single cell activity before and after the administration of PD173212. We used MATLAB to analyze imaging data. Data were analyzed by repeated measures ANOVA followed by a Bonferroni's multiple comparison test or paired t-test, and a value of P < 0.05 was considered statistically significant.

Results and Discussion: In acute phase of inflammatory pain, the expression of N-type Ca2+ channel was significantly increased compared to WT mice, but the other type Ca2+ channels were not significantly different. Intraventricular administration of PD173212 significantly inhibited S1 neuronal activity and improved pain threshold. Moreover, local administration to S1 of slow release drug of PD173122 significantly improved pain threshold of inflammatory pain model.

Conclusion: This research suggests that neuronal activity via S1 N-type Ca2+ channel may affect the threshold of inflammatory pain.

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The regulation of spinal RNF31 on bias excitement of Gai signaling pathway via ubiquitin-MrgC in bone cancer pain

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Background and Goal of Study: Our previous studies confirmed that Mas-related G-protein-coupled receptor subtype C (MrgC) plays a vital role in the development of bone cancer pain (BCP). And its ubiquitin level increased in spinal neurons during the process of BCP. E3 ubiquitin ligase RNF31 can produce a complex of linear ubiquitin chains and may serve as a critical mechanistic link in the relationship between bias excitement of Gai signal pathway and MrgC. However, whether RNF31 participates in BCP by mediating ubiquitination of MrgC remains unclear. To answer this question, we designed and performed this study.

Materials and Methods: Osteosarcoma cells were implanted into the intramedullary space of the right femurs of C3H/HeN mice to induce progressive BCP. Adenoviruses expressing RNF31-small interfering RNA (siRNA) and expressing RNF31 were repeated intrathecal administration on day 14 after BCP was successfully carried out. The pain behaviors, the MrgC ubiquitination levels, the expression of Gai, RNF31, NF-κB and intracellular calcium concentration in spinal neurons were measured before and after injection, respectively.

Results and Discussion: Osteosarcoma cells were implanted into the intramedullary space of the right femurs of C3H/HeN mice to induce BCP. With comparison with sham group, mice in tumor group exhibited serious pain on day 14, and the level of MrgC ubiquilination, Gai, RNF31, NF-κB and intracellular calcium concentration in spinal neurons was significantly higher. Intrathecal repeated injection of Adenoviruses expressing RNF31 attenuated pain hypersensitivity and spinal MrgC ubiquitination. Gai protein and RNF31 expression, down-regulated the expression of spinal NF-κB, and decreased intracellular calcium concentration in spinal cord dorsal horn (SCDH) neurons. Conversely, repeated intrathecal injection of siRNA, produced the opposite effect. Meanwhile, MrgC-like immunoreactivity (IR) co-localizes with ubiquitilation, Gai, RNF31, NF-κB in SCDH neurons.

Conclusion: The present study demonstrates that the regulation of spinal RNF31 on bias excitement of Gai signaling pathway via ubiquitin-MrgC may be crucial in the process of BCP. These findings may provide further insight into the mechanisms and treatment of BCP.

Acknowledgements: This work was supported by National Natural Science Foundation of China (no. 81807871) and Medical Science and Technology Development Foundation, Nanjing (QRX17138, ZXK18018).

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Functional macrophage subtype changes in a mouse model of inflammatory low back pain/radiculopathy

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Background and Goal of Study: Macrophages play key roles in many pain states. They have been broadly classified as M1 or pro-inflammatory, and M2 or anti-inflammatory/involved in tissue repair. Macrophages can change their polarization in response to the local tissue environment. Our previous studies in rat showed that macrophage density (pan-macrophage Iba1 labeling) increased in the DRG after localized inflammation of the DRG (LID; a low back pain/radiculopathy model), but little is known about the functional macrophage subtypes involved in low back pain. In this study, we examined how different functional macrophage subtypes were involved in the LID model.

Materials and Methods: The CX3CR1 eGFP+/+ CCR2 RFPI+ transgenic mouse model was used to separately label CX3CR1-expressing (primarily resident) macrophages and CCR2-expressing (primarily infiltrating) macrophages. The LID model was established by a 3 μl immune activator zymosan (2 mg/ml) injection into the right L4 intervertebral foramen, over the DRG.

Results and Discussion: Local DRG inflammation caused mechanical hypersensitivity and increased guarding (spontaneous pain) in the ipsilateral paw, as previously shown for rats. Quantitative microscopy revealed that infiltrating macrophages increased after LID in the inflamed DRG on day 4, 7 and 14. Liposomal clodronate or vehicle (200 μl) was injected intravenously 2 days before LID surgery in order to deplete macrophages, as verified by decreased expression of CCR2+ macrophages in spleen and DRG. After clodronate, the mice had less LID-induced mechanical hypersensitivity and spontaneous pain, compared with i.v. vehicle-injected mice. We found it feasible to amplify specific macrophage polarization markers with qPCR using small samples of individually identified fluorescently labeled macrophages isolated from blood or DRG, which will enable polarization markers with qPCR using small samples of individually identified fluorescently labeled macrophages isolated from blood or DRG, which will enable further characterization of the polarization state of these two macrophage subtypes in this model over time.

Conclusion: Overall, our results to date suggest that infiltrating macrophages may contribute to inflammatory pain in a mouse model of low back pain and radiculopathy.

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Antinociceptive effect of Avenanthramide C in a rat model of inflammatory pain

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Background and Goal of Study: Avenanthramides (Avns) extracted from oats and those synthetically prepared exhibit potent antioxidant properties in vitro and in vivo. Avenanthramides C (Avn-C), one of the major forms of Avns has the highest antioxidant activity in vitro. Therefore, the purpose of this study was to examine the effect Avn-C in the rat formalin test.

Materials and Methods: An intrathecal catheter was inserted in male Sprague-Dawley rats. For induction of pain, 50 μL of 5% formalin solution was applied to the hind paw. Pain behavior was quantified by periodically counting the number of flinches during phase 2, but not during phase 1 in the formalin test.

Results and Discussion: Intrathecal administration of Avn-C decreased dose-dependently the sum of the number of flinches during phase 2, but not during phase 1 in the formalin test.

Conclusion: These findings indicate that Avn-C is effective against facilitated pain evoked by formalin injection at the spinal level. Thus, the spinal Avn-C may be useful in the management of tissue injury pain.
Combined pregabalin and tianeptine effect in spinal nerve ligation induced neuropathic pain rats

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Background and Goal of Study: Neuropathic pain impaired quality of life around 7~8% of adults, but the treatment was not satisfied because of partial pain relief and side effects in clinical settings. Pregabalin and tianeptine are used for first line drug of neuropathic pain. The experiment study evaluate the pharmacological interaction of pregabalin and tianeptine in a neuropathic pain model.

Materials and Methods: Neuropathic pain was induced by L5 nerve ligation in Sprague-Dawley rats. The effect of intrathecal tianeptine (30, 100, 300 μg) and pregabalin (0.3, 1, 3 μg) were investigated (5~7 rats per group) in allodynia using the von Frey hair test. And dose-response curves and isobolograms were used for investigating drug interactions.

Results and Discussion: Intrathecal administration of pregabalin and tianeptine dose-dependently reduced tactile allodynia. The ED50 values of pregabalin was 0.76 μg and tianeptine was 110 μg. Pregabalin + Tianeptine at 1:1 ratios were characterized as synergistic fashion by isobolographic analysis.

Conclusion: In this study, we demonstrated that intrathecally administered pregabalin and tianeptine have synergistic interaction on decreasing allodynia using spinal nerve ligation rats.

Effectiveness of ultrasound-guided paravertebral nerve block on isolated spinal fracture

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Background: Isolated spinal fracture is usually treated with conservative treatment (1), but in some cases, it is difficult to perform conservative treatment. Ultrasound-guided paravertebral nerve block is known to be a useful method for pain control in patients with chest wall injury or rib fracture (2).

Case Report: A 70-year-old female patient presented with anterior chest pain that had persisted for 2 weeks despite conservative treatment. Sagittal reconstruction chest computed tomography and sternum lateral oblique x-ray revealed an isolated spinal fracture.

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Efficacy of dexmedetomidine or clonidine as adjuvants to bupivacaine hydrochloride for serratus plane block in patients undergoing minimally invasive thoracic surgery

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Background and Goal of Study: Clonidine and Dexmedetomidine have been used to prolong the duration of local anesthetics in peripheral nerve blocks. With the present study we looked at the role of Dexmedetomidine compared to Clonidine when added to bupivacaine hydrochloride for serratus plane block (SPB) in patients undergoing minimally invasive lung lobectomy (MITS).

Materials and Methods: After IRB approval, 46 records of MITS were retrospectively reviewed. Dexmedetomidine (Group D, N=19, 50 mcg) or Clonidine (Group C, N=27, 100 mcg) were used in adjunct with dexamethasone (4mg) to prolong the duration of bupivacaine hydrochloride (0.375%) in ultrasound guided SPB administered at the end of surgery. Cases receiving neuraxial analgesia were excluded. Multimodal analgesia was used in every patient. Intra- and post-operative morphine equivalents, non-opioid anti-inflammatory drugs requirements, sedation (Richmond Agitation Sedation Scale), pain scores and mean arterial pressure (MAP) were compared between the two groups at PACU arrival and after 4 hours. Fisher’s exact test was used for categorical variables, and Wilcoxon rank sum test for continuous one.

Results and Discussion: Demographic data and comorbidities were comparable between the two groups. Group D required less intraoperative narcotics in the presence of similar multimodal analgesia. There was no difference in time for first opioid rescue, RASS, pain score and MAP on arrival and at 4 hours in PACU. Postoperative use of narcotics and adjuvants was similar in the two groups. There was no difference in surgical times, PACU and hospital length of stay.

Conclusions: In the presence of multimodal analgesia, Dexmedetomidine seems to be comparable to Clonidine for postoperative analgesia, sedation and hemodynamics when added to bupivacaine hydrochloride in patients undergoing SPB for MITS.

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Comparison between bipolar pulsed radiofrequency and geniculate nerve radiofrequency ablation in chronic knee pain

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Background and Goal of Study: Gonarthrosis is one of the most common articular diseases in older adults. Pain treatment using bipolar transcutaneous pulsed radiofrequency (TPRF) is very well extended therapeutic procedure in units of chronic pain during the last years; nevertheless, many studies have shown some efficacy for pain management with genicular nerve techniques. The main goal of our study is comparing the analgesic efficacy of genicular nerve radiofrequency ablation (GNRFA) to TPRF treatment.

Materials and Methods: We reviewed the clinical files of those patients who had these procedures between January 2014 and December 2018 at our Chronic Pain Department. We evaluated the analgesic efficacy of both techniques. Besides, we also measured Patient Global Impressions-Improvement (PGI-I) and Clinical Global Impressions-Improvement (CGI-I) in both techniques. The statistical study was performed with SPSS® program. Qualitative variables were analyzed with chi-square test and Fisher’s exact test, meanwhile, quantitative variables were analyzed with no parametric Mann Whitney-U test.

Results and Discussion: A total of 55 patients were analyzed: 80% (44 patients) had TPRF, and 20% (11 patients) had GNRF. There were no differences between sexes. Before the technique, NRS mean at movement was 8 (IQR: 9-7) and at rest was 4 (IQR:4-2) for bipolar TPRF, meanwhile for those with GNRF was 8 (IQR:10-7) at movement and 3 (IQR:7-0) at rest. After performing these techniques, NRS during activity and rest were 7 (IQR: 8-5) and 2 (IQR: 3-0) for bipolar TPRF, and 7 (IQR: 10-5) and 3 (IQR: 7-0) for GNRF, respectively. We did not find any differences among both groups, but there is a tendency in pain reduction, which we can also find in the literature. The majority of our patients related not feeling “any change” after performing both techniques, and there were no significant differences among both techniques. Improvement perception by physicians was similar without finding differences among both groups.

Conclusion: Patients’ NRS, both at rest and at movement, improved lightly in both groups, without significant differences between them. The majority of patients in both groups referred not feeling “any change”. We cannot conclude that one procedure is better than the other regarding pain reduction or patient satisfaction.

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Peroperative pain management in Breast Reconstructive Deep Inferior Epi gastric Perforator (DIEP) artery Flap Surgery: a retrospective study

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Background and Goal of Study: Pain management in reconstructive breast surgery with Deep Inferior Epigastic Perforator (DIEP) artery flap remains a challenge. There is no consensus about what’s the most suitable analgesic approach nor which paper locoregional anesthesia may have. The aim of our study was to audit acute postoperative pain management and to assess its impact on peroperative outcomes in our patients

Materials and Methods: After approval from IRB (19/46), we gathered data from medical records of patients who underwent DIEP flap surgery in our centre between 2014 and 2019. We collected: anthropometric data, ASA, comorbidities, anesthetic technique, peroperative complications; postoperative numerical pain rating scale (NPRS) and morphine consumption; hospital stay, chronic pain rate and outcomes. Results were reported as mean (SD) in quantitative data and percentage in qualitative data. Student’s-t test was used to test differences between continuous data and χ2 test to assess relationship between categorical data. If not applicable, we ran a Mann–Whitney U or a Fisher’s Exact Test respectively. P values <0.05 were considered statistically significant. Analyses were carried out using SPSS v 22.0

Results and Discussion: Sixty-seven patients were included: 35.8% under general anaesthesia (GA), 64.2% under combined anaesthesia (CA): BRILMA and/ or TAP block. ESP block, Paravertebral and/or interpectoral block, thoracic epidural. Postoperative analgesia consisted on NSAIDs and morphine if needed. NPRS at rest and movement at 24h postintervention were lower in CA group (p=0.032/ p=0.004 respectively). Seven patients (10.4%) required morphine PCA; 6 of them in GA group (p=0.004). Complications related to analgesia were all due to morphine secondary effects. Nine patients developed postoperative chronic pain: incidence was higher when NPRS at rest and movement were higher in postanaesthesia unit

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In recent years, there has been an increasing interest in various methods of regional anesthesia, including fascial-sheath blockade of the anterior abdominal wall (FSBAW). FSBAW have proven themselves in clinical practice. Unfortunately, the factors affecting the spread of local anesthetic (LA) in the fascial sheath are still unclear and so an objective of this study was to investigate these unknown factors.

Background and Goal of Study: In recent years, there has been an increasing interest in various methods of regional anesthesia, including fascial-sheath blockade of the anterior abdominal wall (FSBAW).

Materials and methods: Studies were performed in the pathology department in 15 corpses (n=6, W=9), which at the time of death was from 54 to 80 years. The weight of the corpse was 44–97 kg, height 163–185 cm. 10 lateral, 10 upper and 10 lower TAP-blocks were performed with the ultrasonic (US) navigation. Identical blocks were performed on two sides on one corpse. The FujiFilm Sonositeedgeginc-US device with a Sonosite HFL 38 13-6 Mhz linear ultrasonic sensor and SonoflexSinnCannula needles 22G 60–120 mm were used. To assess the solution's distribution the methylene blue was used for 20 (group A) or 30 (group B) ml. The dependence of the solution's distribution on the volume, weight and growth of the corpse as well as on damage in the area of the solution's distribution (surgical incision and scars) was studied. The spread of the dye was assessed 20 minutes after the injection.

Results and discussion: The injection of a larger dye volume led to a larger area of distribution. The injection of the solution in group A didn't provide the necessary coverage area in corpses whose growth exceeded 175 cm (n=11). The weight of the corpse didn't significantly affect the zone of solution's distribution. Thus, the area of solution's distribution in the fascial sheath depended on the growth of the corpse and almost didn't depend on the weight. Damage of anatomical structures in the dye distribution zone led to restriction of its distribution which led to a decrease in the staining zone (n=6).

Conclusions: The preliminary data suggest that the patient's weight has little effect on the volume of LA must be administered when performing FSBAW. The volume of the fascial sheath more depends on the patient's height. Growth determines the volume of LA that must be injected for adequate analgesia. Injection of 20 ml of LA may not be sufficient for adequate analgesia when performing FSBAW in patients whose height is higher than 175 cm. Injuries in the AREA of LA may cause restriction of LA distribution and inadequate analgesia.

References:
Unusual displacement of subcutaneously tunnelled intrathecal catheter

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Background: Intrathecal drug delivery systems (IDDS) are used in the care of patients with complex chronic non-cancer pain and cancer-related pain. IDDS deliver drugs into the intrathecal space by way of a subcutaneously tunnelled catheter. The catheter may be connected to an internally implanted IDDS or an external pump and reservoir. Subcutaneously tunnelled catheters connected to an external pump via an implanted Port-A-Cath are considered a reliable and safe method of intrathecal drug delivery.

Case Report: External displacement of subcutaneously tunnelled intrathecal catheters is widely not reported in the literature. A subcutaneously tunnelled catheter. The catheter may be connected to an internally implanted IDDS or an external pump via an implanted Port-A-Cath are considered a reliable and safe method of intrathecal drug delivery.

Case Report: External displacement of subcutaneously tunnelled intrathecal catheters is widely not reported in the literature. A subcutaneously tunnelled catheter. The catheter may be connected to an internally implanted IDDS or an external pump via an implanted Port-A-Cath are considered a reliable and safe method of intrathecal drug delivery.

Learning points: Displacement of subcutaneously implanted intrathecal catheters through skin may occur, leading to potential complications for patients.

Complete recovery after triple epidural blood patch for the treatment of spontaneous orthostatic headache

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Background: Cerebrospinal fluid (CSF) leakage might be iatrogenic or spontaneous in its nature. This outflow of CSF leads to intracranial hypotension that is felt as an orthostatic headache by the patient. Epidural Blood Patch (EBP) is considered the therapy of choice for orthostatic headaches derived from intracranial hypotension. Even though the EBP is considered the gold-standard treatment, its administration method (treatment level, volume used, number of EBPs and interval between them) for optimal efficacy is still debatable.

Materials and Methods: A 42 year old female presents intense orthostatic headaches in the temporop-occipital region. No iatrogenic cause was found. After conservative treatment failure, she underwent several lumbar punctures, MRI scans and CAT scans and was diagnosed with Liquor-Hypotension Syndrome. A Cisternography showed multiple CSF leakages from thoracic to lumbar L4-L5 levels. Our Pain Management Unit was consulted. During our visit, 45 days after the onset of the headaches, the patient presented bilateral temporo-occipital orthostatic headache 6/10, increasing bilateral tinnitus. Three EBP were performed with 1month interval between each, following the same protocol using 20ml of autologous blood which was drawn meanwhile an epidural needle was inserted into the L4-L5 interspinous level with saline loss of resistance technique. The blood was slowly injected (30-60 seconds). VAS scales were accessed before, 1min after, 1 hour after and 1 week after which were 6-3-2 and 0 respectively and a complete recovery 2 months past.

Results and Discussion: According to bibliography, there seems to be a need for additional EBPs when it comes to spontaneous orthostatic headaches or multiple
Background and Goal of Study: The aim of the study is to assess the quality and continuity of postoperative analgesia using multimodal analgesia with respect to the effect of the guidelines in 2018.

Materials and Methods: After bioethical approval, a prospective analysis of 80 patients (pts) who underwent elective surgery in Departments of General Surgery, and Urology of Hospital of Lithuanian University of Health Sciences Kaunas Clinics in November, 2018 was performed. The results were compared with a 2016 study of 94 pts using the same patients selection criteria and methodology of the study. Following this study performed in 2016, the General Surgery Unit (G) introduced pain management recommendations. Meanwhile, the Urology Unit did not follow the pain management recommendations. The data of the prescription and nursing sheets including the range, dosage of analgesics, methods of administration, pain scores (VAS 0-10) were analyzed. Data are presented as ratio, no (%) of cases, mean including the range, dosage of analgesics, methods of administration, pain scores.

Results and Discussion: Median pain intensity in Post-Anesthesia Care Unit (PACU) assessed in 86.6 % vs 97.5 % of cases was 1.2 vs 1, ranging from 0 to 6 scores, 2016 vs 2018. Pain intensity was neither assessed nor documented in Post-Anesthesia Care Unit (PACU) assessed in 88.6 % vs 97.5 % of cases was 1.2 vs 1, ranging from 0 to 6 scores, 2016 vs 2018.

Conclusion: The preliminary data show good practice in postoperative pain management of patients in surgical wards of general and maxillofacial surgery in “L. Vanvitelli” Hospital (Naples, Italy) from April 2018 to November 2019. The conclusions criteria are as follows: 1. Time of data collection is POD 1 and patients is 6 hours minimum in ward; 2. Patient is consenting age or over; 3. Patient has given assent or consent to participate.

Results and Discussion: 198 patients were enrolled: 171 underwent general surgery (G group) and 27 oral and maxillofacial surgery (OM group). In G group the mean least pain collect 6 hours minimum after surgery was 1.73±1.82, with a mean worst pain of 5.51±2.96. The percentage of time the patient experienced severe pain was 26.67±19.96. In OM group patients experienced a mean least pain of 1.33±1.80, with a mean worst pain of 3.78±3.12. The percentage of time the patient experienced severe pain was 27.41±31.69. In both groups, pain didn't interfered to doing activities in bed, breathing deeply or coughing, and sleeping. 58% of patients underwent general surgery was out of bed versus 81% of patients underwent oral and maxillofacial surgery without interference in activities such as walking, sitting in a chair, or standing at the sink. Low interference in emotions was reported in both groups. Adverse effects such as nausea, drowsiness, itching and dizziness were rarely recorded. Finally, pain relief was of 76.43% in G group and 85.19% in OM group with good satisfaction level (8.33 vs 8.93).
Perioperative acute pain management in Chinese institutions: preliminary result from a perioperative acute pain registry

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Background and Goal of Study: Perioperative acute pain is still an important clinical problem worldwide. Chinese medical institutions also made great efforts to relieve patients’ acute pain after surgery. However, there is still no large-scale investigation on the current acute pain management in China. Therefore, led by the Chinese Association of Anaesthesiologists, we started an observational study using the perioperative acute pain management registration database in China. In this abstract, we analyzed the initial results of the study to evaluate the postoperative acute pain control.

Materials and Methods: This study was approved by the ethics committee of Chinese PLA General Hospital. At present, 45 medical institutions in mainland China participated in this study. 2069 patients aged ≥18 years old were asked to complete a pain outcome questionnaire. Medical treatment that related to pain management was documented. Descriptive statistical analysis was used to analyze the demographic data, pain treatment and patients’ reported pain outcomes. The differences of pain outcomes among different surgical departments were compared with ANOVA.

Results and Discussion: 2012 patients were included in the current analysis. The worst postoperative pain reported by patients was scored at 4.0 ± 2.6 (Figure 1), and the duration of worst pain was 17.6 ± 24.7%. Patients’ reported satisfaction score was 8.5 ± 1.8. The degree of postoperative pain in obstetric patients was significantly higher than that in other departments. In addition, the departments with the worst pain score higher than 4 were orthopedics, urology and thoracic surgery (Figure 2).

Conclusion: In this abstract, we have made a preliminary analysis on the current profile of perioperative acute pain management in China. Our further study, we believe, will be able to provide valuable information to improve acute pain management in China, which include find the most vulnerable patients who need the most attention.

Acknowledgements: We thank for the contribution of our colleague in the 45 hospitals participated in our study.

Prospective audit: adequacy of pain assessment in the medical and surgical ward

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Background: Accurate assessment of pain is associated with improved pain management, which can lead to better patient outcomes. Pain is a fifth vital sign in Early Warning Scoring (EWS) chart2. The Royal College of Anaesthetists has recommended regular pain assessment3.

Aims: 1. Determine the prevalence of pain experienced by patients in Our Lady of Lourdes Hospital, Drogheda. 2. Determine the accuracy of documentation on observation charts and analgesia plans available for pain.

Method: After approval from the local audit committee, a prospective audit was conducted in the medical and surgical wards. Data was collected on proforma by direct questioning as well as reviewing patient charts.

Results: Of the 81 patients included, 55% were from the medical ward and 45% from the surgical ward. Documentation of pain was not universal, with 52 patients having no score documented with their last set of observations, but on direct questioning, 21% of patients had a pain score ≥4. Of those with a score recorded, the recorded score was not found to correlate with the scores reported on direct questioning in 60% of patients. Approximately 88% of the patient had appropriate analgesia plan available in charts.

Conclusions: The documentation of pain in the wards falls below the standard set by the Royal College of Anaesthetists3. Regular education and training programmes are needed to improve pain assessment and management to enhance the patient experience.

References:

Patient Related Outcome Domains in Studies related to Postoperative Pain Management after Total Knee Arthroplasty and Sternotomy: A comparison between two procedures

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Background and Goal of Study: In clinical trials, the efficacy of a treatment is assessed through endpoints; however, endpoints are often inconsistent representing different “outcome domains” which in turn are assessed by different instruments (“outcome measures”). This heterogeneity hinders standardization and comparability of research. Furthermore, there is increasing discussion about the endpoint pain intensity that might not be – at least not alone – the ideal predictor of treatment efficacy in pain trials. Thus, the development of an agreed standardized set of clinical relevant outcomes (a “core outcome set”) might solve these problems.

Materials and Methods: Here, we performed as a first step of such a process two SRs related to pain management after surgery, one after total knee arthroplasty (TKA) and one after sternotomy (ST). The SRs followed the recommendations of the COnsensus-based Critique Of Effectiveness, implementation, TKA or sternotomy, adults). Of those with a score recorded were “physical function” (TKA: 53.5%; ST: 17.4%), opioid consumption (88%/85.51%) and side effects (69.7%/64.5%). However, clear definition of domain by authors was often missing and combination of outcomes differed between surgical procedures. Finally, subdomains differed between studies of the same procedure as well as between procedures.

Conclusion: Studies on the efficacy of postoperative pain management after TKA and sternotomy show considerable heterogeneity regarding the outcome domains recorded and indicate a need for the development of a consented core outcome set of domains.

Postoperative pain management in France: national study of 3315 patients

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Background and Goal: The last French audit on postoperative pain realized in 20081 revealed that 51% of the patients experienced severe pain after a surgery. To allow national surveys concerning postoperative pain, the French Society of Anaesthesiology and Intensive Care designed an online tool, AlgoSFAR. By analysing the data collected from multiple centres, this study aimed to assess postoperative pain in France 10 years after the last audit and further suggest possible improvements.

Methods: French anaesthesiologists use AlgoSFAR to register pain data of their patients. All centres willing to audit their practice can use AlgoSFAR. After written institutional review board approval we analysed the data implemented in AlgoSFAR from January 2017 to December 2018. All patients older than 16 years old were eligible. We realized analyses using x2 and Student parametric tests and Fisher and Mann-Whitney-Wilcoxon nonparametric tests for comparisons.
Intrathecal diamorphine (ITD) is an established technique to provide post-operative analgesia following laparoscopic colorectal resections in the UK. However, there is no consensus on the optimum dose that should be used. The aim of this survey was to establish the dose of ITD used by consultant anaesthetists across the UK.

**Materials and Methods:** Online questionnaires were distributed to anaesthetists at 100 UK hospitals. Respondents were asked to indicate the most common and the maximum dose of ITD they use, the timing of injection in relation to the anticipated length of surgery and the number of patients that they anaesthetise per month for laparoscopic colorectal resections. Frequencies of each dose were calculated.

**Results:** Over 479 consultants responded. Of these, about 60% use ITD as primary mode of analgesia. The majority of spinal injections are performed with the patient awake [n=372, 77.7%], regardless of the anticipated duration of surgery. The most common dose of ITD used is 500 mcg [n=96/350, 27.4%]; range=200-1500 mcg; median=500 mcg; IQR=350]. The most frequent maximum dose used is 500 mcg [n=103/350, 29.4%]; range=200-2000; median=600, IQR=500]. There was a positive correlation between the number of patients anaesthetised per month and the dose of ITD used, both in terms of most common dose [r=0.129, p=0.015] and maximum dose used [r=0.105, p=0.049]. Consultants who use higher doses of ITD (e.g. >500 mcg) anaesthetise more patients per month compared to those who use lower doses (e.g. <=500 mcg) [medians= 3 vs 2, respectively, IQR=1, p=0.012].

**Discussion & Conclusions:** We demonstrated that ITD is the most common primary mode of analgesia used for laparoscopic colorectal resections but the range of doses used is considerable large, indicating that there is currently no consensus on the dose of ITD. Consultants who perform anaesthesia for these procedures more regularly use higher doses of ITD, suggesting that higher doses of ITD may be more effective and improve patient outcomes. Dose-response trials, specific to the colorectal population, are needed to investigate the relationship between doses of ITD and patient outcomes.
in groups of seniority and high prescription frequencies may increase acceptance in patients long-term opioids prescribe practice and increasing daily dose consumptions in part of attitude to administer opioids. There is a positive correlation between attitude to administer controlled drugs and either the item of knowledge of opioids prescribing or hours spent in controlled drugs continuing education. Hours spent in controlled medicines continuing education also has a positive correlation with increased prescription frequencies. However, knowledge of opioids prescribing showed no positive correlations with hours spent in controlled drugs continuing education.

Conclusion: The controlled drugs continuing education should consider the trend. How to provide a proper continuing education program for physicians to improve prescriptions information in the future is an important issue. Due to the item of knowledge of prescribing opioids showing positive correlation with long-term Opioids use only, we suggest to enhance continuing education on how to safely prescribing and tapering Opioid doses to improve prescription physicians clinical related knowledges.

Explores Influential Factors of Postoperative Pain Resolution after Hip Fracture Surgery in Elderly Patients Using Latent Growth Curve Analysis
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Background: Hip fractures among elderly patients are major public health issues around the world and early surgery is of paramount importance to reduce morbidity and mortality of these patients. However, few studies have ever explored factors associated with the variations in postoperative pain trajectories over time in these patients and we conducted this retrospective study to investigate influential factors of postoperative pain after hip fracture surgery using latent curve models.

Methods: After the approval of our Institutional Review Board, we collected data from patients aged 70 or more with hip fracture surgery by electronic chart review between January 2012 and December 2015 in Taipei Veterans General Hospital in Taiwan. We also collected numeric rating pain scores in the first three days post-op days, demographic variables, ASA physical status, chronic renal insufficiency, diabetes, perioperative blood transfusion, type of anesthesia and so on. Latent curve models with two latent variables, intercept and slope, were used to depict the variations in postoperative pain trajectories over time. The effects of collected variables on these two latent variables were estimated as well and backward model selection processes were employed to determine the final multiple predictors model which explained the changes in postoperative pain resolution most parsimoniously. The comparative fit statistic (CFI) and root mean square error of approximation (RMSEA) were also used to evaluate the model fit to the collected data.

Results: There were 1034 patients included in our analysis and the mean pain scores of the first, second and third postoperative days were 3.9, 3.1 and 2.8, respectively. After the model selection, four influential factors were identified to be associated with postoperative pain trajectories over time. Increasing anesthesia time was correlated with higher baseline level of postoperative pain (p = 0.005) and general anesthesia, use of epidural analgesia and aging were connected to faster pain resolution after surgery (p = 0.008, 0.046 and 0.015, respectively). The fit statistic analysis demonstrated good model fit (RMSEA = 0.03, CFI = 0.98).

Conclusions: Anesthesia time, general anesthesia, use of epidural analgesia and aging were associated with the variations in postoperative pain trajectories over time in elderly patients receiving hip fracture surgery.

Risk factors for chronic pain in open inguinal hernia repair- a multicentric prospective observational study (preliminary results)
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Background and Goal of Study: Open inguinal hernia repair is one of the commonest ambulatory surgeries, reaching approximately 155.9/100.000 inhabitants/year in Portugal. Most patients experience at least moderate pain during the following days, and chronic postsurgical pain might be as high as 50%. We aim to assess the incidence and risk factors for the development of chronic postsurgical pain after open inguinal hernia repair.

Materials and Methods: This is a sub-group of a multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inguinal hernia repair patients were recruited in 2 Portuguese ambulatory units, from September to November 2018. Perioperative data including pain and anxiety were collected. Postoperative pain was assessed through blind telephone interviews up to one year after surgery. Association between pain, anxiety and midazolam were assessed, including subgroup analysis and multiple regression techniques; alpha=0.05.

Results and Discussion: 56 men and 11 women were included, mean age 57.0 (1.5). 19% were smokers and 87% ASA≤3. Three months after surgery, 57.3% of patients referred at least some pain, 10.7% referred moderate to severe pain and 18.4% had criteria for neuropathic pain. One year after surgery, 50.6% of patients referred at least some pain; 13.0% referred moderate to severe pain and 13.0% had criteria for neuropathic pain. Multivariate regression identified risk factors for persistent pain after one year: older age (p=0.001), preoperative pain (p=0.028), chronic benzodiazepine consumption (p=0.008), active worker (p=0.047) and female gender (p=0.017). Lichtenstein technique (p=0.021) and higher education level (p=0.005) were risk factors for neuropathic pain at one year. Anxiety and midazolam administration did not predict pain at one year, but preoperative anxiety did predict pain at 3 months (p=0.043). Pain intensity at 1 year correlated to 24h midazolam administration did not predict pain at one year, but preoperative anxiety did predict pain at 3 months (p=0.043).

Conclusions: One year after open inguinal hernia repair, 50.6% of our patients have some level of pain. Modifiable risk factors include surgical technique and chronic benzodiazepine consumption.

Relief of neuropathic pain after spinal cord stimulator implantation in a patient with intramedullary cystic tumor. A case report
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Background: Syringomyelia is commonly associated with Chiari malformations, spinal trauma, arachnoiditis, or tumors. Intramedullary ependymal cysts of the spinal cord are rare, benign, fluid-filled cysts usually situated along the ventral surface of the spinal cord. Syringomyelia is characterized by an intraspinal cavity, it may cause central neuropathic pain.

Case Report: We report a case in a 25 year-old woman with 3 year history of cystic lesion intramedullary cystic tumor presented to the pain clinic. Clinical assessment demonstrated constant neuropathic pain which extended from left axila to thigh. She rated her pain 5-6 / 10 on a numerical rating scale, which worsened over the day and increased to 10 / 10 during frequent exacerbations. SL was prescribed multiple medications for pain including oxycodone, pregabalin, amitriptyline, duloxetine. Despite these, pain remained uncontrolled. Magnetic resonance imaging demonstrated a C6 nonenhancing anterior intramedullary hypointense signal change at the T1 level spanning cephalocaudal 12 mm, 5.5 mm anteroposterior and 6.3 mm transversal. SCS was proposed due to her significant refractory pain. The patient has reported long periods of excellent relief of pain (VAS 1) with occasionally increased pain (VAS 3) relative to emotional stress.

Discussion: The supposed pain mechanism was spinothalamic tract injury due to the syrinx cavity. In several studies, no correlation has been found between cyst
dimension using MRI and clinical symptoms of the syrinx, including the intensity of neuropathic pain. According to some authors, the position of the syrinx, rather than its size, may be better correlated with the clinical findings. The mechanisms behind the efficacy of this method remain unclear. We have successfully treated the patient and based on our case, neuromodulation with SCS has been found to be successful in the treatment of the selected patient with medication-resistant neuropathic pain related to syringomyelia.

References:

Learning points: SCS is a safe technique in patients with neuropathic pain with intramedullary cystic tumor.

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Unusual manifestations of the pain caused by psoas muscle
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Background: Psoas muscle is a big, long muscle which originates from T12 to L3 or L4 and extends to lesser trochanter of thigh. This muscle comprises of a lot of nerves that innervate the large parts of body including low back, pelvis and thigh. This muscle can cause various manifestations of pain according to the nerve affected by psoas muscle. Psoas works as a main hip flexor. We report cases of psoas-caused pain which are very unusual and treated by psoas muscle injection.

Case Report: Case 1. A 44-year old female underwent a gynecologic surgery and 2 weeks later she complained of low back pain, anterior thigh pain and inguinal area pain. The pain was not controlled by oral analgesics. She was transferred to pain clinic. On physical examination severe tenderness of psoas muscle was found and psoas muscle injection was done. The patient was pain free after two injections. Case 2. A 58-year old male complained of both knee pain and the X-ray showed no abnormality. The patient showed mild dysthesia on both anterior thigh and tenderness on both psoas. One injection to psoas removed the knee pain. Case 3. A 59-year old male was suffered from severe pain of ant thigh after hard tractor work. He could not walk and flex or extend his hip at all. Oral analgesics could not relieve his pain at all. Because the patient showed severe tenderness on psoas muscle of painful side. Two injections of psoas muscle could relieve the pain. Case 4. A 65-year old female complained of severe pain of inner thigh when she stood up from the bed. On physical examination there was a severe tenderness on symphysis pubis where the adductor muscles of thigh originate. The injection of this area relieved the pain only several days and pain developed again. Meticulous examination of psoas muscle showed the tenderness comparing with the contralateral side.

Discussion: The psoas muscle is a important muscle in low back pain. Also, this muscle contains nerves to thigh and pelvis area and lots of nerves around the psoas can be affected by psoas muscle dysfunction. It is necessary to check up the psoas muscle meticulously when the pain of pelvis, thigh, knee is not well controlled by the conservative measures such as oral analgesics and nerve blocks.

References:

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Billiard player’s unexpected neuralgia
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Background: Digital nerve blocks are often used for many finger surgeons. Although many methods have been described, the traditional method of performing local anesthesia laterally to the extensor tendons by marking the finger at the base of the finger is the most preferred.

Case Report: We report the case of a 38-year-old male introduced himself with prickly pain, which was sudden, stabbing, stinging and tapping triggered in the middle finger of the left hand 2 years ago. There weren’t any similar symptoms on the right hand. He said that all the symptoms began right after Paronychia. As a medication, Pregabalin was used. One year later, the patient reports a transmission of the pain on the left hand in the middle finger onto the index finger as well. Digital nerve block (DNB) was applied with 1% Lidocaine and complaints significantly decreased. During DNB, the patient’s wife told us that the patient had played Billiards for 10 years. When we asked the patient, he told us that he didn’t use any glove while he was playing Billiards. In digital neuralgia, the level of the digital nerve damage ranges from minor damage as neuropraxia to more severe damages as neuritis. Etiology can be due to many reasons. It’s diagnosed with nerve findings and symptoms that accompany the lesion which is often seen in chronic conditions. Treatment is primarily provided by awareness of risk scales and avoidance of repetitive activities that may pose a particular risk. The neural block may be applied as a therapy.

Discussion: It is useful to pay attention to handgrip in billiards and to be awake against neuralgia-like complaints. This a rare occasion but we should still take this into consideration and hence, promote the measurements for the people who play Billiards professionally, who have an increased risk of suffering from digital neuralgia.

References:

Learning points: In conclusion, acute neuralgia carries the danger of developing into chronic neuralgia if not diagnosed and treated early. Therefore, taking these pains into consideration and taking the necessary precautions in time is extremely important for the prognosis of patients.

6203

Preauricular infiltration in a case of persistent idiopathic facial pain
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Background: Persistent idiopathic facial pain (PIFP) is a peculiar disease, with non-specific symptoms, often related to psychological aspects. It’s an excruciating disorder of the face that cause persistent pain usually on one side of the face and that occurs in the absence of autonomic signs, laboratory or imaging abnormalities. It is usually described as a burning sensation.

Case Report: A 54 years-old male, referral due to excruciating facial pain in the left preauricular region, which started a year ago. He has pathological history of anxiety and left masseter surgery 20 years ago. At the time of examination, he had a continuous pain in preauricular region, with sensations of electric shocks, that was rated on the visual analogue scale of 10, with interference with sleep. The episodes of pain relieved when he was hurrying in the area. The patient denied trauma, infections, headache and sensitive tongue disorders. On clinical examination, he presented allodynia in the left preauricular region. The cranioencephalic nuclear magnetic resonance exclude organic lesion and the computed tomography of the temporomandibular joint had a slight irregularity of the left condyle with millimeter osteophyte labiation on its posterior side, with no other alterations. The patient was treated with oxcarbazapine 600 mg 12/12hr, tapentadol 50mg 12/12hr and paracetamol1000mg SOS3, reporting 60% relief. Subsequently we did preauricular infiltration with 3ml of 0.2% ropivacaine with 100% relief of pain lasting about 3 months without the need for systemic medication. The patient repeated just one more infiltration and currently has controlled pain.

Discussion: PIFP has a much lower persistence than trigeminal neuralgia and can be quite disabling. The diagnosis is difficult and there are no curative therapies. The pathophysiology remains poorly understood, and patients often present with psychological complaints. The 1st-line treatment is a low-dose tricyclic antidepressant and in 2nd-line: SNRIs, SNRIs and anticonvulsants. Finding new, more effective treatments for PIFP will allow better understanding of pathophysiology.

References:

Learning points: Local anesthetic infiltration is a relatively simple and safe technique that can be effective in some cases and allow pain control, reducing the need for systemic drugs and their adverse effects, as well as invasive surgical measures.
Ultrasound-guided pulsed radiofrequency in the management of unresponsive oncologic pain

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Background: Pulsed radiofrequency (PRF) is a novel therapeutic approach that could be useful in the management of oncologic pain unresponsive to conventional therapeutic strategies.PRF is based on an alteration in synaptic transmission and a neuramodulatory-type effect.(1)

Case Report: We report a case of a 59-year-old male patient, with metastatic colorectal cancer and a 5 cm mass infiltrating left ileosacral muscle. The patient came to our attention due to severe pain (9 on NRS) to the anteromedial face of left thigh and knee paresthesia. Poor response and the onset of side effect to oxycodone/naloxone 10/5mg twice daily, pregabalin 75mg twice daily, fentanyl 100 mcg, were reported. On the basis of neuropathic pain, we applied ultrasound-guided (USG) PRF to the hip articular branches of femoral nerve and accessory obturator nerve (PENG), putting the active needle tip at 5 o’clock position. After sensory and quadriceps motor stimulation test, PRF was performed in “pulse dose” mode, delivering 1200 pulses at 42°C. 20 ml ropivacaine 0.15%, plus dexamethasone 4 mg were administered at the end of the stimulation. Then we proceeded to apply PRF on the obturator and saphenous nerves, with an overall dose of 480 pulses at 42°C for each nerve, followed by injection of ropivacaine and dexamethasone according to the previous scheme. After 7 days follow-up visit, the patient reported pain relief with a significant reduction on NRS score from 9 to 4. Unfortunately, long term follow-up was not achieved due to patient’s death two months later.

Discussion: This case showed efficacy and safety of USG-PRF neuromedulation in oncologic pain associated with a major neuropathic component, unresponsive to conventional treatments. Moreover, it seems that PRF can improve quality of life of oncologic patients for long periods, with the possibility to repeat the treatment if needed.(2)

References:

Learning points: PRF is a minimally invasive, well tolerated and safe procedure. It's a valid alternative to conventional treatments for oncologic neuropathic pain in patients unresponsive or suffering from side effects.

The effect of a two-week osteopathic visceral manipulation in patients with non-specific chronic low back pain – a randomized controlled study

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Background and Goal of Study: After headaches and chronic fatigue, low back pain is the most reported complaint, with more than 80% of the population reporting LBP at some point in their life.[1]This study aims to evaluate the effectiveness of a two-week osteopathic visceral manipulation in patients with non-specific chronic low back pain.

Materials and Methods: The prospective randomized study included 162 patients with chronic non-specific low back pain (nsLBP), turned to spine surgery department in Aug.2018–Aug.2019. All the patients were allocated to two groups(81 each) using the sealed envelope method: study group–osteopathic visceral manipulation(OVM) and control group–placebo visceral manipulation(PVM).OVM and PVM were 40min long and performed once per week for two weeks. Evaluations were performed before the first session, two weeks and six months after treatment, and involved interview, manual testing, the Oswestry Disability Index(ODI),Visual analogue scales(VAS).

Results and Discussion: Man age was 38.1±8.2 and 42.3±6.7 in the study and control group, respectively. At admission the VAS score was 5.5±2.1 and 6.2±1.8,ODI–31.4±4.5%,36.3±2.9% in the study and control group, respectively, whereas manual testing revealed tenderness and visceral laxity restriction in the abdominal and pelvic regions in 85% of the enrolled patients as well as sacroiliac joint movement restriction on the painful side in 92%.In two weeks after treatment patients showed following results: VAS score decreased to 3.2±2.4 and 4.7±1.8,ODI–18.6±1.3%,32.7±4.4% in the study and control group, respectively.

Manual testing revealed the increase in the range of sacroiliac joint movements in the study group in 73%(versus 28% in the control group).In a 6-month period patients of study group showed significant decrease in VAS score–2.9±0.8 and ODI improvement–20.2%(compared to the controls:4.5±0.7 and 34.1±3.5%).

Conclusion: The majority of patients with nsLBP demonstrated visceral laxity restriction and muscle tone changes in the abdominal and pelvic regions without clinical symptoms’ manifestation but accompanied with visceral palpation tenderness. Followed by OVM muscle tone and visceral movement normalization caused less visceral palpation tenderness, adequate pelvic bone biomechanics and pain relief in most patients of the study group. Patients with nsLBP may benefit from OVM.

References:

Mesenteric Panniculitis: an often forgotten treatable cause of chronic abdominal pain

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Background: Management of chronic abdominal pain is challenging since the symptoms are frequently disabling and abdominal causes are not always evident. Accurate characterization of symptoms often allows a correct diagnosis and avoids unnecessary invasive procedures. The authors present a case of chronic abdominal pain completely solved after the corticoid therapy.

Case Report: 77-years-old man presented to Chronic Pain Unit for persistent abdominal pain unresponsive to conventional analgesia. His past medical history was positive for insulin-treated Type II Diabetes and prostate carcinoma (stable and with no evidence of metastatic disease). The patient complained of spontaneous pain to the left upper quadrant of the abdomen with irradiation to the left hemithorax, with 4 years of evolution, worsen in the last 2 years. Pain was stab-like, had night aggravation and relief with gauze emission (patient denied intestinal transit disorders). Gastroenterological pathology was excluded. An abdominopelvic CT showed an incipient mesenteric panniculitis (MP), with no other relevant changes. Patient medication was optimized without any improvement. In the absence of any other aetiology, a therapeutic trial with prednisolone 20mg/day was started and gabapentin dose was adjusted. After 2 weeks, patient experienced a markedly pain relief, with full resolution of symptoms after 4 months, allowing weaning of corticosteroids as well all analgesic medication. No recurrence of symptoms was noticed.

Discussion: MP is a benign condition characterized by chronic inflammation leading to fibrosis of the mesentry. Although there are many different clinical presentations, abdominal pain is the most frequent (up to 70%). Radiological features are very helpful, but just histological findings provide a definitive diagnosis. Despite MP represents a rare cause of abdominal pain, because of its favourable response to corticosteroids, this disorder should not be forgotten, especially when patient present risk factors.

References:

Learning points: This report highlights the importance of clinical doubt for final diagnosis, especially in chronic abdominal pain where there are many possible aetiologies. MP is a rare disorder but can be successfully treated conservatively, this emphasis that treatable causes should always be excluded.

The hidden culprit: Splenosis as a cause of Chronic Abdominal Pain

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Background: Disseminated splenosis (DS) is a rare condition caused by metastatic deposits of splenic tissue following trauma or surgery.1 Although DS is usually asymptomatic, it can also be present as persistent abdominal pain or other serious complications. This case report aims to alert the fact that splenosis can be a hidden cause of chronic abdominal pain (CAP).

Clinical Report: A 79-year-old woman with history of degenerative ostearticular disease, bladder cancer, paracetamol-coenzyme-induced hepatitis and multiple abdominal surgeries, including a splenectomy. She suffered from CAP with 15 years of evolution, with multiple unsuccessful treatment attempts. She even performed a total colectomy for megacolon (a possible contribute for CAP). After this surgery, the
pain was localized to left hypochondrium (LH). Patient realized multiple analgesic schemes, including gabapentin, pregabalin, amitriptyline, lidocaine patch and other therapies like dorsolumbar transcutaneous electrical stimulation, intercostal nerve fluoroscopy-guided block, lumbar space and paravertebral ultrasound-guide blocks (USB). Neither of these procedures produces pain relieve. Patient was than presented to our Unit for realization of another USB. At this time the patient was under gabapentin 100 mg tid and cyclobenzaprine 10mg id and she wasn’t receptive to any other oral medication. She complains of LH constant and burning pain irradiated to the back and abdomen’s lower left quadrant, with a maximum pain score of 8/10. Before deciding another intervention, an abdominopelvic CT scan was performed, which revealed splenosis. The case was presented to General Surgery and definitive surgical solution was proposed.

Discussion: Despite splenosis affects up to 2/3 of patients that underwent a splenectomy, it is often silent and therefore sometimes a forgotten diagnosis. The existent literature especially addresses the surgical aspects and not the need of a high suspicion index for an early diagnosis.

References:
To conclude: In all patients with a history of spleen surgery, splenosis should be considered in differential diagnosis of CAP. In symptomatic patients surgery is the definitive solution and that way avoid years of ineffective treatments to pain control. It is essential that physicians be aware of this diagnosis in order to manage correctly this rare case of CAP.

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Clinical utility of ozone therapy in chronic shoulder pain

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Background: Oxygen-Ozone therapy is a treatment with anti-inflammatory and analgesic effects that relieves pain and improves joint function. Ozone is bactericidal, fungicidal and viricidal with a low risk of infection. Thus, it is advantageous in musculoskeletal disorders, including low back pain, disc herniation, periarthritis shoulder and knee osteoarthritis, and is considered a satisfactory treatment with low risk of complications and high success rate.

Case Report: A 78-year-old female, referred due to right omalgia because of a splenectomy, was presented to our Unit for realization of another USB. At this time the patient was under gabapentin 100 mg tid and cyclobenzaprine 10mg id and she wasn’t receptive to any other oral medication. She complains of LH constant and burning pain irradiated to the back and abdomen’s lower left quadrant, with a maximum pain score of 8/10. Before deciding another intervention, an abdominopelvic CT scan was performed, which revealed splenosis. The case was presented to General Surgery and definitive surgical solution was proposed.

Discussion: Despite splenosis affects up to 2/3 of patients that underwent a splenectomy, it is often silent and therefore sometimes a forgotten diagnosis. The existent literature especially addresses the surgical aspects and not the need of a high suspicion index for an early diagnosis.

References:
To conclude: In all patients with a history of spleen surgery, splenosis should be considered in differential diagnosis of CAP. In symptomatic patients surgery is the definitive solution and that way avoid years of ineffective treatments to pain control. It is essential that physicians be aware of this diagnosis in order to manage correctly this rare case of CAP.

5598

The timing of the formation of neuropathic pain in children with leukemia. Efficacy and tolerability of pain therapy

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Background and Goal of Study: Neuropathic pain in pediatric oncology can occur as a result of various injuries of the somatosensoory system. The aim of the study was to analyze the pain syndrome in children with hemoblastoses at the first stage of chemotheraphy and compare the effectiveness of various methods of pain treatment.

Materials and Methods: Conducted cohort prospective study, which included 60 children with newly diagnosed hemoblastoses, aged 6 to 18 years. All the children were divided into three groups depending on the treatment of pain. The I group received morphone analgesia, II group received morphine in combination with gabapentin and the III group received paracetamol with gabapentin. Venous blood was tested in 40 children for the activity of superoxide dismutate (SOD) and catalase, the content of sialic acids (SC) and malondialdehyde (MDA).

Results and Discussion: The study found that pain syndrome in most children - 51 children (85%) occurs after 15 days of chemotheraphy protocol. On the 1st day of the manifestation of pain in 8 children (13%), the result on the neuropoatic component of pain was negative, in 48 children (80%) - doubtful, and in 4 children (7%) - positive. In the II group, the pain syndrome was detected in 5 children (3%), the diabetic for neuropathy are negative, in 56 children (91%) - doubtful, and in 4 children (6%) - positive. On the 64th and 78th day of chemotheraphy, the data for neuropathy are the same and are: in 53 children (88%) doubtful, and in 7 children (12%) positive. Signs of oxidative stress were found - SOD activity was 35.4 times lower than normal, the amount of MDA and SC was 7.5 and 1.8 times higher than normal, respectively.

The pain intensity according to VAS on day 30 was in the I group ≤5 points, in the II group ≤4 points and in the III group ≤3 points. On day 78, the intensity of pain in group I was ≤5 points, in groups II and III ≥3 points. Severe asthenia was observed only in 6 children (10%) of the first group, moderate asthenia in 45 children (75%) and the fatigue reaction in 9 children (25%).

Conclusion: Results of the study show that the manifestation of pain should be expected with 15 days of chemotheraphy protocol. At the 1st stage of chemotheraphy, there are already demyelinating processes and the formation of neuropathic pain.

5253

Prospective open labeled pilot study of quercetin as an add-on therapy on chemotheraphy-induced peripheral neuropathy

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Background and Goal of Study: Chemotheraphy-induced peripheral neuropathy (CIPN) is one of the common side effects of chemotheraphy. It can affect physical, emotional, cognitive functioning in cancer survivors. The life quality of patient and treatment schedules can also be disrupted. However, CIPN is difficult to treat and there is no established treatment. Recently, it has been reported that Quercetin (3,3’,4’,5,7-pentahydroxy-2-phenylchromen-4-one, QU) has many antitumor, anti-inflammatory, antioxidiant effect. Therefore we aimed to investigate efficay of QU on CIPN as an add-on therapy with conventional therapy.

Materials and Methods: A total of 6 patients developed CIPN were given QU and taught to take 500mg QU by mouth twice daily for 12 weeks. Severity and quality of neuropathic pain (primary outcome) were evaluated through questionnaires for Douleur Neuropathique 4 Questions (DN4) and Neuropathic Pain Scale (NPS). And cancer-related symptoms (secondary outcome) were assessed with MD Anderson Symptom Inventory (MDASI) and Edmonton Symptom Assessment Scale (ESAS). Changes in DN4 and NPS, MDASI, ESAS were measured repeatedly through the preparation of questionnaires on the first, fourth and 12th weeks after taking the drug.

Results and Discussion: DN4 score of 6 patients were significantly reduced after taking QU for 12 weeks (p=0.036). Pain quality was also decreased in 4 patients, but 2 patients showed increased NPS score due to their cancer progression (p=0.63). Also effects of QU on other cancer-related symptoms were minimal, as investigated by MDASI (p=0.70) and ESAS (p=0.65).

References:
Conclusion: DNA score of 6 patients were significantly reduced after taking QU for 12 weeks (p=0.036). Pain quality was also decreased in 4 patients, but 2 patients showed increased NPS score due to their cancer progression (p=0.63). Also effects of QU on other cancer-related symptoms were minimal, as investigated by MDASI (p=0.70) and ESAS (p=0.65).

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in acute cerebrovascular pathology

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Background and Goal of Study: We study the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress adaptation hormones in relation to the neurological status by the end of the acute period of cerebral stroke in acute cerebrovascular pathology.

Materials and Methods: In 626 adult patients in the acute period of cerebral stroke (regardless of its type, variant, etc.) who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, in cerebrospinal fluid and venous blood samples colorimetric determination of adenosine, guanine, hypoxanthine, xanthine, uric acid, magnesium was carried out, enzyme-linked immunosorbent assay for cortisol and dehydroepiandrosterone, thyroid-stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The relative risk of subsequent depression of consciousness is high when a stroke is detected on the 1st day of elevated levels of magnesium (3.34) and cortisol (2.33) in blood serum, hypoxanthine (2.62) and cortisol (2.52) in cerebrospinal fluid, as well as upon detection of a stroke on the 1st day of low level of adenosine in the cerebrospinal fluid (2.60); when a stroke level of 3 cortisol (11.0), magnesium (2.13), uric acid (2.06) and xanthine (2.05) in the blood serum is detected on the 3rd day of a stroke. The highest chances of worsening neurological status by the end of the acute period of cerebral stroke in detecting elevated serum levels on the 1st day of magnesium (OR = 7.08), cortisol (OR 3.0), adenosine (OR = 2.77); increased content on the 1st day in the cerebrospinal fluid of cortisol (OR 3.38) and hypoxanthine (OR = 4.69), low content of adenosine in the cerebrospinal fluid (OR 4.21); increased content on the 3rd day in the blood serum of magnesium (OR 3.25), cortisol (OR 21), uric acid (OR 4.15), hypoxanthine (OR 3.03), xanthine (OR 2.9), adenosine (OR 2.83), guanine (OR 2.77).

Conclusion: In patients in the acute period of cerebral stroke (regardless of its type), indicators of the purine spectrum, stress-adaptive hormonal status are highly informative factors in predicting worsening neurological status. The most “powerful” prognostic factors are cortisol and uric acid levels.

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in acute cerebral ischemia: diagnostic and prognostic aspects

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Background and Goal of Study: We compare the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress adaptive hormones in relation to the neurological status in acute cerebral ischemia.

Materials and Methods: In 402 adult patients in the acute period of cerebral ischemic stroke, who were treated in the intensive care unit and intensive care unit of the angioeurological department, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenosine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The relative risk of subsequent depression is high when a 3-day stroke is detected in serum with elevated cortisol (4.5), hypoxanthin (2.48), xanthin (2.85), adenin (2.16), guanine (2.08), uric acid (2.09); in the liquor with elevated total activity of xanthine-oxidase (2.25). The highest chances of deterioration of the neurological status by the end of the acute period of ischemic stroke are found at the detection of its increased content in the blood serum of magnesium (OR 4.8), cortisol (OR 2.5), reduced total activity of xanthine-oxidase in the blood serum (OR 2.5), reduced activity of the first stage of xanthine-oxidase reaction in the liquor (OR 3.27). There are high chances of deterioration of neurological status at detection of increased content of adenosine (OR 4.0), guanine (OR 4.27), hypoxanthin (OR 7.7) in blood serum for 3 days, Xanthine (OR 5.1), uric...
Results and Discussion: The most sensitive factor (0.72), "predicting" subsequent depression of consciousness by 7-10 days of hemorrhagic stroke, was increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction). The most specific factors were reduced levels in the cerebrospinal fluid of adenine (0.92) and guanine (0.96) on the 1st day of stroke. The relative risk of subsequent depression of consciousness is also high when detecting a reduced content of adenine in the cerebrospinal fluid (3.38) and increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction, 3.04) on the 1st day of stroke. The highest chances of deterioration of the neurological status by the end of the acute period of hemorrhagic stroke with the detection of reduced concentrations of adenine (OR 5.77) and guanine (OR 3.75) in cerebrospinal fluid, increased xanthine oxidase activity in blood serum (in the first stage of the xanthine oxidase reaction - OR 4.31) on the 1st day of a stroke.

Conclusion: In patients with secondary cerebral ischemia in the acute period of hemorrhagic stroke, the most prognostically significant factors in the deterioration of neurological status are the level of cerebrospinal fluid adenine and serum xanthine oxidase activity.

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and lethal outcome at hemorrhagic stroke: diagnostic and prognostic aspects

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Background and Goal of Study: We study the possibility of predicting the onset of death with the help of various hormonal and metabolic indicators in the acute period of cerebral hemorrhagic stroke

Materials and Methods: In 224 adult patients in the acute period of cerebral hemorrhagic stroke who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunooassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most sensitive factors for the subsequent onset of death in hemorrhagic stroke were: increased xanthine concentration on the 1st and 3rd day of stroke (0.83 and 0.76), reduced xanthine oxidase activity (in the second stage of the xanthine oxidase reaction - 0.61). Among the most specific such factors: an increased concentration of uric acid in the blood serum on the 1st and 3rd day of a stroke (0.91 and 0.98), a combination of an increased content of uric acid in the blood serum and cerebrospinal fluid on the 1st day of a stroke (0.93). The relative risk of death is highest when a stroke concentration of uric acid in the blood serum is detected on the 3rd day (3.93). The highest chances of a fatal outcome when a stroke is detected on the 3rd day of an elevated blood serum uric acid (OR 21.5), adenine (OR 3.55), guanine (OR 3.27); a combination of an increased content of uric acid and cerebrospinal fluid (OR 3.37), increased serum uric acid (OR 2.87), decreased xanthine oxidase activity in the second stage of the xanthine oxidase reaction on the 1st day of stroke (OR 2.67).

Conclusion: In patients with secondary cerebral ischemia in the acute period of cerebral hemorrhagic stroke, the most prognostically significant factor in fatal outcome is the blood level of uric acid.

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in intracranial hemorrhage: diagnostic and prognostic aspects

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Background and Goal of Study: We study the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress-adaptation hormones in relation to neurological status by the end of the acute period of hemorrhagic stroke.

Materials and Methods: In 224 adult patients in the acute period of cerebral hemorrhagic stroke, who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunooassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most sensitive factor (0.72), "predicting" subsequent depression of consciousness by 7-10 days of hemorrhagic stroke, was increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction). The most specific factors were reduced levels in the cerebrospinal fluid of adenine (0.92) and guanine (0.96) on the 1st day of stroke. The relative risk of subsequent depression of consciousness is also high when detecting a reduced content of adenine in the cerebrospinal fluid (3.38) and increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction, 3.04) on the 1st day of stroke. The highest chances of deterioration of the neurological status by the end of the acute period of hemorrhagic stroke with the detection of reduced concentrations of adenine (OR 5.77) and guanine (OR 3.75) in cerebrospinal fluid, increased xanthine oxidase activity in blood serum (in the first stage of the xanthine oxidase reaction - OR 4.31) on the 1st day of a stroke.

Conclusion: In patients with secondary cerebral ischemia in the acute period of hemorrhagic stroke, the most prognostically significant factors in the deterioration of neurological status are the level of cerebrospinal fluid adenine and serum xanthine oxidase activity.

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and letal outcome in acute cerebral ischemia: diagnostic and prognostic aspects

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Background and Goal of Study: We study the possibility of predicting the onset of a fatal outcome using various hormonal and metabolic parameters in acute cerebral ischemia.

Materials and Methods: In 402 adult patients in the acute period of cerebral ischemic stroke, who were treated in the intensive care unit and intensive care unit of the angiographourgical department, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunooassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most sensitive predictors of lethal outcome of ischemic strokes were: increased xanthine concentration on the 1st and 3rd day of stroke (0.83 and 0.76), reduced xanthine oxidase activity (in the second stage of the xanthine oxidase reaction - 0.61). Among the most specific such factors: an increased concentration of uric acid in the blood serum on the 1st and 3rd day of a stroke (0.91 and 0.98), a combination of an increased content of uric acid in the blood serum and cerebrospinal fluid on the 1st day of a stroke (0.93). The relative risk of death is highest when a stroke concentration of uric acid in the blood serum is detected on the 3rd day (3.93). The highest chances of a fatal outcome when a stroke is detected on the 3rd day of an elevated blood serum uric acid (OR 21.5), adenine (OR 3.55), guanine (OR 3.27); a combination of increased serum uric acid and cerebrospinal fluid (OR 3.37), increased serum uric acid (OR 2.87), decreased xanthine oxidase activity in the second stage of the xanthine oxidase reaction on the 1st day of stroke (OR 2.67).

Conclusion: In patients with acute cerebral ischemia in the acute period of cerebral ischemic stroke, the most prognostically "powerful" lethal outcome factors are uric acid level and xanthine oxidase activity.

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in intracranial hemorrhage: diagnostic and prognostic aspects

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Background and Goal of Study: We study the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress-adaptation hormones in relation to neurological status by the end of the acute period of hemorrhagic stroke.

Materials and Methods: In 224 adult patients in the acute period of cerebral hemorrhagic stroke who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunooassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most sensitive factor (0.72), "predicting" subsequent depression of consciousness by 7-10 days of hemorrhagic stroke, was increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction). The most specific factors were reduced levels in the cerebrospinal fluid of adenine (0.92) and guanine (0.96) on the 1st day of stroke. The relative risk of subsequent depression of consciousness is also high when detecting a reduced content of adenine in the cerebrospinal fluid (3.38) and increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction, 3.04) on the 1st day of stroke. The highest chances of deterioration of the neurological status by the end of the acute period of hemorrhagic stroke with the detection of reduced concentrations of adenine (OR 5.77) and guanine (OR 3.75) in cerebrospinal fluid, increased xanthine oxidase activity in blood serum (in the first stage of the xanthine oxidase reaction - OR 4.31) on the 1st day of a stroke.

Conclusion: In patients with secondary cerebral ischemia in the acute period of hemorrhagic stroke, the most prognostically significant factors in the deterioration of neurological status are the level of cerebrospinal fluid adenine and serum xanthine oxidase activity.
Purine metabolites, magnesium, corticosteroid, thyroid hormones and lethal outcome in acute cerebrovascular pathology

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Background and Goal of Study: We study the possibility of predicting the onset of death with the help of various hormonal and metabolic indicators in the acute period of cerebral stroke.

Materials and Methods: In 626 adult patients in the acute period of cerebral stroke (regardless of its type, variant, etc.) who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, in cerebrospinal fluid and venous blood samples colorimetric determination of adenosine, guanine, hypoxanthine, xanthine, uric acid, magnesium was carried out, enzyme-linked immunosorbent assay for cortisol and dehydroepiandrosterone, thyroid-stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most specific factors were: increased concentration of uric acid in the blood serum on the 1st and 3rd day of stroke (0.89 and 0.98), combination of an increased content of uric acid in blood serum and cerebrospinal fluid on the 1st and 3rd day of a stroke (0.90 and 0.97); reduced guanine in cerebrospinal fluid (0.84) on the 3rd day of stroke; increased content of free fractions of tridiodothyronine and thyroxine on the 1st day of stroke (0.86 and 0.76).

The relative risk of a fatal outcome is high when a stroke of increased concentration in the blood serum of cortisol is detected on the 1st and 3rd day (3.25 and 7.39); increased content of hypoxanthine (2.49), xanthine (2.49) and uric acid (3.53) on the 3rd day of stroke, a combination of increased serum uric acid and cerebrospinal fluid (2.71). The highest chances of a fatal outcome when a stroke is detected on the 1st day of a stroke are elevated concentrations of cortisol and free thyroxine in blood serum (OR 4.98 and 2.59, respectively), uric acid in cerebrospinal fluid (OR 2.79); when a stroke concentration of adenosine (OR 2.81), guanine (OR 3.75), hypoxanthine (OR 4.05), xanthine (OR 3.60). Urea is detected in the blood serum on the 3rd day of a stroke (OR 20.0), cortisol (OR 10.4), a combination of high uric acid in blood serum and cerebrospinal fluid (OR 23.3).

Conclusion: In patients in the acute period of cerebral stroke (regardless of its type), indicators of the purine spectrum, stress-adaptive hormonal status are highly informative factors in predicting the onset of a fatal outcome. The most prognostically "powerful" of the studied parameters is the blood level of uric acid.

5105
Diagnostic challenge of Euglycemic Diabetic Ketoacidosis in the ICU setting

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Background: In surgical patients with intestinal pathology who are on SGLT2 inhibitors (SGLT2-I), the pre-operative period of poor feeding coupled with the post-operative inability to initiate feeds makes the management of Euglycemic diabetic ketoacidosis (EuDKA) challenging. We present a rare case of a patient with persistent EuDKA on SGLT2-I.

Case Report: Mdm. X was a type 2 diabetic who was on Dapaglifozin. She presented with clinical dehydration, hypotension and severe abdominal pain. She was diagnosed with a rectosigmoid tumour complicated by sealed perforation. As she presented with the triad of normoglycemia, high anion gap metabolic acidosis and ketonemia, a diagnosis of EuDKA was suspected and she was immediately started on IV insulin infusion. As her ketones normalized, she was transitioned to a subcutaneous insulin sliding scale regime. However, she was kept fasted as she was planned for a trephine colostomy the next day. She then developed rebound ketosis requiring IV insulin.

Discussion: In patients with acidosis, the differentials of lactic acidosis and starvation ketosis should also be considered. The pathogenesis of euglycemic DKA includes decreased insulin secretion in the setting of increased counter-regulatory hormone secretion (1). In contrast to starvation ketosis, it has a precipitating critical illness, a bicarbonate concentration lower than 18mmol/L and rapid resolution of clinical abnormalities with administration of insulin (2). Our patient's malignancy, infection, decreased dietary intake secondary to loss of appetite coupled with the use of SGLT2 inhibitors may have precipitated her condition. It is interesting to note that her EuDKA persisted despite having stopped dapaglifozin for 5 days. This appears to be longer than what was previously reported.

References:

Learning points: We suspect that the duration of action, metabolism and excretion of SGLT2 inhibitors could be longer in high risk patients. More studies should be performed to determine the appropriate duration to continue this medication preoperatively in order to minimize EuDKA risk.

4579
Analysis of patients with stress induced hyperglycaemia after burns and insulin pharmacotherapy

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Background and Goal of Study: The hyperglycemic condition from dysregulation of glucose homeostasis has been defined Stress Induced Hyperglycemia (SIH). In the burned patients SIH is present in the ebb phase (up to 24 hours after trauma) and in the flow phase (till the closure of wounds). Surviving Sepsis Campaign in 2016 specifies as a strong recommendation with high level of evidence commencing insulin dosing when 2 consecutive blood glucose levels are >180 mg/dL. The aim of this study is to evaluate the prevalence of SIH in the burned patients in two periods of the disease Our hypothesis is that testing critical hyperglycemia in the first 24 hours after burn can we predict the probability of critical hyperglycemia during the disease?

Materials and Methods: This is an observational prospective cohort study. Population is composed of adults hospitalized in ICU of the Service of Burns near University Hospital Center, Tirana, Albania in the last 5 years. Patients are grouped according blood glucose(BG) values in three categories. Patients with Euglycemia (BG<80 mg/dL), Moderate Hyperglycemia (BG=121-180 mg/dL) and Critical Hyperglycemia (BG>180 mg/dL).To respond to our clinical question, we designed a hyperglycemia prediction test based on BG level in the first 24h of admission. We calculated the Test Performance and the Accuracy of our test. Discrimination of the patients developing critical hyperglycemia or not during the disease is also graphically presented by the ROC Curve.

Results and Discussion: The prevalence of critical hyperglycemia in the burned adult population in our study is 15.6% on admission and 7% during the disease. Using the value 180 mg/dL as cutoff we found that the test had a Sensitivity of 66.67 % and Specificity of 88.20 %, Positive Likelihood Ratio (PLR) is 5.65 and Negative Likelihood Ratio (NLR) is 0.38. We analyzed test performance concretely: Positive Predictive Value (PPV) is 29.63 %, Negative Predictive Value (NPV) is 97.26 %. Accuracy is 0.86 (Figure 1)ROC Curve for BG values on admission and during the burn disease is presented in Figure 2.

Conclusion: BG values on admission, as one of the derangement features of the burn shock, are prognostic factors for critical hyperglycemia during the disease. Insulin has benefits in the complexity of treatment in patients with burns. Measures of test performance (PPV, NPV) help in interpreting the results.
Patients admitted with severe hyponatraemia (<125 mmol/L) and hypernatraemia (>145 mmol/L) had a higher risk of mortality. For mild hyponatraemia, normonatraemia, and hypernatraemia at ICU admission, a Δ48h-[Na+] > 5 mmol/L was associated with larger hazards of mortality (Figure 1). Based on our findings, it is possible that mild hyponatraemia may be a protective mechanism in critical illness, which questions common practice of routinely correcting serum sodium when it is too low.

Conclusion: An increase in serum sodium in the first 48 hours of ICU admission is independently associated with a higher mortality in patients admitted with mild hyponatraemia, normonatraemia, and hypernatraemia. Future interventional trials are necessary to determine optimal policy in patients with mild hyponatraemia, for whom unintentional or intentional correction of low serum sodium could be detrimental.

**5459**

**Manifestation of the Graves’ disease after off-pump coronary artery bypass grafting (clinical case)**

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**Background:** Decompensation of endocrine disorders, including thyroid gland diseases, during perioperative period of major surgery is associated with poor outcomes.

**Case Report:** A 66-year-old female patient was admitted in cardiac surgery for urgent coronary revascularization. Among comorbidities, the patient had arterial hypertension and nodular goiter (controlled with mercazol 2.5 mg/day with levothyroxine 25 mg/day). Systolic function of the left ventricle was preserved (ejection fraction 67%) with mild mitral and tricuspid regurgitation. After successful OPCAB surgery (3 grafts) the patient was admitted in cardiac ICU. After tracheal extubation in 4.5 hours, it was diagnosed hyperactive delirium and paroxysm of atrial fibrillation on POD 1 caused hemodynamic instability. At 36 hours after OPCAB the patient was re-intubated due to progression of dyspnoe. Since POD2, she had hyperthermia up to 39 °C with elevation of inflammatory markers (CRP 410 mg/l, PCT 8.1 ng/ml), purulent sputum and right-side infiltration on chest X-ray; wide-spectrum antibiotics were given. Atrial fibrillation was refractory both for amiodarone and cardioversion. On POD 3-4, heart failure has worsened with elevation of NT-proBNP up to 13682 pg/ml, troponin T 950.8 pg/ml with signs of biventricular dysfunction diagnosed with transthoracic echocardiography. After receiving the results of thyroid hormone levels at POD3, hemodynamic deterioration was considered as a consequence of thyroid storm due to Graves' disease decompensation (reduced TSH, increased T3 and T4, antibodies to TSH receptors 20.88 mIU/l). After cancellation of amiodarone and initiation of mercazol in a combination with steroids, the patient has improved: vasopressor were stopped on POD4, sinus rhythm restored on POD6, she was weaned from respirator on POD 8, cognitive status normalized on POD 11 and she was discharged on POD12.

**Discussion:** Usually, thyroid gland disorders are associated with gradual deterioration of symptoms, but surgical stress, concomitant medications and nosocomial infection can promote rapid progression of disease and make the diagnosis difficult. Proper suppressive treatment of underlying hyperthyroidism is crucial in prevention of life-threatening complications.

**Learning points:** Heart failure, atrial fibrillation and inflammatory response after cardiac surgery can be caused by thyroid gland disorders that requires additional attention to concomitant diseases and medications.

**5827**

**Pancreatitis treatment with Lipopheresis in Pregnancy and Outcome**

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**Background:** Acute pancreatitis in pregnancy is rare, occurring in approximately 1/3000 pregnancies. Significant maternal morbidity can occur including intensive care admission, metabolic disturbances, sepsis, pancreatic necrosis, and hypovolemic shock. Rates of preterm delivery, fetal distress, and demise are increased in pregnancies with pancreatitis.

**Case Report:** 21-year-old, 19 weeks pregnant woman presented to a emergency service with 4 h of abdominal pain that radiates to her back, nausea and vomiting. She doesn’t use any medication and cigarettes, she only used folic acid. And she uses vitamin D for 15 weeks. 2 days ago she came to emergency services with Abdominal pain that radiates to her back. Nausea. And Vomiting. In biochemistry markers didn’t be concluded that lipemic serum and abdominal USG. A radiological and biochemical diagnosis of moderate acute pancreatitis was made. Bloodwork demonstrated prominent lipemic serum. Ketone levels were deemed +3. In abdominal usg: Free fluid was observed around the pancreas. The pancreas wall is edematous and heterogeneous. Appearance is compatible with pancreatitis. There was no known history of diabetes in the patient. She uses only vitamin D and folic acid. And the patient transferred to intensive care unit support. The patient was consulted with the internal medicine department. Oral stop and lipophoresis are recommended. Management included aggressive rehydration and pain control, and we started lipophoresis, and we repeated that lipophoresis three times. At first her bloodworks were lipemic but after first lipophoresis, Bloodwork demonstrated prominent hypertriglyceridemia (HTG) of 541 mg/dl.

**Discussion:** Patients with acute pancreatitis should be treated with analgesia and fluid resuscitation. Severe hypertriglycerideria-induced pancreatitis includes similar management. Lipopheresis may be considered in refractory cases. Preventing severe dyslipidemia in gestation can decrease the risk of pancreatitis and improve maternal and neonatal outcomes. Lipopheresis in acute pancreatitis in perinatal outcomes are likely due to improvements in maternal and perinatal care.
Remote liver ischemic preconditioning protects rats against cerebral ischemia and reperfusion injury

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Background and Goal of Study: Remote limb ischemic preconditioning has been shown to have beneficial effects in protecting organs against ischemia and reperfusion (I/R) injury. However, whether brief ischemic preconditioning of vital organ, such as the liver, would exert brain protection against I/R injury is unknown. We therefore investigated the effect of remote liver ischemic preconditioning (RLIPC) on brain tissues suffering from I/R injury in a rat model.

Materials and Methods: Rats were anesthetized with pentobarbital sodium (50 mg/kg ip) and were randomly assigned to a sham group (sham operation), control group (CON) or a remote liver ischemic preconditioning group (RLIPC). Rats except for the sham group received middle cerebral artery occlusion (MCAO) for 1h, followed by 48h of reperfusion. For the RLIPC rats, four cycles of 5 min of liver ischemia (the portal vein, hepatic arterial and venous trunk occlusion) followed by 5 min reperusions were executed before brain ischemia. After the intervention, brains were collected at 48h for analysis.

Results and Discussion: RLIPC decreased the volume of the MCAO-evoked infarct region when compared to CON (P<0.001). Meanwhile, RLIPC-treated rats showed significant improvements in neurological function compared with CON (P<0.001). There was a 44.7% and 26.4% reduction in serum LDH and CK-MB concentration from RLIPC rats compared with that of control ones, suggestive of relatively less cerebral damage in RLIPC-treated rats in response to I/R injury. Representative cerebral injury phenotypes, such as oedema, neuronal loss and vacuolization were visualized in brain tissue after I/R injury. However, the degree of brain damage was less severe in RLIPC-treated rats, as less neuronal loss and more intact neurons were detected in the vacuolated spaces. RLIPC treatment ameliorated the cerebral damage and largely recovered the number of Nissl bodies (P>0.001 vs CON). After reperfusion, sufficient TUNEL-positive cells were observed in brains, however, the number of TUNEL-positive cells was significantly reduced in the RLIPC-treated group compared with the CON (P<0.001), suggesting the ant apoptotic activity of liver ischemic preconditioning on the neurons.

Conclusion: Liver ischemic preconditioning effectively protects brain against I/R injury by reducing brain infarct volume, serum LDH and CK-MB concentration, inhibiting apoptosis, and improving neurological function.

Materials and Methods: After 120 minutes of ischemia of the superior mesenteric artery in male Wistar rats, the reperfusion was carried out for 120 minutes to induce intestinal ischemia-reperfusion injury. The experimental animals were divided into four groups: (i) surgical control (Sham), (ii) Sham and Ang-(1-7) (1 ml/kg intravenous infusion at 30 minutes before surgery), (iii) Ischemia-reperfusion (I/R), and (iv) I/R and Ang-(1-7). During this study, we examined the liver and kidney function index and intestine blood flow. In additional, we measured the survival rate in different groups. After 4-hour study the lung, liver and kidney tissues were harvested to investigate superoxide ion level and pathohistology.

Results and Discussion: Histological findings showed that intestine I/R caused widespread mucosal destruction, loss of villi and infiltration of inflammatory cells, while Ang-(1-7) administration ameliorated intestine injury after intestinal I/R. Ang-(1-7), given before ischemia, attenuated serum creatinine increase after intestine I/R, indicating Ang-(1-7) could improve renal dysfunction induced by intestine I/R. None of the 5 rats infused with Ang-(1-7) were dead 24 hours post-intestinal I/R, while three out of the 5 rats in the I/R group were still alive 24 hours after intestinal I/R, indicating that pre-ischemia treatment of Ang-(1-7) improved the survival rate after intestinal I/R.

Conclusion: These findings suggest that Ang-(1-7) appears to reduce organ damage and even death induced by intestinal ischemia-reperfusion, and may be a potential adjuvant for ischemia-reperfusion injury.

New murine sepsis model for persistent inflammation, immunosuppression, and catabolism syndrome
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Background and Goal of Study: Sepsis, defined as dysregulation of immune and inflammatory responses to infection, can develop refractory shock and multiple organ failure (MOF) leading to early in-hospital death or persistent inflammation, immunosuppression, and catabolism syndrome (PICS) leading to extended recovery periods and multiple complications. The recent development of programs that support earlier diagnosis and intervention with best-practices for sepsis should be increase the portion of PICS. However, these processes of develop to PICS from sepsis are not well-understood.

Materials and Methods: In this study, we utilized cecal ligation and puncture (CLP) method in mice for three steps sepsis models involving SIRS and CARIS (CLP only), MOF (lipopolysaccharide (LPS) + CLP), and PICS (LPS + CLP + Antibiotic) models. We examined mortality, the levels of pro- and anti-inflammatory cytokytes, mitogen-activated protein kinases (MAPKs), nuclear factor kappa b (NF-kb) expression in lung and immune cell involving neutrophils, T cells, and myeloid derived suppressor cells (MDSCs) in mouse models.

Results and Discussion: Mortality were 100% (MOF), 60% (PICS), 20% (SIRS/ CARIS), and 0% (SHAM). We found that mice develop MOF at day 5 post-CLP surgeries, and pro-inflammatory cytokines were elevated from days 5–10. In the contrast, anti-inflammatory cytokines express highly level after 24hr surgery, and continued to significantly increase from days 5 to 10 in PICS. Furthermore, the recruitment of MDSCs were significantly augmented over time; whereas neutrophils recruitment and T cells functions were elevated at day 5 and decreased at day 10 post-CLP surgeries. We also observed an increase of the mortality of PICS model, approximately 60% of mice had died after 14 days.

Conclusion: Our results contribute to characterization of three sepsis phases, which may support the diagnosis and treatment of sepsis in the future.

Angiotensin-(1-7) protects the intestinal injury after ischemia and reperfusion in rats
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Background and Goal of Study: Intestinal ischemia-reperfusion injury can lead to activation of local inflammatory response and changes in several inflammatory mediators, resulting in multiple organ failure and systemic inflammatory response. Previous study revealed that angiotensin (Ang)-(1-7) binds and activates a G protein-coupling receptor: Mas, through which Ang-(1-7) induces vasodilation, anti-inflammatory, and proliferative effects, in general, oppose those mediated by Ang II. Ang-(1-7) can act via both the Mas receptor and the AT2R. In our previous study, we found that Ang-(1-7) could attenuate organ dysfunction, decrease inflammatory cytokines and improve survival in septic rats. In the rat model of intestinal ischemia-reperfusion, this study evaluated the role of Ang-(1-7) in inflammation, oxidative stress and organ injury.
Ferroptosis contributes to tissue injury in lung ischemia/reperfusion

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Background and goal of study: Ferroptosis, a form of regulated cell death triggered by lipid peroxidation, is a therapeutic target in the pathological process of some diseases. The inhibitors of ferroptosis have been reported to protect against heart, kidney, and liver ischemia-reperfusion. However, the role of ferroptosis in lung ischemia/reperfusion (IR) injury remains unknown. Considering the unique features required for ferroptosis, therefore we investigated whether ferroptosis is present in lung ischemia/reperfusion.

Materials and Methods: To establish the lung ischemia/reperfusion (LIR) model, a left thoracotomy was performed in Male C57BL/6 mice, the left pulmonary hilum was clamped for 60 min, followed by 60 or 120 min. The sham group received thoracotomy. We used (DAB)-enhanced Pearls’ staining to detect iron accumulation in lung sections. We determined the expression levels of two key proteins involved in ferroptosis, glutathione peroxidase 4 (GPX4) and Acyl-CoA synthetase long-chain family member 4 (ACSL4), by western blotting. Also, transmission electron microscopy (TEM) from lung tissues was examined to confirm the morphological features of ferroptosis.

Results and Discussion: Perl’s DAB staining disclosed that mice who received LIR had higher levels of non-heme iron compared to sham group. Accumulation of mitochondria with smaller appearance and increased membrane density was demonstrated in LIR mice, which was rarely detected in control mice. Levels of GPX4 were significantly decreased in IR/120min treatment groups compared to the sham group (all P<0.05). Both of the IR/60min and 120min groups showed significantly increased levels of ACSL4, as compared to the sham group (all P<0.05).

Conclusion: This study demonstrates that ferroptosis is involved in the tissue injury from LIR. These results suggest a potential approach for lung IR injury prevention.

Effects of remote ischemic preconditioning on erythrocytes in sepsis

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Background and Goal of Study: Impaired tissue perfusion and microcirculation are hallmarks of septic shock. Therefore, preventing RBC rheologic alterations in may be important to help reduce morbidity and mortality from severe sepsis. Previous studies have shown that such remote ischemic preconditioning (RIPC) not only prevents tissue damage due to severe ischemia but also reduces inflammation and mortality due to sepsis. However, the effect of RIPC on the coagulation and elasticity of erythrocytes due to sepsis has not been established. Therefore, this study is to investigate the effect of RIPC on RBC rheologic alterations of erythrocytes in sepsis.

Materials and Methods: We used 30 male Sprague-Dawley rats. Endotoxin-induced sepsis model was created by injecting 20 mg/kg LPS intraperitoneally. RIPC was induced on the right hind legs with a tourniquet in three cycles of 10 min of ischemia and 10 min of reperfusion. And this study is to investigate the effect of RIPC elongation index (EI), aggregation index (AI), and Time to half-maximal aggregation (T1/2) of erythrocytes in sepsis.

Results and Discussion: AI values were significantly greater and the T1/2 values were shorter in the LPS group and the RIPC/LPS group than those in the control group. And, there was no significant difference between those values of the LPS group and the RIPC/LPS group. The EI decreased significantly in the LPS group compared to that in the control group, whereas the EI does not changed significantly in the RIPC/LPS group compared to that in the control group. Previous studies have shown that several proinflammatory cytokines were reduced by RIPC. However, in this study, RIPC has revealed no positive effects on the elasticity and cohesiveness of erythrocytes in sepsis.

Conclusion: The RBC rheologic alterations of erythrocytes due to sepsis is not improved by RIPC.

The Effects of Hydroxyurea on Proinflammatory Cytokine and Tissue Histopathology in Experimental Sepsis Model

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Background and Goal of Study: The diagnosis and treatment of sepsis is a costly healthcare service and it is an important disease with high mortality rates. In the pathogenesis of sepsis, which we still cannot provide complete cure, there is increased cytokine release in the acute period and organ damage in the following period. Hydroxyurea has been shown to reduce leucocyte count, decrease inflammatory cytokines, and limit organ inflammation in ischemia-reperfusion models. In this study, we aimed to evaluate leucocyte count, IL1 beta, IL6 and TNF alpha cytokine values and organ inflammatory processes in hydroxyurea treated rats with experimental sepsis model. To our knowledge, this is the first research that combines sepsis and hydroxyurea.

Materials and Methods: After ethical approval, Sprague-Dawley rats were randomly divided into three groups, control(n=7), sepsis(n=7), hydroxyurea(n=7). Sepsis was created using the cecal ligation and perforation (CLP) method in rats other than control group. Rats in the hydroxyurea group received hydroxyurea (200 mg/kg) intragastrically while control and sepsis groups received sterile distilled water. IL1 beta, IL6 and TNF alpha cytokine values and organ inflammatory processes in hydroxyurea treated rats with experimental sepsis model. To our knowledge, this is the first research that combines sepsis and hydroxyurea.

Results and Discussion: It has been shown that cytokine levels(IL1,IL6, TNFα) levels and tissue damage are increased after sepsis model in rats. It was found that the amount of cytokine levels at 8th hour, white blood cell count and brain tissue damage in hydroxyurea group were decreased significantly compared to sepsis group.

Conclusion: We conclude that early hydroxyurea treatment in rats with sepsis decreases proinflammatory cytokine(IL1,IL6, TNFα) levels and thus reduces brain damage.
The study was conducted with six healthy minipigs. Comparing continuous thermodilution measurements Acute respiratory distress syndrome (ARDS) is Cochrane Library, PubMed, EMBASE, and MEDLINE In ICU, we must be continually re-evaluate patients and model. output in a continuous-flow MCSD for partial support of left ventricle in a porcine thermodilution could be used as reliable method in the measurement of cardiac Conclusion: when partial support with MCSD was provided, 14% (Bias -0.09) in hypervolemia a percentage of error of 16% (Bias -0.08) in the basal moment, 27% (Bias -0.04) with bolus cardiac output through the PAC, the Bland-Altman analysis demonstrated General Universitario Gregorio Marañon, Madrid, Spain. thermodilution. All procedures were approved by the Ethics Committee of Hospital with hypovolemia. Bland-Altman plot was used for validation of transpulmonary Background and Goal of Study: Transpulmonary thermodilution is recommended in the treatment of critically ill patients with heart disease. However, so far it has not been validated in patients with mechanical circulatory support devices (MCSDs). The aim of this study was to validate the cardiac output obtained by transpulmonary thermodilution in partial support of the heart with a continuous-flow MCSD in an experimental porcine model. Materials and Methods: The study was conducted with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for partial assistance of left ventricle. Cardiac output measurements were made using a PICCO thermodilution catheter, and the reference method was the pulmonary artery catheter (PAC). Measurements where performed in four different moments of the study: immediately before MCSD was initiated (basal cardiac output), meanwhile partial support was provided, in MCSD associated with hypervolemia status and in MCSD associated with hypovolemia. Bland-Altman plot was used for validation of transpulmonary thermodilution. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain. Results and Discussion: Comparing continuous thermodilution measurements with bolus cardiac output through the PAC, the Bland-Altman analysis demonstrated a percentage of error of 16% (Bias -0.08) in the basal moment, 27% (Bias -0.04) when partial support with MCSD was provided, 14% (Bias -0.09) in hypervolemia model and 29% (Bias -0.63) in state of hypovolemia. Conclusion: The results described above show that the transpulmonary thermodilution could be used as reliable method in the measurement of cardiac output in a continuous-flow MCSD for partial support of left ventricle in a porcine model.

Cardiac output monitoring in mechanical circulatory support devices: Validation of transpulmonary thermodilution

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Background and Goal of Study: Transpulmonary thermodilution is recommended in the treatment of critically ill patients with heart disease. However, so far it has not been validated in patients with mechanical circulatory support devices (MCSDs). The aim of this study was to validate the cardiac output obtained by transpulmonary thermodilution in partial support of the heart with a continuous-flow MCSD in an experimental porcine model. Materials and Methods: The study was conducted with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for partial assistance of left ventricle. Cardiac output measurements were made using a PICCO thermodilution catheter, and the reference method was the pulmonary artery catheter (PAC). Measurements where performed in four different moments of the study: immediately before MCSD was initiated (basal cardiac output), meanwhile partial support was provided, in MCSD associated with hypervolemia status and in MCSD associated with hypovolemia. Bland-Altman plot was used for validation of transpulmonary thermodilution. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain. Results and Discussion: Comparing continuous thermodilution measurements with bolus cardiac output through the PAC, the Bland-Altman analysis demonstrated a percentage of error of 16% (Bias -0.08) in the basal moment, 27% (Bias -0.04) when partial support with MCSD was provided, 14% (Bias -0.09) in hypervolemia model and 29% (Bias -0.63) in state of hypovolemia. Conclusion: The results described above show that the transpulmonary thermodilution could be used as reliable method in the measurement of cardiac output in a continuous-flow MCSD for partial support of left ventricle in a porcine model.

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Persistent respiratory insufficiency in an obese patient with coexistence of intrathoracic lipoma and Morgagni Hernia

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Background: Respiratory insufficiency (RI) is a common problem in patients admitted to the Intensive Care Units (ICU), and may be one of the reasons for prolonged stay.1 Case Report: A 34-year-old male admitted to the ICU for acute RI. His medical history was a schizoid mental disorder, grade III obesity, active smoker and a Morgagni hernia detected in 2009. CT scan showed an increase in the hernia sac with complete atelectasis of the right lung. Due to the suspicion that MH was responsible for respiratory failure, the patient underwent laparoscopic surgery. The hernia sac was reduced and the diaphragmatic defect was closed. After two weeks, due to weaning failure, a new CT scan was performed, identifying a right paracardiac image with fat density. The patient was re-intervene and a mediastinal mass (21x11x11 cm) was found. The pathological report showed adipose tissue, compatible with lipoma. After the resection of the mass the patient presented a satisfactory evolution, with a right weaning in the following 4 days, being able to be discharged from the ICU and to his home a week later. Discussion: MH is a rare cause of RI, but it can produce an hypoxemic alteration with a restrictive component due to the alteration of diaphragmatic function and the atelectasis produced by the abdominal visera housed inside the thorax. 2 Intrathoracic lipomas are a class of adipose tumors located in deep tissues, of unknown etiology, which usually appear in obese people. They are a very rare cause of RI, as they often are asymptomatic and are diagnosed incidentally in imaging tests3. The only treatment of this two problems are surgical. The patient in this case did not improve until the surgical resection was performed. References: 1. Fred F. Ferri MD, FACP . Pulmonary and Critical Care . Ferri’s Practical Guide: Fast Facts for Patient Care, 11, 340-371 2. Dionísio P, Moreira S, Pinto Basto R, Pinto P. Morgagni Hernia as a Fast Facts for Patient Care, 11, 340-371

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Neuromuscular blocking agents in acute respiratory distress syndrome outcomes: A meta-analysis of randomized controlled trials

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Background and Goal of Study: Acute respiratory distress syndrome (ARDS) is of high-mortality and treatment options are limited. Neuromuscular blocking agents (NMBA) in ARDS have been inconclusive about effects on outcomes. The objective of this meta-analysis is to explore the effect of NMBA in adults with ARDS. Materials and Methods: Cochrane Library, PubMed, EMBASE, and MEDLINE were searched from inception up to June 30, 2019. Randomized controlled trials (RCTs) that investigated the effects of neuromuscular blocking agents in adults with ARDS were included. Two investigators independently retrieved studies for inclusion and performed data extraction. Results and Discussion: Five trials involving 1463 patients with moderate-to-severe ARDS were enrolled. NMBA was associated with a lower intensive care unit (ICU) mortality (RR 0.72 95% CI, 0.57-0.91; P = 0.007), but no statistically significant differences were found between two groups for 28-day mortality (RR 0.76; 95% CI, 0.56-1.04; P = 0.08) and 90-day mortality (RR 0.86; 95% CI, 0.66-1.12; P = 0.25) (Figure 1). NMBA improved oxygenation at 24, 48, 72 hours after randomization, reduced the risk of barotrauma and pneumothorax, did not prolong ventilator-free days, and did not affect the duration of mechanical ventilation or the risk of ICU acquired weakness. Conclusion: NMBA reduced ICU mortality, barotrauma, and pneumothorax, improved oxygenation, did not affect the duration of mechanical ventilation, and did not appear to increase ICU-acquired weakness for ARDS subjects. Considering NMBA use in ARDS has limited data supporting the practice, we suggested that NMBA should not be used routinely in patients with ARDS, even in severe cases. Conversely, it should be used when physiologically and clinically indicated.
Subject-ventilator asynchrony does not increase lung injury in pigs

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Background and Goal of Study: During spontaneous breathing activity (SB) in mechanically ventilated patients with acute respiratory distress syndrome (ARDS) subject-ventilator asynchrony can occur, which has been associated with poor outcome. We hypothesized that asynchrony worsens lung injury.

Materials and Methods: In 21 anesthetized pigs, ARDS was induced by a double hit consisting of saline lung lavage and injurious ventilation. Animals were randomly assigned to one of three groups (n=7/group; 12 h): 1) SB + externally induced asynchrony (Asyn); 2) SB (Sync) and 3) control (Ctrl, no SB). All animals were ventilated in the pressure assist-control mode (VT=6 ml/kg, PEEP=10 cmH2O, and fraction of inspired oxygen (FiO2)=1.0). Remote control of the mechanical ventilator was used to induce asynchrony externally. Gas exchange, hemodynamics, respiratory variables, and distribution of ventilation (electro impedance tomography) were assessed. Postmortem quantitative histologic analysis, inflammatory markers, wet-to-dry ratio and diaphragmatic muscle fibre thickness were determined.

Results: The Asynchrony Index (AIX) (percentage of missed and double triggered breaths) was higher in the Asyn-group (AIX: Asyn: 15.9±5.7, Sync: 1.6±0.9 %; p<0.001). PaO2/FiO2 and oxygen consumption did not differ significantly among groups. P0.1 did not differ significantly between Asyn and Sync groups, whereas respiratory rate was higher in the Asyn than in the Ctrl group. The percentage of pendelluft was higher in the Asyn compared with Sync group, whereas the distribution of ventilation did not differ significantly between SB groups. The gene expression and protein levels of interleukins 6 and 8, as well tumor necrosis factor alpha, amphiregulin, vascular endothelial growth factor, vascular cell adhesion molecule and intercellular adhesion molecule in lung tissue, as well as wet-to-dry ratio did not differ between groups. Mean septal thickness, volume fraction of atelectasis as well as the total surface area of aerated lung did not differ between groups. Diaphragmatic muscle fibre thickness did not differ among the groups.

Conclusion: In this experimental model of ARDS, subject-ventilator asynchrony neither increased lung injury, nor affected diaphragmatic muscle fibre thickness.

Efficacy of the de-escalation therapy in patients with sepsis-induced ARDS

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Background and Goal of Study: During the de-escalation stage of therapy, the patients with acute respiratory distress syndrome (ARDS) can require more aggressive fluid removal by means of diuretics or renal replacement therapy (RRT). The aim of our study was to compare the efficacy of de-escalation therapy in patients with sepsis-induced direct and indirect ARDS.

Materials and Methods: Sixty adult patients with sepsis and ARDS, receiving mechanical ventilation ≥24 hours, were enrolled into a prospective study. All patients had invasive hemodynamic monitoring using transpulmonary thermodilution (PiCCO2, Pulsion, Germany). The patients received active de-escalation by means of diuretics or RRT in case of global end-diastolic volume index (GEDVI) > 650 ml/m2 or extravascular lung water index (EVLWI) > 10 ml/kg. The primary goal of de-escalation was the achievement of fluid balance at 48 hrs from 0 to – 3000 ml. In case of GEDVI < 650 ml/m2 or EVLWI < 10 m/kg, the target fluid balance was in range from 0 to 3000 ml. The measurements included hemodynamics and blood gases. The patients were divided into two groups with pulmonary (direct, n=30) and extrapulmonary (indirect, n=30) ARDS. The statistical analysis was performed using non-parametric tests.

Results and Discussion: We found no baseline changes regarding age, gender or SOFA score in direct and indirect ARDS. Despite active fluid removal, in patients with extrapulmonary ARDS EVLWI did not change significantly to 48 hrs (p=0.06), whereas PaO2/FiO2 increased from 261 (203 - 280) mm Hg at baseline to 260 (200 - 325) mm Hg at 48 hrs (p=0.05). By contrast, in direct ARDS we observed the decrements in EVLWI from 12 (10 – 12) to 11 (8 – 12) m/kg (p=0.006) and GEDVI from 777 (677 - 934) ml/m2 to 728 (614 - 885) ml/m2 (p=0.04), accompanied by improvement of PaO2/FiO2 from 184 (131 - 207) mm Hg to 246 (183 - 323) mm Hg (p<0.0001). There was no significant differences in target fluid balance during 48 hrs: -2330 (-3923 - ..-4250) ml in extrapulmonary ARDS vs. -2210 (-3200 - ..-9450) ml in pulmonary ARDS (p=0.08). The survival rate and the number of ventilator-free days did not differ between the groups.

Conclusion: In sepsis-induced direct ARDS, active de-escalation therapy is more effective than in patients with indirect ARDS.
Use of high-flow oxygenation during weaning from ventilation of ARDS patient with burns and inhalation injury of respiratory tract

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Background: High-flow oxygenation (HFO) through nasal cannula allows the delivery of a moisturized and heated oxygen-air mixture with a fraction of inspiratory oxygen (FiO2) from 21 to 100% and a flow rate of up to 80 l/min. This method has several potential advantages compared with standard inhalation of oxygen and non-invasive ventilation in different settings including weaning from ventilation in acute respiratory distress syndrome (ARDS).

Case Report: A 65-year-old female was admitted to the multidisciplinary ICU of a university hospital on October 14, 2019 with burns of the face, back, and upper extremities with a total area of 40% and inhalation injury of respiratory tract. The patient was diagnosed with moderate ARDS and received mechanical ventilation during 5 days. After stabilization, the patient was weaned from ventilator on October 19, 2019, followed by oxygen inhalation through a standard nasal cannula. In one hour after tracheal extubation, we observed severe hypoxemia requiring urgent reintubation. The bronchoscopy has revealed the obstruction of a right bronchus by thick sputum. The patient received several bronchoscopies, mucolytic therapy, invasive hemodynamic monitoring (PiCCO2) and protective mechanical ventilation until October 24. The burns of face made impossible the use of mask for non-invasive ventilation to reduce risk of unsuccessful weaning and improve sputum discharge, during transfer of patient to spontaneous breathing after tracheal extubation we used HFO (Airvo2, Fisher &Paykel, New Zealand) with a flow of 50 l/min and FiO2 80% followed by gradual decrease to 40-50% for maintaining SpO2 within 92-97%. At 24 hrs, extravascular lung water increased from 7 to 10 ml/kg but we maintained HFO 50 l/min and achieved negative fluid balance using diuretics, thus extubation failure was avoided. The patient did not experience any discomfort from the procedure. To 72 hrs, lung water returned to baseline values, PaO2/FiO2 did not decrease below 200 mm Hg, and respiratory rate did not exceed 25 /min, allowing the start of standard oxygen inhalation on October 27. The patient was transferred to the trauma unit on November 1 and discharged from the hospital on November 19 in a satisfactory condition.

Learning points: The use of HFO during weaning from ventilation of ARDS patients with burns and inhalation injury can be a useful tool for prevention of respiratory failure and reintubation.

Water droplets inside the polyurethane cuff at 24 hours after tracheal intubation: A single center, retrospective pilot study

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Background and Goal of Study: The polyurethane (PU) cuff of endotracheal tube (ETT) has been demonstrated to prevent ventilator-associated pneumonia compared with polyvinylchloride (PVC) cuff. However, ETT with PU-cuff has been also reported the water droplets within the cuff, infiltration line and/or pilot balloon owing to its thinness and high-water molecule permeability. Droplets could be a serious obstacle to measure the cuff pressure. Nevertheless, there are no studies investigating the frequency and timing of water accumulation in the PU-cuff in the clinical setting. This study conducted to investigate the timing and frequency of water-droplet accumulation in PU-cuffs in the post-surgical patients.

Materials and Methods: This retrospective study was conducted at Tokyo Woman’s Medical University Hospital (Tokyo, Japan). We enrolled patients admitted to the intensive care unit after surgery, while intubated with PU-cuff ETTs (SealGuard EvacTM, Coviden, Dublin, Ireland) or PVC-cuff ETTs (Lo-ProTM, Coviden, Dublin, Ireland) and were extubated on the following day. Same model mechanical ventilators and humidifiers were used for all patients.

Results and Discussion: Between April 25 and May 27, 2019, ETTs with PU-cuff were used for 10 patients (PU group) and PVC-cuff ETTs were used for 16 patients (PVC group). The median intubation time was 24 h (IQR :18.8–25.5 h) in the PU group, and 25 h (IQR :25–26 h) in the PVC group, respectively. In the PU group, water droplet was detected in the cuff, infiltration line and pilot balloon of all the extubated ETTs. No water was detected in PVC group. No perforations of the cuffs were observed in any of the ETTs. Our study is the first to investigate the timing and frequency of water-droplet accumulation in PU-cuffs in clinical situations. We found that water droplets had accumulated within all PU-cuffs as early as 24 h after intubation. The water inside the inflation line and/or pilot balloon have been demonstrated to create a difference of 10 cmH2O or more between pressure measured at the pilot balloon and actual cuff pressure. Since the inability to accurately adjust cuff pressure increases the risk of insufficient ventilation due to air leakage and tracheal membrane injury; this phenomenon should be more investigated.

Conclusion: Water droplets were confirmed inside the all PU-cuff as earlier as 24 hours after intubation. Therefore, water droplets inside the PU-cuff should be checked carefully on the cuff pressure management.
Conclusion: In conclusions, mechanical power and transpulmonary mechanical power are associated to the short term outcome in ARDS patients only when normalized on the respiratory system compliance or on the amount of well aerated tissue.

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Ventilator associated pneumonia in patients with aneurysmal subarachnoid hemorrhage. Preliminary results from a retrospective study

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Background and Goal of Study: Ventilator associated pneumonia (VAP) is a serious complication in patients with aneurysmal subarachnoid hemorrhage (SAH). Systemic signs of infection from VAP may exacerbate secondary brain injury, prolong the length of stay in the ICU and increase morbidity and mortality rates. The main aim of the study was to determine the incidence of VAP among patients with SAH and to ascertain whether the presence of VAP, as well as the duration of antibiotic treatment have an impact on patient mortality.

Materials and Methods: This is a preliminary retrospective cohort study based on data collected from January to October 2019 on 44 patients having SAH. Statistical analysis was performed using the software IBM SPSS 22.0. Mann-Whitney U test and Fisher Test were used to check for statistical significance. The complete study will include a total of four years spanning 2016-2019.

Results and Discussion: The median length of stay in the ICU was 6 (IQR 14.75) days and 9 (20.4%) people died during their stay. None of the patients had aspiration pneumonia. 14 of the 44 patients developed VAP and received antibiotic treatment as a result. The median SAPSII score of our patients was 31.5 (IQR 32.5) and all aneurysms were excluded from circulation using either an endovascular coil or a surgical clipping. Patients with VAP had longer stays in the ICU than those without VAP (21.143±7.98 vs 4.72±5.45; P=0.001). There was no association between development of VAP and patient mortality (Fisher Test = 0.429). Neither the WFNS score nor the GCS score and presence of VAP were correlated (P=0.157 and P=0.193 respectively). An average of 5 days of antibiotic treatment did not influence mortality of patients with VAP (P=0.6).

Conclusion: Our preliminary data suggests that the timing of antibiotic treatment could perform just as well as longer antibiotic treatments in terms of patient mortality. However, due to the small sample size more data needs to be collected to confirm our conclusions.

References:

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Pneumothorax and Cardiac Arrest Pressures Surpass Higher Threshold in Lung Recruitment Maneuvers: An In Vivo ARDS newborn model

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Background and Goal of Study: Recruitment maneuvers (RM) are beneficial for pediatric patients with ARDS. These consist of a transient and controlled increase of transpulmonary pressure, with the goal of opening alveolar units. RM have been shown to improve oxygenation and reduce the heterogeneity of the distribution of tidal volume (TV) in patients with ARDS. There is no consensus on how RM should be programed, so that the efficacy and safety objectives are met. The aim of this study is to determine the level of peak inspiratory pressure (PIP), at which pneumothorax and asystole occur.

Materials and Methods: We designed a prospective, experimental study. We selected 11 Landrace x Large-White piglets, between two and three days old, with a mean weight of 2.54 ± 0.22 kg. Under general anesthesia and tracheal intubation, invasive hemodynamic monitoring and bilateral chest tubes (10 French) were inserted. To develop the reduced compliance neonatal model, broncho-alveolar washes with 10ml / kg of hot physiological saline, was performed. The ventilation mode was pressure controlled, with a constant driving pressure (15 cmH2O); the PIP was raised at 2-min intervals, with steps of 5 cm H2O until air leak was observed through the chest tubes. The statistical analysis was performed with the STATA 15 program.

Results: Pneumothorax was observed with a PIP of 65.55 ± 9.5 cmH2O. The highest PIP causing pneumothorax was 80 cmH2O, and the lowest was 50 cmH2O. Asystole was produced at PIP 57.77 ± 9.501 cmH2O. The minimum PIP at which we recorded asystole was 50 cmH2O, and the maximum was 80 cmH2O. The Cardiac Output decreases since the PIP 20 cmH2O, being statistically significant at PIP 25cmH2O, with a decrease of 0.225 ml/min (p = 0.054).

Discussion-Conclusion: According to our results, the recruitment maneuver pressures used in the Critical Care Unit or the operating theater are lower than those PIPs producing pneumothorax and asystole, in our in vivo ARDS newborn model. Nevertheless hemodynamic alterations have appeared since the initial stages of PIP. For this reason, every patient under RM should be closely monitored.
MRPs have shown an improvement in tissue oxygenation, increase in alveolar volume and a homogeneous distribution of TV in patients with ARDS. Although the adverse events associated to RM, have been described as transient and self-limited, their routine use is not recommended; due to uncertainty about its long-term consequences and its possible relationship with an increase in morbidity and mortality. There is no consensus on how RM should be programmed, so that minimizes the risk of hemodynamic and barotrauma alterations. The aim of this study is to determine if the shortening of RM is effective in terms of improving ventilatory parameters and tissue oxygenation, in an in vivo ARSD newborn model.

Materials and Methods: We designed a prospective, experimental study. We selected 5 Landrace x Large-White piglets, between two and three days old, with a mean weight of 2.54 ± 0.22 kg. Under general anesthesia and tracheal intubation, invasive hemodynamic monitoring was performed with a pediatric arterial thermocatheter. To develop the reduced compliance neonatal model, bronchio-alveolar washes with 10mL/kg of physiological saline, was performed. We designed two RM protocols: type 1 and type 2. Both mechanical PIP is increased 5cmH2O to a maximum of 30cmH2O and PEEP 15cmH2O. The duration of the steps in type 1 was 3 breaths in each step and 5 breaths in the maximum pressure step (19 sec). In type 2, 5 breaths in each step and 10 breaths in the maximum pressure (34 sec). The statistical analysis was performed with the STATA 15 program.

Results: Increase in Static compliance from basal to after RM was in type 1 + 1.32 cmH2O (p = 0.01) and after RM type 2 was + 1.62 cmH2O (p = 0.005). Static compliance was higher than Theoretical compliance (1cmH2O / kg); difference in RM type 1 was + 0.76cmH2O (p = 0.01) and difference in RM type 2 was + 0.92cmH2O (p = 0.018). The PaO2 / FiO2 index improves after RM type 1 the difference is + 288.12 (p = 0.001); and in type 2 + 282.16 (p = 0.001). We found a decrease in cardiac output after type RM TYPE 2 of 0.062 L / min (p 0.049). The remaining hemodynamic variables remained without significant changes.

Discussion-Conclusion: The results obtained allow us to verify the effectiveness of shortening protocols in ARDS newborn model. We hypothesize that duration of RM could be a determining factor in the development of hemodynamic alterations.

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How can we manage the nitric oxide concentration of inhalation therapy with high flow cannula system? - simulator study

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Background and Goal of Study: With Nitric oxide (NO) inhalation therapy, a new option using high-flow nasal cannula (HFNC) system was developed. In inhalation therapy using HFNC, the correlation between the setting concentration and the administered concentration is unclear. In this study, we investigated the correlation between the setting NO concentration and the measured using a spontaneous breathing simulator with HFNC system.

Materials and Methods: We made a spontaneous breathing simulator. The simulator was made from three components; lung simulator (Training and Test Lung), Hamilton T1 ventilator and Airway Management Trainer model for tracheal intubation. Precision Flow (Vapotherm,Inc, USA) was chosen as the HFNC system. Aniflow was used for NO administration and measurement. Setting NO concentration (NOset) and measured NO concentration at the pharyngeal (NOmeasured) were recorded. Minute ventilation volume (MV) and HFNC fresh gas flow (FGFHFCN) were set for several conditions. Each measurement was repeated four times, and the average was obtained. The correlation coefficients between NOset and NOmeasured in each setting were calculated using JMP.

Results and Discussion: In the setting of MV 5 L/min and FGGFHNFC rates 20 L/min, [NOmeasured] = 0.174 ± 0.782 * [NOset] (R2 = 0.999). In the setting of MV 15 L/min and FGGFHNFC rates 20 L/min, [NOmeasured] = 0.141 ± 0.673 * [NOset] (R2 = 0.996). In the setting of MV 15 L/min and FGGFHNFC rates 10 L/min, [NOmeasured] = 0.371 ± 0.596 * [NOset] (R2 = 0.996). There was a high correlation between the NOset and the NOmeasured in each condition. When the MV was increased, the measured NO concentration at pharyngeal was decreased. When NO was administered with HFNC, the pharyngeal NO concentration was lower than the setting concentration. The pharyngeal concentration was directly proportional to the pulmonary inhalation concentration. The difference between measured concentration at pharyngeal and setting concentration was wide in large

Mv or low FGGHFCN rate.

Conclusion: There are two findings assumed from our simulation about NO inhalation therapy with HFNC. (1) The NO concentration at pharyngeal can maintain with a sufficient HFNC flow rate. (2) The correlation between the NOset and the NOmeasured is well. Therefore, the NO concentration at pharyngeal (pulmonary inhalation NO concentration) can maintain with the setting NO concentration.

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Effects of Continuous External Negative Pressure on Respiratory Mechanics and Function in an Experimental Model of Atelectasis

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Background and Goal of Study: Continuous external negative pressure (CENP) can be as effective as positive end-expiratory pressure (PEEP) in recruiting lungs, but without impairing haemodynamics. We tested the hypothesis that CENP, applied regionally to the thorax or abdomen only, increases the caudal end-expiratory trans-pulmonary pressure (TPCaud) depending on the PEEP level.

Materials and Methods: On eight surfactant-depleted mini-pigs, a CENP shell was placed on abdominal and thoracic position. Animals were ventilated using PEEP of 15, 7 and 0 cmH2O. On each PEEP, CENP of -40, -30, -20, -10, and 0 cmH2O were applied (Figure 1A-B). Respiratory, lung mechanics and haemodynamics were recorded. Electrical impedance tomography allowed assessment of the centre of ventilation. Zero CENP served as reference for comparisons.

Results and Discussion: CENP of -20 cmH2O increased TPCaud during PEEP of 0 (P<0.001) and 7 cmH2O (P<0.01), while CENP of -30 cmH2O increased TPCaud during PEEP of 15 cmH2O (P=0.012) (Figure 1C). CENP of -20 cmH2O reduced the mean airway pressure at zero PEEP (P<0.025). Both elastance (P<0.001) and resistance (P<0.001) of the respiratory system decreased at CENP of -30 and -40 cmH2O at both PEEP of 0 and 7 cmH2O. CENP of -30 cmH2O reduced the applied mechanical power during zero PEEP (P<0.001). CENP of -5 to 20 during PEEP57 (P<0.001) increased Pao2, respectively. The centre of aeration was shifted dorsally by CENP of 20 cmH2O at PEEP zero and 15 cmH2O, as well as at CENP of -10 cmH2O during PEEP of 7 cmH2O (P<0.001, each). Cardiac output decreased significantly at CENP of -20 cmH2O and all PEEP levels (P<0.001). Effects on TPCaud, elastance and cardiac output were less pronounced in thoracic than in abdominal position.

Conclusion: In mechanically ventilated pigs with atelectasis, CENP combined with zero to moderate PEEP recruited lungs and improved oxygenation, mainly when the shell was placed at the abdomen. CENP ≤ 20 cmH2O impaired haemodynamics, comparable to PEEP.
Development septic arthritis due to B. Fragilis in a critical ill patient

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Background: Septic arthritis of native joints is a potentially life-threatening disease [1]. The most frequently isolated pathogens are Gram positive cocci [2, 3]. Bacteroides fragilis is a rare pathogen in joint infections and related to skin or local perineal infections or are secondary to B. fragilis bacteremia from another source, for example from the gastrointestinal tract.

Case Report: A 64-year-old male was admitted with fever. He had a past medical history of paraplegia. The patient suffered a mid-shaft femur fracture 12 months earlier, without dislocations, treated conservatively, CT scan demonstrated avascular necrosis of left hip joint with destruction. Patient was treated with antibiotics including metronidazole. After initial surgical drainage, the patient developed multiple organ failure and septic shock. During this period, intensive supportive management included the administration of crystalloids, vasopressors and broad-spectrum antibiotics. Diagnosis of septic arthritis was confirmed by a positive synovial fluid for B. fragilis. Due to recurrence of multiple intra-articular abscesses a left extended hemiepiphleectomy was performed. The patient was discharged from the unit 6 weeks after admission.

Discussion: Despite the fact that fractures in a paralyzed limb are relatively rare, such asymptomatic, subclinical fracture of the hip joint might be a potential risk factor for the development of septic arthritis.

References: 

Comparison of diagnostic and prognostic value among Presepsin (sCD14-ST), Procalcitonin (PCT) and Interleukin-6 (IL-6) in the management of Sepsis

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Background and goal of study: Membrane monocyte/macrophage CD14 (mCD-14) is a co-receptor for endotoxin, & its soluble form is k/a Presepsin or sCD-14 ST cleaved from the monocyte/macrophage-specific mCD14 receptor complex during systemic infections. In our study we tested the hypothesis that: Presepsin may have better diagnostic & prognostic value amongst PCT & IL-6; Presepsin may correlate with illness severity score (SOFA) & mortality. The aim of this study is to investigate the clinical value of Presepsin in early diagnosis, risk stratification & prognostic evaluation of sepsis in a patient with sepsis/septic shock admitted in ICU & to compare it with the diagnostic & prognostic value of PCT & IL-6.

Material and methods: Total 30 patients were included in this study which met all inclusion criteria. Subjects were divided into two groups (Sepsis and Septic shock) on the basis of clinical diagnosis. Blood samples for biomarkers like Presepsin, PCT & IL-6 measurements were taken at the time of admission/arrival in ICU before administration of first dose of antibiotics at time (T0)/D1 & at 24hrs (T1)/D2, & to compare it with the diagnostic & prognostic value of PCT & IL-6.

Results and discussion: Presepsin was significantly (p<0.01) lower in sepsis patients (169.50±34.74 ng/ml) compared to sepsic shock (291.90±334.67 ng/ml) at admission (T0) & D1, & at 24hrs (T1)/D2, & to compare it with the diagnostic & prognostic value of PCT & IL-6.

Efficacy of recombinant thrombomodulin for septic multiple organ failure and Disseminated Intraocular Coagulation: a single centre retrospective cohort study

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Background and Goal of Study: Recombinant thrombomodulin (rTM) is one of the anticoagulants developed in Japan and is expected to be effective against septic Disseminated Intravascular Coagulation (DIC). The possibility of improving multiple organ failure in sepsis has also been suggested, but these have not been clarified yet. The SOFA score is generally used as an index for evaluating multiple organ failure in sepsis. Recent studies have shown that this rate of change (ΔSOFA) during ICU stay is related to the severity and mortality of patients with sepsis. The aim of our study is to examine whether this administration of rTM improves multiple organ failure in sepsis or septic DIC.

Materials and Methods: A single centre retrospective cohort study. The subjects were sepsis patients who entered ICU from April to October 2017. The primary endpoint was ΔSOFA. The secondary endpoints were DIC incidence and acute DIC score at the time of ICU admission and after 7 days, the change in the DIC score (ΔDIC), 28-day mortality, and in-hospital mortality. Acute DIC score was used as the DIC evaluation. Mann-Whitney U test and χ2 test was used as statistical evaluation. Results and Discussion: 95 patients were included in the study period, of which 21 were in the rTM group and 74 were the control group. The ΔSOFA score was 2.5 ± 3.3 vs. 2.9 ± 4.8 (p = N.S.). The incidence of DIC was 62% vs. 20% (p <0.01) at ICU admission and 48% vs. 16% (p <0.01) 7days after. The acute DIC score was 4.1 vs. 2.0 (p <0.01) at ICU admission and 3.1 vs. 2.1 (p <0.05) 7days after. There was no significant difference in 28-day mortality (29% vs. 15% (p = N.S.)), and in-hospital mortality (38% vs. 20% (p = N.S.)). Although, there was no significant difference in patient age or SOFA score at ICU admission between the rTM group and control group, acute DIC was significantly higher in the rTM group: 1.02±2.4 vs. -0.1±2.0 (p <0.05).

Conclusion: There was no difference in SOFA score and ΔSOFA between rTM group and control group. This study is limited to retrospective study, and stratification of patient backgrounds may give different results. Although there was a difference
in the incidence of DIC at ICU admission, because of the incidence 7days after was reduced and ΔDIC was different, rTM may be expected to be effective as a DIC treatment.

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Pneumococcal sepsis with septicemia in a 6 years old child, complicated with Pneumococcal-associated hemolytic uremic syndrome (pHUS): case report

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Background: Despite the vaccination against pneumococcal infection has been taking place and actively promoted in Kazakhstan as well as worldwide, frequency of the infection remains high among children. One of the rare but severe complications of generalized invasive pneumococcal infection is pHUS.

Case Report: A 6-year-old girl was admitted to the clinic complaining of vomiting, fever and rash. Parents indicated that the disease has started 6 hours ago, when the child’s temperature rose to 39°C. Upon admission, the patient was alert and responsive. On day 2 depression of consciousness to stupor was noted, oxygen saturation dropped to 83%, which is why the child was intubated and placed on mechanical ventilation in SIMV mode. On the same day due to the presence of prolonged anuria, azotemia and edema abdominal catheter for peritoneal dialysis was placed. After the dialysis catheter implantation, the realization and progression of hemorrhagic syndrome with development of anemia was noted. This is why transfusion with FFP as well as packed red blood cells was initiated. On day 3 the results of nasal, CSF and blood cultures came in, from which pneumococcus was identified. also, PCR analysis of the CSF was obtained and result was positive for pneumococcal DNA, which made us to reconsider the diagnosis and change it to generalized form of pneumococcal infection with septicaemia, complicated with pHUS. The patient was switched to hemodialysis, which resulted in slight reduction of nitrogenous substances in the blood. Respiratory function was improving, which allowed us to switch to the CPAP mode. 22 days following hospitalization creatinine level was equal to 294 mcMol/l and the patient was transferred to the specialized nephrology clinic, where two more hemodialysis sessions were conducted, and she was discharged 2 weeks later with creatinine level of 174 mcMol/l (See table 1).

Discussion: Diagnosis of pHUS is based on the association of the clinical triad of HUS with confirmed or suspected S. pneumoniae infection. The clinical course of pHUS is typically more severe, with more frequent need for dialysis and transfusions, and longer hospital stays.

Learning points: Generalized course of pneumococcal infection complicated with pHUS is rare, clinicians should pay particular attention when dealing with immunocompromised and unvaccinated as well as asplenic patients (e.g. after splenectomy).

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Incidence and outcome of sepsis and septic shock in patients of a multidisciplinary North-Russian intensive care unit

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Background and Goal of Study: Sepsis and septic shock are considered to be the leading cause of mortality in critically ill patients. Since a morbidity from sepsis in the intensive care units (ICU) is changing over time, the purpose of our study was to evaluate the incidence, structure and outcomes of sepsis and septic shock according to Sepsis-3 definitions in a Russian ICU.

Materials and Methods: We performed a retrospective analysis of 3103 admissions in the multidisciplinary ICU of a 1000-bed university hospital (the City Hospital #1 of Arkhangelsk, Russia) with an average size of 22 patients during the year 2018 and assessed ICU charts of 121 (3.9% from all admissions) adult patients with diagnosis of sepsis. We evaluated age, gender, origin of sepsis, localization of organ dysfunction according to SOFA score, duration of ICU stay, and mortality rate. The data are presented as n (%), M±SD or median (25–75 percentiles).

Results and discussion: The study population included 62 (51.2%) males and 59 (48.8%) females. The mean age was 66.5±14.7 years, the duration of ICU stay was 4 (1–7.2) days. The most common origins of sepsis were pulmonary and abdominal sources (in 43.8% and 28.9% of patients, respectively), followed by urological, soft tissue, central nervous system, vascular, combined or other infections. Septic shock occurred in 70 (57.9%) of cases, Other sepsis-induced organ dysfunctions with SOFA score ≥2 included kidney injury (57.9%), deterioration of mental state (53.7%), acute respiratory distress syndrome (ARDS) (50.4%), disseminated intravascular coagulation (28.9%), metabolic disorders (26.4%), and hepatic failure (23.1%). The mortality rate was 31.4% in sepsis without septic shock and 65.7% in septic shock. From all non-survivors, 37.1% died during the first 24 hours.

Conclusions: Sepsis occurs in 3.9% of ICU patients with mortality rate increased twice in septic shock. The most common origins of sepsis are pulmonary and abdominal sources. In addition to septic shock, the organ dysfunctions observing in more than half of sepsis patients include kidney injury, deterioration of mental state and ARDS.

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Septic shock due to Acute Bartholinitis, a case report

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Background: Acute Bartholinitis is a local infectious process, a common reason for consultation in ED. Frequently, it is treated with drainage and PO antibiotics with no complications. We report a case of a healthy female who suffered one of serious complications related to Bartholinitis.

Case Report: A 27 years old female with no other medical history, except for use of IUD as anticonceptive purpose, was sent to ED by the primary care physician for acute Bartholinitis with fever, abdominal distention, hypotension and tachycardia. She already had consulted because of this to the physician 48 hours ago, PO antibiotics and NSAIDs were prescribed but no drainage of the abscess. The clinical statue rapidly deteriorate despite drainage of the abscess in the ED, requiring IV fluid therapy, vasopressors and mechanical ventilation due to acute pulmonary edema associated to her septic condition. Blood work demonstrated leukocytosis with left shift, coagulopathy, procalcitonin >100, metabolic acidosis with Hyperlactacidemia. An abdominal and pelvic CT scan with contrast was performed where severe pelvic inflammation and free liquid in the abdominal cavity were present. Because of critical clinical state, empiric treatment with Meropenem, Tigecyclin and Metronidazole was initiated, exploratory laparotomy was performed with no findings; after the surgery she was transferred to ICU, in mechanical ventilation, PaFi 122 mmHg, with noradrenal in 0.8 mcg/kg/min; SOFA score of 10 points. The ICU evolution was favorable; in next 48 hours she was extubated, noradrenalin suspended, and the blood work up normalized. Positive culture of the abscess demonstrated Prevotella bivia. She was maintained in ICU for 4 days and discharged from the hospital after 12 days.

Discussion: Acute Bartholinitis its a local process that curs with severe pain and discomfort but its a rare cause of septic shock. There are a few cases of Bartholinitis related sepsis published in the literature. Bacteriemia can be related with manipulation of the abscess.

Learning points: There was delayed initiation of treatment recommended by the Surviving sepsis campign2 due to underestimated risk of the patient and her disease.

References:
Changes in chloride concentration and association of hyperchloraemia with organ function in sepsis and septic shock

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Background and Goal of Study: Hyperchloraemia is increasingly recognised as a prominent increase in chloride concentration and association of hyperchloraemia with organ dysfunction in sepsis and septic shock.

Materials and Methods: The medical records of 121 patients diagnosed with sepsis have been retrospectively analysed for the changes in chloride concentration and organ functions according to SOFA score over 72 hrs after admission to mixed ICU. Septic shock and sepsis have been defined in accordance with Sepsis-3 criteria.

The cumulative fluid balance was calculated on Day 3 after ICU admission. The 28-day mortality and the length of ICU stay have also been registered.

Results and Discussion: Septic shock was diagnosed in 65 (54%) patients. On ICU admission, chloride concentration has been available in 86% of sepsis patients. Twenty-one (17.4%) of all the patients were excluded from the following analysis due to haemodialysis / haemofiltration that could affect natural changes in chloride and creatinine. Hyperchloraemia at admission (CI− ≥ 106 mmol/L) was registered in 40% patients with septic shock and in 48% of patients with sepsis without shock. In shock, only the change in CI− defined as a difference between the last and first available values over 74 hrs but not absolute values of plasma CI− concentration on admission correlated with parallel changes in SOFA score (rho = 0.49, n = 25, p = 0.01). Changes in CI− were more prominent in septic shock compared with sepsis without shock: 4 (-1-14) and 2 (-2-5) mmol/L, respectively (p = 0.04). Lactate and creatinine concentrations on admission as well as cumulative fluid balance by 72 hrs were higher in non-survivors (p = 0.002). There was no association of hyperchloraemia with mortality or length of ICU stay.

Conclusion: Hyperchloraemia is a frequent electrolyte disorder observing in almost a half of patients with sepsis. The patients with septic shock demonstrate more prominent increase in chloride concentration. Increased plasma chloride in septic shock is associated with a progress of organ dysfunction.

Recurrent pulmonary haemorrhage in patient with septic thrombophlebitis of the jugular vein. A case report

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Background: Septic thrombophlebitis of the jugular vein or Lemierre syndrome refers to a venous thrombosis associated with inflammation in the context of a bacteremia. The main treatment should be addressed primarily at an infectious level. Surgery should be considered, especially when we are faced with a patient who do not respond appropriately to antibiotic treatment or when it is an urgent situation. There is controversy regarding the benefit of anticoagulant treatment.

Case Report: 21-year-old male with a paramandibular cellulitis associated with a dental focus, which requires exodontics and antibiotic treatment with good initial evolution. Within a few days, the patient begins to suffer from fever, trismus, dysphagia, right submandibular swelling, nausea and vomiting. Urgent cervical CT is performed in which a large collection adjacent to the region of the exodontics is observed, which extends caudal to the sterno-clavicular junction and infiltrates the right internal jugular vein, also showing a filling defect in its light suggestive of septic thrombophlebitis. In his lungs, a lesion compatible with septic embolism is observed. It is operated urgently and transferred to the ICU. To prevent the progression of the thrombus and prevent new embolic processes, anticoagulation with unfractionated heparin is initiated, presenting three episodes of surgical bed hemorrhage and hemoptysis. Cervico-thoracic CT is performed, where the persistence of the thrombus and the appearance of multiple bilateral cavitated pulmonary nodules associated with pleural effusion, compatible with septic emboli, are observed. After two new episodes of hemoptysis with clinical repercussion, it was decided that a mechanical thrombectomy and venous ligation and placement would be performed. Anticoagulation is subsequently restarted without new incidents.

Discussion: There is no consensus on the indication of anticoagulant treatment in this pathology. We must bear in mind the existence of the risk of bleeding, but in the face of a greater risk of serious and irreversible lung damage, the attitude to be followed must be individualized. The risk-benefit balance should be weighted according to the patient’s clinical situation.

References:

Learning points: Septic thrombophlebitis is a rare but serious complication. Patient management must be individualized. Anticoagulation should be considered in selected cases.

Sepsis due to Rhodotorula mucilaginosa in an immunocompromised patient- a case report

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Background and Goal of Study: The purpose of this case report is to show a rare case of an immunocompromised patient with pneumonia and sepsis due to Rhodotorula mucilaginosa infection. The incidence of this infection in Europe is 0.5%–2.3%. The patient is a 71 years old male, suffering from LPL. He had underwent several courses of chemotherapy and radiotherapy. He had fever of 40 degrees Centigrade for over one year. The patient was admitted to Hematology Department of UMHAT "Aleksandrovsko"- Bulgaria in November 2019, where antibiotic treatment begun. On the 14th day his condition aggravated and he was transferred to ICU with severe sepsis and pneumonia. Microbiological findings from the hemoculture showed growth of the opportunist yeast Rhodotorula mucilaginosa. Despite the treatment and the mechanical ventilation, the patient died on the sixth day of his ICU stay.

Materials and Methods: Microbiology samples were collected from the patient. Hospital staff collected hemoculture, urroculture, swap from the trachea and swap from the patient’s throat. The samples were incubated for one week at room temperature.

Results and Discussion: Despite Rhodotorula being previously considered a nonviral saprophyte, recent findings show it can cause severe infections and death in immunocompromised patients. The major risk factors are prolonged treatment with antibiotics and corticosteroids, especially in patients with hematologic malignancies. Currently there are no guidelines or definite treatment of this causative agent.

Conclusion: Rhodotorula mucilaginosa is a rare, yet lethal infection in patients with suppressed immune system. This yeast should not be underestimated and when enough cases are collected, we must aim at creating a suitable guideline.

Selective decontamination of the intestine in neurosurgical patients with subarachnoid haemorrhage in the acute period of cerebral aneurysm rupture

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Background: In patients in the acute period of cerebral aneurysm (CA) rupture SIRS is triggered due to subarachnoid haemorrhage (SAH) stimulating cerebral vasospasm. Therefore such patients from the first hours need neurovegetative blockade (NVB) for neuroprotection. NVB makes the intestinal motility slow down and creates favorable conditions for the translocation of intestinal flora in systemic blood flow, which can initiate the development of infectious complications. Preventive decontamination of the intestine using broad-spectrum antibiotics can reduce the pathogenic bacterial load.

Goal of Study: To reduce the number of infectious complications and sepsis in patients with SAH in the acute period of CA rupture.

Materials and Methods: The prospective control cohort study included 84 (age 64±8, female-51, male-33) patients in the acute period of CA rupture (Fisher 4, Hunt-Hess 3). The main group - 48 patients, the control group - 36 patients. All patients were treated with NVB (Thiopental 1,0-3,0 mg/kg or propofol 2,0 mg/kg, h+Hentany 1,0,0 mg/kg+dxmedetomidine 0,2 mg/kg), artificial lungs ventilation, an external ventricular drainage. Monitoring included HR,ECG,SpO2,etCO2, invasive BP (PICCO, IntelliVew800 PHILIPS). Patients of the main group from the 1st day of treatment got Rifaximinum 200 mg every 8 hours or Nifuroxazide 200 mg every 6 hours for 7 days orally through a nasogastric tube. In all patients we performed daily CRP, PCT concentration, the occurrence of infectious complications, duration of stay in ICU.
Results and Discussion: in both groups high growth of CRP was observed from the 2nd day from aneurysm rupture with maximum rise at about the 7th day to 560 mg/l in the control group. The CRP level in the main group was about 2.5 times lower compared to the control group. Procalcitonin concentrations were more lower in the main group on the 3d, 5th, 7th and 10th days from the CA rupture (>0.05). In the main group we did not observe the development of intestinal parasis. In control group 24 patients developed infectious complications including 6 cases of sepsis. No cases of sepsis were observed in the main group. Time in ICU also differed: the main group 9.0±5.6 days; control group - 18.0±5.3 days.

Conclusion: prophylactic decontamination of the intestine in neurological patients in the acute period of CA rupture allows to reduce the incidence of infectious complications and sepsis.

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Tetanus in 3-years old child

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Background: Clostridium tetani (G-positive rod-shaped anaerobic bacterium) can be found globally in soil and in gastrointestinal system of several animals (including human). Tetanus is caused by clostridium tetani invasive infection, mainly through the infected/contaminated wound and the most common presentation of the disease is muscle twitches, muscle cramps and (opisthotonos, trismus). Tetanus-associated spasm is extremely painful and can compromise the airway patency, that can lead to hypoxaemia and even death. Currently tetanus in developed countries is extremely rare case due to world-wide vaccination.

Case Report: We present a case of 3-years old child, with the nasal mucosal defect after button battery. The patient was examined by ENT surgeon and the battery was successfully removed. After 14 days, parents reported face grimaces, progressive fatigue and trismus. In two days, the condition further deteriorated, and the child is not able to swallow. Patient was admitted to the hospital with the working diagnose of tetanus (patients is not vaccinated). After admission muscle spasm with opisthotonos was triggered by attempt to drink. Benzodiazepines was administered, EEG and CSF fluid were without pathology. Antitetanic globulin + tetanic vaccination was administered together with antibiotic against clostridium (clindamyacin + metronidazole). In four days despite the antitetanic globulin treatment, magnesium and benzodiazepines, because of spasms cumulation and respiratory failure patient was intubated and mechanically ventilated for next 7 days. After extubation the condition was gradually improving, and patient was dismissed from hospital at 34th day.

Discussion: Although tetanus is nowadays extremely rare in developed countries, the incidence of extended disease can have rising tendency due to growing number of not vaccinated patients (vaccination refusal).

Learning points: In the differential diagnosis, it is extremely important to consider the patient’s history of vaccination. Tetanus has mortality up to 50%. It can be treated by antitetanic globulin + vaccination and the supportive therapy (magnesium and benzodiazepines) – to lower the threshold for muscle spasms.

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Hemorrhagic fever with renal syndrome and concomitant pulmonary syndrome: Fatal Hantavirus case in a farmer from Turkey

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Background: There isn't any reported hantavirus case in Turkey until 2009. It's aimed to provide information about clinical findings and follow-up of this rare case in the intensive care unit (ICU).

Case Report: A 57-year-old male farmer admitted to the emergency department with nausea, vomiting, abdominal pain and high fever. Renal function test (RFT) deterioration, thrombocytopenia, PT and PTT prolongation were detected in first examinations. The patient was admitted to the ICU with acute renal failure. His detailed history revealed that there were mice and squirrels in his living environment. In the follow-up, common petechiae developed in his lower extremity. Crimean-Congo Hemorrhagic Fever and leptospirosis were considered in the differential diagnosis with thrombocytopenia, transaminase elevation, RFT deterioration. Hantavirus IgM and IgG were diagnosed by ELISA. During follow-up, it was observed that lung and kidney failure developed and the patient was intubated, mechanical ventilator support was initiated and underwent continued veno-veno voice hemodialfiltration (CVVH) therapy with cytokine absorption. After the addition of liver and lung failure to the patient in hantavirus fever with renal syndrome (HFRS), the clinic progressively worsened and he died at 32nd day of ICU.

Discussion: Hantavirus is a zoonotic infection with several subgroups of RNA in the bunyavirus family. The virus is ejected into the environment with feces and urine of rodents. The disease is caused by the ingestion of virus, by inhalation of the contaminated dust into the environment or by the bite of rodent carrying the virus. It can be seen in a wide spectrum from influenza-like symptoms to lethal organ dysfunctions. Clinical manifestation by this virus, which cannot be certain treated with antiviral treatment, liver, kidney and lung supportive treatment and strict intensive care support are essential. These clinical syndromes may be confused with other infectious or noninfectious diseases. Hanta virus should always be keep in our minds for differential diagnosis.


Learning points: clinical manifestation, prognosis and complications of hantavirus infection in intensive care follow-up.

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Invasive Amebiasis in a Spanish Host who has not travelled to endemic Areas

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Background and Goal of Study: Amebiasis is an endemic parasitic disease in developing countries caused for Entamoeba histolytica. In industrialised zones, is usually seen in migrants and travellers returning from endemic areas. The infection primarily occurs by ingestion of contaminated food or water, but sexual transmission by fecal-oral contact has been described.

Case report: A 39-year-old spanish male with personal history of alcoholism, who had not travelled outside Europe, was admitted to Emergency with fever, abdominal and pleuric pain, and seven-day diarrhea. He was transferred to the Resuscitation Unit due to septic shock. A CT scan showed a 78 mm liver abscess of the right lobe. An ultrasound guided drainage was inserted and cultures obtained. In the liver aspirate, E. histolytica was directly visualized, and PCR was positive in different tissues on 3rd day. The pleuropulmonary and peritoneal affection was due to direct extension of liver-abscess. Haematogenous dissemination presented as skin lesions on the chest and face, and multiple intraparenchymal and basal ganglia brain abscesses, which were observed in a cranial CT scan. He received a 10 weeks intravenous (IV) metronidazole therapy, plus 10 days of IV chloroquine and 7 days of oral paromomycin. After completing therapy, the patient was discharged to ward on the 110th lacking neurological damage.

Discussion: This is a rare case of native amebiasis in Spain of unknown aetiology. 90% of primary infections are asymptomatic. Extraintestinal manifestations are present in less than 1%, being amebic liver-abscess the most common. Synchronous brain lesions are less frequent, usually not more than 10% of all liver abscesses. The disease is diagnosed by liver imaging and histology. The treatment of choice is metronidazole, which is generally used for 4 weeks IV and 6 weeks orally. Newer drugs such as tinidazole or nitazoxanide are also used. Complications include abscess rupture, septicaemia, and fulminant hepatic failure. The mortality rate of amebic liver abscess in Spain spans from 0 to 4%.

Learning points: In presence of liver abscess, amebiasis must be considered even in patients without travel history.
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The USS machine as a vector for infection transmission in critical care: a study of microbiological contamination

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Background and Goal of Study: Point of care ultrasound has become increasingly common in both anaesthesia and critical care. Frequent use of machines renders them a potential vector for transmission of infection between patients. This prospective study was undertaken to assess our ultrasound machines (USM) for physical and microbiological contamination.

Materials and Methods: Following institutional review and approval (CARMS-15238) retrospective single-centre cohort study was conducted. As patients were not involved in this study, further ethical approval was not sought. Three rounds of inspection were undertaken on all USM in the ICU, each one month apart. The USM were Philips Sparq Echocardiography (3), Sonosite Nanomaxx (1), S-ICU (1) and S-Nerve (2). Each USM was visually inspected for contamination, then microbiological samples were taken, one swab from the screen/controls, the probes and the connecting cables. These were cultured and identified in the laboratory. Categorical data were presented as numbers and percentage, and were then analysed using Fisher’s exact test, using Graphpad Prism 8.3.0. San Diego, California, USA.

Results and Discussion: The USMs were sampled on three occasions, totalling 19 sampling events (some USMs were away for maintenance during sampling). On 15 occasions, dried gel was found on the probe or screen, 5 had dried and 1 had wet blood, 10 had open gel packets and 4 had used ECG electrodes. Of a total of 57 cultures taken, 46 had positive growth, 45 were bacteria and 4 fungi (some samples positive for both). All bacteria were aerobic spore formers or skin commensals; no high concern species were detected. All the fungi were found on the echocardiography machines’ probes and cables. Soiling of a USM was not associated with an altered risk of positive culture (p>0.05 for all tests), but the study may be underpowered for these endpoints.

Conclusion: We were reassured no pathogenic organisms were detected on USMs, but clearly there is scope to improve our US machines’ cleanliness. We therefore propose to develop processes to improve cleaning (attaching cleaning wipes to machines, allocating USS machine cleaning to designated ICU staff, raising staff awareness) and mandate sterile sheaths for all invasive procedures.

References:

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Gastric Aspergillosis as a Complication of Virus H1N1 Respiratory Infection

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Background: Invasive pulmonary aspergillosis-IPA is typically considered a common disease among severely immunocompromised patients. Few cases of IPA in critical immunocompetent patients have been described. We present the case of a previously healthy individual with acute respiratory viral infection, who presented in a secondary phase with gastric aspergillosis.

Case Report: 62-yr male without any medical history was admitted to the ICU with bilateral and multiple pulmonary consolidation due to influenza virus type A H1N1, septic shock and associated bacteriaemia due to streptococcus pyogenes skin infection. At admission we found ARDS and multiple organ failure (DIC, hemodynamic, acute renal failure, liver failure). SAPS II score 53, SOFA score 13. Invasive mechanical ventilation, aggressive antibiotic and antiviral regimen, hemodynamic therapy and enriched immunoglobulins were started. After ten days of admission upon gastric aspergillosis, treatment with voriconazole was started and continued for a total of 90 days. He was successfully discharged from our ICU after 30 days.

Discussion: In our case the early aggressive therapy aided the patient in overcoming the initial septic pro inflammatory response. It’s probable that in a secondary phase the host defenses were severely compromised facilitating an Aspergillus colonization of upper airways and further haematological diffusion onto the gastrointestinal tract leading to an invasive pulmonary and extrapulmonary infection. After the initial respiratory viral infection he didn't present any new respiratory symptoms that could prompt us to suspect a secondary pulmonary infection, therefore the identification of aspergillus spp on bronchoalveolar lavage was interpreted as colonisation. Antifungal therapy was initiated only after histological diagnosis of Aspergillus spp in the stomach and ileal segment.

References:

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Necrotizing fasciitis in a patient with Eisenmenger Syndrome

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Background: The triad of congenital systemic-to-pulmonary communication, pulmonary arterial disease, and cyanosis is called Eisenmenger syndrome. Important aspects of management include avoidance of high-risk situations, extreme caution when undertaking noncardiac surgery, and specific attention to hematologic issues. Any surgical procedure is potentially life-threatening in patients with Eisenmenger syndrome and is associated with a high perioperative mortality, especially when emergency surgery is required. Necrotizing fasciitis is a complication of the deep soft tissues that results in progressive destruction of the muscle fascia and overlying subcutaneous fat. Necrotizing infection usually presents over hours or days. Rapid progression to extensive destruction can occur, leading to systemic toxicity, limb loss, and/or death. Therefore, early recognition of necrotizing infection is critical.

Learning points: Algorithms for non-immunocompromised patients are needed. Invasive aspergillosis can present in extrapulmonary settings in absence of respiratory symptoms.

References:

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Disseminated Tuberculosis and Hemophagocytic Syndrome in Critical Care Unit, in a young woman with Inflammatory Bowel disease treated with Infliximab

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Background and Goal of Study: We present a case of a 27 years old woman with inflammatory bowel disease, admitted into Postsurgical Critical Care, after scheduled splenectomy to study her short course of fever, leukeopenia and splenic space occupying lesions and splenomegaly. She has been previously treated with Infliximab due to Colitis and completed correct Tuberculosis Prophylaxis.

Materials and Methods: We reviewed our case in our Electronic Health Database JANUS and compared it with other case reports in literature, found in PubMed, with keywords Tuberculosis, Inflammatory disease and Hemophagocytic Lymphohistiocytosis.

Results and Discussion: After splenectomy, she needed Intensive Care, due to acute respiratory failure, alveolar-interstitial pulmonary infiltrates, right pleural effusion, shock and fever. Bone marrow aspirate resulted in hemophagocytic lymphohistiocytosis and acute respiratory failure despite correct prior Tuberculosis Prophylaxis.

Conclusion: The importance of this case, is given by association between Hemophagocytic Syndrome and Disseminated Tuberculosis in an immunosuppressed patient with Infliximab and the outbreak of this infectious disease that must always be considered in the differential diagnosis of fever despite correct prior Prophylaxis. Therefore, is an opportunity to focus on the efficacy of anti-TB chemoprophylaxis in
Preventing ICU's infections by electronic flow devices

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Background and Goal of Study: Preventing healthcare associated infections is important in patients’ management and safety, especially in ICU. Bactiguard® devices consist in endotracheal tube, central venous catheter and urinary catheter with a metal alloy coating of gold, silver and palladium. This coating creates a galvanic effect when it comes in contact with fluids preventing microbial adhesion and potential infections.

Materials and Methods: Aim of this study is to evaluate if clinical outcomes improve in ICU's patients treated with Bactiguard® devices. 20 patients admitted to ICU requiring enteral nutrition, central venous catheter and urinary catheter were randomly treated with standard devices (GROUP A) or Bactiguard® devices (GROUP B). Data are presented as medianDS, p-values<0.05 have been considered significant.

Results and Discussion: At ICU entrance, the 2 groups have no differences among them finally solved. Microbiologically, no causal agent was found. He finally was discharged from the hospital and lives his basal life situation. Learning points: Although both necrotizing fasciitis and Eisenmenger Syndrome have high mortality rates, with adequate care this patient survived and now has been discharged from the hospital and lives his basal life situation.

5339

Causative agents in patients with suspected bacteraemia - prospective study

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Background and Goal of Study: Blood samples were collected and routine blood cultures (BC) were ordered from the patients with suspected sepsis, to evaluate the prevalence of different causative agents/positive BC in patients with suspected bacteraemia, were taken in the frames of the FAPIC project.

Materials and Methods: A prospective cohort study was set up at five ICU and three other wards at the University Hospital Centre Zagreb and University Hospital Centre Merkur in Zagreb, Croatia. Patients with suspected bacteraemia, for whom routine BC were ordered, were included in a cohort. Inclusion criteria were: age above 18 years, BC positive results, presence of clinical signs and/or symptoms of bacteraemia. Data were analysed using students-t test (continuous) or with non-parametric tests in case of the non-normal data.

Results and Discussion: In total, 229 patients were included between 21st January and 03rd October 2017. 158 (69%) patients were male. The mean age of patients was 61.5 years. True bacteraemia (contamination excluded) was found in 55 patients (24%). Haemoglobin content and the systolic blood pressure values were significantly lower in patients with positive BC than in those with negative BC (p=0.004 and p=0.002 respectively). Serum lactate levels and urea content were significantly higher in patients with positive BC compared to patients with negative BC (p=0.024 and p=0.001 respectively). The most frequently isolated pathogens were: Pseudomonas aeruginosa (12 patients), Staphylococcus epidermidis (11 patients) Escherichia coli (6 patients), Enterococcus faecium (6 patients) and Klebsiella pneumoniae (5 patients). Six isolates were multirug-resistant according to Magiorakos et al: two VRE, two ESBL, one MRSA and one colistin-resistant K.
pneumoniae. Median time from collection to laboratory arrival was 131 minutes. Median time to blood cultures being flagged positive was one day.

**Conclusion:** The study revealed high percentage of positive blood cultures (24%) and high rate of multiresistant strains among positive BC.

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**References:**

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**4522**

**Should an early hospital discharge strategy be implemented following a successful primary PCI for acute ST elevation myocardial infarction?**

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**Background:** Early hospital discharge following ST elevation myocardial infarction and primary PCI is reasonable after 72 hours for selected low risk patients. Yet, these recommendations, which were mainly based on data from fibrinolytic era, are not widely implemented. We present single center experience regarding efficacy and safety of early hospital discharge.

**Method:** We conducted a retrospective study based on data from 2014 to 2015. The patients were classified into three groups based on the duration of hospitalization; within 48 h, 48-72 h, and >72 h. The primary endpoints were all-cause mortality and major cardiovascular events (MACE) within 30 days and 1 year. Secondary endpoint was acute kidney injury.

**Results:** 178 patients were included; 60 patient (33.7%) were discharged within 48 hours, 75 patients (42.1%) discharge after 72 hours, and 43 patient (24.2%) discharged between 48 and 72 h. Patients discharged >72 h were significantly older (p < 0.001), had extensive myocardial damage (p < 0.001) and a significant reduction in left ventricular systolic function (p < 0.02). Most common catheterization approach in this group was the femoral artery (p < 0.02). No statistically significant difference observed between the three group regarding primary and secondary end points.

**Conclusion:** Early hospital discharge, within 48 to 72 hours after successful primary PCI for Acute STEMI was not associated with a higher rate of all-cause mortality or MACE up to one year after discharge for selected patients. In an era where the incidence of perioperative and mechanical complications are low an early hospital discharge strategy should be widely and routinely implemented.

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**4720**

**Use of clevidipine for hypertension treatment in postpartum patients with preeclampsia: A case series study**

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**Background and Goal of Study:** Preeclampsia and other hypertensive disorders of pregnancy are associated with an increased risk of maternal and perinatal morbidity and mortality. Current guidelines recommend using labetalol, hydralazine, and nifedipine as first-line treatment but in our experience high doses or combinations of multiple drugs are needed to achieve the blood pressure (BP) goals. Clevidipine is a calcium channel antagonist that has a rapid onset and offset of action and reduces BP via decreasing arterial resistance without affecting venous capacitance vessels [1]. The use of clevidipine hasn’t been investigated in pregnancy and postpartum patients and it’s considered “off-label” according to the Spanish Agency of Medication and Healthcare Products (AEMPS). Our study aims to describe the use of clevidipine for the management of hypertension in postpartum patients diagnosed with severe preeclampsia.

**Materials and Methods:** Retrospective, observational study. We reviewed the electronic health record of 5 patients diagnosed with severe preeclampsia admitted at the surgical ICU after cesarean section, none of these patients wanted to breastfeed and were treated before with labetalol. Clevidipine infusion were started at admission and it was titrated to achieve blood pressure goals. We collected and analyzed data regarding age, comorbidities, BP at the admission, days of stay at the ICU, time needed to achieve BP control, total dose of clevidipine and adverse effects.

**Results and Discussion:** Mean age was 33.8 years, 40% of patients had gestational diabetes, 60% were diagnosed with HELLP syndrome, one patient had eclampsia and another one pre-gestational hypertension. The average MAP at ICU admission was 107 mmHg. The patients stayed at the ICU for a mean of 3.8 days, and the time needed to achieve complete BP control was on average 3 days. Clevidipine mean total dose was 90 mg. Main adverse effects were headache (40%), mild hypotension in one case and one patient developed rebound hypertension after discontinuation of clevidipine infusion.

**Conclusion:** Our results showed that clevidipine can be an effective treatment for postpartum hypertension because of the favorable pharmacokinetic profile, easy titration and few adverse effects.

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**4906**

**Stroke volume variation predicts fluid responsiveness in patients with implanted IABP after cardiac surgery, believe it or not**

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**Background and Goal of Study:** There is a vast body of scientific evidence confirming validity of dynamic hemodynamic indices (such as stroke volume variation [SVV]) as predictors of fluid responsiveness in patients receiving mechanical ventilation. Patients with implanted intraaortic balloon pump (IABP) have always been excluded from this concept under the belief that pump artifacts in the invasive arterial pressure trace influence the accuracy of SVV, which is true. The presented study aims to test whether SVV is a valid predictor of fluid responsiveness in that patient population provided that IABP is switched to standby mode for a brief period.

**Materials and Methods:** We present a prospective study with 30 patients included. All patients received IABP in situ prior to admission and were transferred to ICU with IABP activated. SVV was calculated using arterial pressure waveform and IABP output was measured again. Fluid responders were defined as patients with a 10% or bigger increase in cardiac output after fluid challenge. Statistical analysis was performed using IBM SPSS. A ROC curve was generated for SVV and a positive response to fluid challenge.

**Results and Discussion:** SVV threshold of 8.5% was estimated using Yoden’s index of the maximum value of (Se+Sp-1), for the validity of SVV. showed clinical- or laboratory signs of tissue hypoperfusion. IABP was implanted intraoperatively on the lead surgeon’s request. After completion of elective or emergent cardiac surgical procedure patients were admitted to ICU for optimization and monitoring. Standard monitoring was applied and a pulmonary artery catheter was inserted in all patients. The following algorithm was applied immediately after admission to ICU: 1. IABP was switched to standby mode for one minute. 2. SVV was estimated using the Edwards Vigileo monitor and Flotrac system. 3. IABP was returned to 1.1 mode. 4. Cardiac output was measured using pulmonary artery thermometry. 5. Fluid bolus consisting of 6 mkg colloid solution was applied for 10 minutes. 6. Cardiac output was measured again. Fluid responders were defined as patients with a 10% or bigger increase in cardiac output after fluid challenge. Statistical analysis was performed using IBM SPSS. A ROC curve was generated for SVV and a positive response to fluid challenge.

**Conclusion:** SVV is a valid predictor of fluid responsiveness under the specific circumstances applied in the study. Our findings suggest that clinicians should keep dynamic hemodynamic indices in their armamentarium when resuscitating patients with IABP.

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**4922**

**Out of hospital cardiac arrest PCI protocol**

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**Background and Goal of Study:** Our hospital is the primary percutaneous coronary intervention (PCI) centre caring for more than 1 million people living in the west of Scotland. Human, environment and equipment factors make the cath lab unsafe area for the initial resuscitation of out of hospital cardiac arrest (OHCA) patients due to ST elevation myocardial infarction (STEMI) who achieve return of spontaneous circulation (ROSC). Equally, unnecessary delays in the transfer of these patients to the cath lab and in initiation of protective physiological strategies for the post cardiac arrest syndrome can affect outcomes. We introduced a standardised OHCA PCI protocol to overcome these problems.

**Materials and Methods:** Thirty-two ventilated patients admitted to our ICU from the cath lab after having had PCI post OHCA due to STEMI between November 2018-November 2019. We looked into patient transfer time from ROSC to the start of PCI, initial resuscitation clinical area and the documented initiation of physiological protective strategies for the post cardiac arrest syndrome prior to PCI.

**Results and Discussion:** The mean transfer time from ROSC to PCI was 4h 37m versus 2h 34m for patients who were admitted via A&E to the cath lab versus...
directly to the cath lab, respectively. Twenty (62.5%) versus 12 (37.5%) patients had their initial resuscitation in A&E versus the cath lab, respectively. Eighteen (65%) out of these 22 A&E patients had unnecessary delays due to unnecessary interventions for example CT scans, blood tests, central line etc. before transfer to the cath lab, while 9 (75%) out of these 12 cath lab patients required intubation and ventilation in the cath lab. Only 2 (6.25%) patients had documented initiation of physiological protective strategies for the post cardiac arrest syndrome prior to PCI.

Conclusion: Our OHCA PCI protocol transfers patient either directly or via A&E to the cath lab and avoids initial resuscitation in the cath lab. It initiates physiological protective strategies for the post cardiac arrest syndrome and avoids unnecessary delays prior to PCI.
Case of electrotrauma to the rescuer during CPR from implantable cardioverter-defibrillator

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Background: With the widespread use of implantable cardioverter-defibrillators (ICD) these days, it is of great importance to the rescuer to be aware of dangers associated with such devices. Although the devices are being modernized and new modes of defibrillation are invented [1], electrotrauma from implantable devices remains a threat to healthcare providers [2].

Case Report: A 76-year old patient was admitted to the ICU with asystole. Advanced life-support resuscitation was initiated immediately. During chest compressions in latex protective glasses tingling sensations became apparent. Subcutaneous device was detected in the left subclavian area. It became obvious that the patient had ICD and mechanical movement of the chest wall during compressions initiated defibrillation. Electroenergy was transferred to the rescuers causing tingling sensations. Despite that, chest compressions were resumed but the patient failed to revive rhythm.

Discussion: Defibrillation energy can be life-threatening to personnel. Shock can be delivered to the rescuer not only through chest compressions but also during central venous catheterization when advancing needle or a guidewire contact with a lead of ICD [3]. However, there are anecdotal reports on such cases and current resuscitation guidelines do not cover this issue in detail. Nevertheless, it is wise to detect ICDS during emergency resuscitation as soon as possible and to deal with it professionally, i.e. to cover it with a magnet during the whole period of resuscitation.

References:

Learning points: Always check for ICD in a cardiac arrest patient and turn it off with a magnet in order to protect yourself from electrocution.

Case of fulminant develop septic shock after perforative gangrenous appendicitis in child

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Background: Acute appendicitis is one of the most common causes of abdominal pain and is the most frequent condition leading to emergent abdominal surgery in children. Gram-negative bacterias is major health problem, causing one-half of cases of lethal septic shock.

Case Report: A 15-year-old boy who underwent surgery for perforated gangrenous appendicitis complicated with peritonitis. Complicated postoperative period with nausea, vomiting and fever. An abdominal scan was performed on 5th day and an intra-abdominal abscess was detected. Relaparotomy - abscess and drainage evacuation. Two hours after the surgery there was an arterial bleeding from the drains. Urgent re-operation detected hemoperitoneum and diffuse bleeding from all wound surfaces, no source of bleeding was identified. The boy was presented to our clinic intubated FIO2-60%, icteric skin and visible mucous membranes, HR 150/min, BP 80/60. Anuria, naso-gastric tube- haematuria, drains-hemorrhagic. Laboratory tests revealed extremely high inflammation rates, hepatic failure, uremia, extremely high systematic Bactericidal enzymes and DIC syndrome. CVLs were inserted immediately in the OR in v.jugularis interna sinistra and v.femoralis dextra under US control. The patient was put on antibiotic treatment, catecholamine support (Dopamine 10mg/ kg/min, Noradrenaline 0,5mg/kg/min, Dobutamine 15mg/kg/min, Adrenaline and Milrinone) and urgent hemodialysis was performed. Electrocardiography showed a structurally normal heart, with no signs of acute myocardial infarction, pulmonary embolism or myocarditis. The next hours extremely increased of cardiac enzymes, persistent severe hypotension and tachycardia with high catecholamines needs, renal and hepatic failure, anuria and haemorrhagic syndrome persistene. Despite resuscitation, exilus letalis was registrated.

Discussion: An extremely fast-growing infection was presented by E.coli infection with hepatorenal syndrome and advanced DIC syndrome. Early diagnosis and recognition of the infection is crucial to the outcome of the disease.

References:

Learning points: Recognition and adequate response at the earliest moment of the development of the shock state is the most essential condition for the patient to survive. But even in routine operations we should think and for aggressive bacterial strains of E.coli.

Myocardial dysfunction, Sepsis, MOF; May the patients have Broken Heart Sy in ICU?

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Background: Myocardial dysfunction is one of the main predictors of poor outcome in septic patients (mortality 70%). Sepsis induced myocardial dysfunction can lead to reduced ejection fraction and consequently a weakened response to reanimation procedures, including fluid resuscitation and catecholamine administration.

Case Report: This case report details the case of a 33-year-old male without cardiac history. He was admitted unconscious, normotensive, with agonal breathing and tachycardia. Shortly after admission to the ICU, the patient became hemodynamically unstable after which noradrenaline and vasopressin were administered, followed by a central venous access, pulmonary artery catheterisation and V-A ECMO was started. Immediately after beginning ECMO the patient became asystolic and cardiopulmonary reanimation was performed (cardiac massage, defibrillation, administration of adrenaline and atropine, external pacing). Due to continuing MOF, CVVHDF with blood purification was started. A Transthoracic echocardiogram showed normal dimensions of the left chamber and ascending aorta, with a global reduction in left ventricular systolic function (EFLV Simpson 19-20%) and significant diastolic dysfunction. Moderate mitral and tricuspid regurgitation was present, with indirect signs of a mild increase in pulmonary vascular pressure (RVSP 41.69 mmHg). Estimated cardiac index (CI) was decreased at 1.35 L/min. Laboratory investigations showed a significant rise in troponin (1274-157g/L). 24 hours after admission, the patient's pupils were fixed and dilated and subsequent cerebral angiography confirmed brain death.

Discussion: In terms of the absence of typical clinical, electrocardiographic features and laboratory parameters, which would indicate acute coronary syndrome (ACS), the cause of fulminant echocardiographic changes remains unanswered. Takotsubo cardiomyopathy, also called broken-heart syndrome, has been recently implicated as possible cause of rapidly developing myocardial dysfunction in ICUs. It is cardiac syndrome that involves dramatic left ventricular apical akinesia and often mimics ACS. Unfortunately, it is very challenging to diagnose it in ICU patients.

Learning points: Cardiac pathology associated with septic shock may lead to a very poor prognosis, therefore, timely diagnosis combined with aggressive therapy is of crucial importance in reversing myocardial dysfunction.
Results and Discussion: On the 150 VA-ECMO included (65 after cardiac surgery and 85 for medical etiology; median age 58 [48-69] years and SAPS II 54 [38-70]), 2163 BC were performed (1162 systematic BC and 984 on-demand BC); 192 (9%) were positive, including 68 with contaminants. Regarding systematic BC, 52 (4%) revealed BSI; meanwhile, 72 (7%) “on-demand” BC revealed BSI. Performing systematic BC was negatively associated with diagnosing BSI (OR 0.55, 95%CI[0.4;0.8], p=0.002). Regarding systematic BC, independent risk factors for BSI diagnosis were: ECMO for graft failure (OR 2.4, 95%CI[1.2;4.9], p=0.013), sampling under antimicrobial therapy or renal replacement therapy (OR 2.2, 95%CI[1.1;4.3], p=0.029 and OR 2.1, 95%CI[1.1;3.8], p=0.008, respectively). On the 68 BC with contaminants, 10 (15%) led to inappropriate antimicrobial therapy, i.e. 7% of the whole cohort of patients on VA-ECMO. Conclusion: Despite risk of contamination and inappropriate antimicrobial therapy, BC often detect poorly symptomatic BSI. On-demand BC are more useful than systematic BC. This argues for a reasonable approach of BC prescription on VA-ECMO.

Genetic predisposition for bacterial infection in cirrhotic patients

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Background and Goal of Study: Patients with liver cirrhosis have an increased incidence of infections that are a major cause of morbidity and mortality. About 30% of critically ill patients cases suffer an infection. Some studies, recently, showed association between altered toll-like receptors 2 and 4 and susceptibility to bacterial infections. But there are small amount of such studies in cirrhotic patients. The aim of this study was to analyze the relationship between the presence of TLR2 rs4696480/AT, TLR4 rs4986791/CT and TLR4 rs4986790/AG polymorphisms and the incidence of bacterial infections in cirrhotic patients of Kazakh population. Materials and Methods: After the Local Ethnic Committee approval we prospectively studied 90 and retrospectively 30 adult patients of Kazakh population with liver cirrhosis. We studied incidence of bacterial infections, site and etiology of infection, presence of TLR2 rs4696480/AT, TLR4 rs4986791/CT and TLR4 rs4986790/AG polymorphisms and the incidence of bacterial infections in cirrhotic patients of Kazakh population. Results: 57 out of 120 examined patients had presented bacterial infections, which is 47.5% (5.8.7%) patients were hospitalized with or due to an infectious complication. 52 patients (43.3%) presented in-hospital infections. In 39(32.5%) cases such complications occurred after an invasive procedure. 90 prospectively studied patients underwent genetic screening for TLR2 and TLR4 polymorphisms. We revealed normal genotype in 47(52.2%) patients, and pathological genotype in 43(47.8%) patients. In those 43 patients with pathological genotype, 42 had presented bacterial infections (Tab1). We have found the pathological genotype TLR2 rs4696480 in 38.3%, genotype TLR4 rs4986791 in 11.1% and genotype TLR4 rs4986790 in 7.8% of studied cases.

<table>
<thead>
<tr>
<th>Group/Genotype</th>
<th>Normal</th>
<th>Pathological</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No infection</td>
<td>37/17.4%</td>
<td>1/2.6%</td>
<td>38/42.2%</td>
</tr>
<tr>
<td>With infection</td>
<td>10/19.2%</td>
<td>4/20.8%</td>
<td>14/24.8%</td>
</tr>
<tr>
<td>* p&lt;0.05 between groups</td>
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Tab1. TLR2 and TLR4 genotype in the studied sample of patients with liver cirrhosis.

Results and Discussion: On the 150 VA-ECMO included (65 after cardiac surgery and 85 for medical etiology), i.e. 1422 VA-ECMO days, 2163 BC were performed. Median age of patients was 58 [48-69] years and SAPS II was 54 [38-70]. Duration of VA-ECMO support was 7 [5-13] days. One hundred and ninety-two BC were positive, including 68 contaminants. BSI episode rate was of 43 cases/1,000 days of ECMO support. From implantation up to five days after withdrawal, BSI occurred in 50 patients, with 53% in the first week and 20% after withdrawal. Pathogens were: Klebsiella pneumoniae (n=8), Gram negative non-fertmentative bacilli (n=7), Escherichia coli (n=7), Enterobacter cloacae (n=6), Candida spp (n=5), Enterococcus spp (n=5), Streplococcus spp (n=4), coagulase-negative Staphylococci (n=2), Proteus mirabilis (n=2), Gram positive bacteria (n=1), Staphylococcus aureus (n=1) and other enterobacteria (n=15). Forty percent of BSI was primary, i.e. not associated with another active infection. Mortality rate did not differ between patients with or without BSI (60 vs. 54%, respectively, p=0.49). Conclusion: The incidence of BSI is high. The number of potential contaminants raises the question of the cost/effectiveness and timing of BC sampling, in particular those systematically collected.

Bloodstream infection on veno-arterial ECMO

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Background and Goal of Study: Bloodstream infections (BSI) are often reported on Veno-Arterial ExtraCorporal Membrane Oxygenation (VA-ECMO). However, previous studies were heterogeneous, mixing venous-venous and VA-ECMO, adults and children. Our objective was to study the incidence and profile of BSI in an adult population of VA-ECMO. Materials and Methods: All adult patients requiring VA-ECMO, surviving more than 24 hours, were included (01/2013-01/2017). Routine blood culture (BC) was performed daily up to five days after ECMO withdrawal, and also at the physician’s discretion. All positive BC were considered as BSI, except for contaminant pathogens which required at least two positive BC in 48 hours to be classified as BSI.

Results and Discussion: On the 150 VA-ECMO included (65 after cardiac surgery and 85 for medical etiology), i.e. 1422 VA-ECMO days, 2163 BC were performed. Median age of patients was 58 [48-69] years and SAPS II was 54 [38-70]. Duration of VA-ECMO support was 7 [5-13] days. One hundred and ninety-two BC were positive, including 68 contaminants. BSI episode rate was of 43 cases/1,000 days of ECMO support. From implantation up to five days after withdrawal, BSI occurred in 50 patients, with 53% in the first week and 20% after withdrawal. Pathogens were: Klebsiella pneumoniae (n=8), Gram negative non-fertmentative bacilli (n=7), Escherichia coli (n=7), Enterobacter cloacae (n=6), Candida spp (n=5), Enterococcus spp (n=5), Streplococcus spp (n=4), coagulase-negative Staphylococci (n=2), Proteus mirabilis (n=2), Gram positive bacteria (n=1), Staphylococcus aureus (n=1) and other enterobacteria (n=15). Forty percent of BSI was primary, i.e. not associated with another active infection. Mortality rate did not differ between patients with or without BSI (60 vs. 54%, respectively, p=0.49). Conclusion: The incidence of BSI is high. The number of potential contaminants raises the question of the cost/effectiveness and timing of BC sampling, in particular those systematically collected.

Optimizing linezolid administration in critically ill patients: is continuous infusion enough?

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Background and Goal of Study: Linezolid standard administration leads to a high serum levels variability and frequent under-exposure in ICU. Continuous infusion (CI) showed an in vivo bactericidal activity in animal models and could improve therapeutic target attainment (TTA) in severely ill patients, as showed in ICU patients with sepsis or ventilator-associated pneumonia. The aim of our study was to investigate the TTA rate with linezolid CI in ICU patients with all degrees of organ dysfunction.

Materials and methods: ICU patients receiving linezolid by CI (600mg LD in 1 hour, then 1200mg/day) for at least 48 hours were included. Drug concentrations (CSS) were measured at least once daily, after 48 hours from starting therapy, at steady-state, using a validated immunoassay method (ARK™). TTA was defined as AUC0-24>160mg*h/L, corresponding to an AUC/MIC>80 for MIC of 2mg/L, as to optimize drug exposure.

Materials and method: For the 68 BC with contaminants, 10 (15%) led to inappropriate antimicrobial therapy, i.e. 7% of the whole cohort of patients on VA-ECMO. Conclusion: Despite risk of contamination and inappropriate antimicrobial therapy, BC often detect poorly symptomatic BSI. On-demand BC are more useful than systematic BC. This argues for a reasonable approach of BC prescription on VA-ECMO.

Intensive Care Medicine
Characterization of Ceftobiprole’s cerebrospinal fluid penetration in patients with External Ventricular Drainage

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Background and Goal of Study: Healthcare-associated meningitis (HAM) is associated with significant morbidity and mortality. HAM treatment is challenging because of antibiotics resistance and the difficulty to achieve a therapeutic dose of antibiotics in the CNS. Ceftobiprole is a novel broad-spectrum cephalosporin with excellent activity against multi-drug resistant (MDR) pathogens. Since ceftobiprole is bactericidal, well-tolerated and it has anti-biofilm activity, it could be useful in case of HAM. Nowadays there are no human studies concerning the penetration and the efficacy of ceftobiprole in the cerebrospinal fluid (CSF). The present study aims to fill these gaps in the literature.

Materials and Methods: We enrolled 5 patients with and implanted EVD who received Ceftobiprole for other reasons than HAM, in a single-center pilot study. Exclusion criteria were: patients < 18, cephalosporine allergy, end-stage renal insufficiency, BMI>30, pregnancy and end-stage diseases. We have measured the ceftobiprole concentration in blood samples and 11 CSF samples from each patient (95 samples in total), as described at www.coqualab.it. We calculate the maximum serum (Cmax-s) and CSF concentration (Cmax-csf) and the percentage of CSF penetration of ceftobiprole, after the third infusion of Ceftobiprole (500mg e.v. every 8hr).

Results and Discussion: The mean Cmax-s was 12.02 mg/L, reached after 2hr from drug infusion, whereas the mean Cmax-csf was 0.6 mg/L. In Figure 1 the mean concentrations (and the relative standard deviations) of serum and CSF ceftobiprole concentration for each time point are represented. The mean Ceftobiprole CSF penetration was 15.3%. 

Conclusion: For the first time we studied the CSF ceftobiprole’s penetration in humans, founding a mean value of 15.3%. Although we cannot conclude anything about the Ceftobiprole CSF efficacy, its meningeal penetration is in line with other cephaplorines and it is higher than Vancomycin, posing the base for a possible role of Ceftobiprole in HAM treatment.

In-hospital mortality predictors after secondary intraabdominal peritonitis

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Background and Goal of Study: Urgent abdominal surgery (UAS) for secondary peritonitis has a high risk of mortality especially in elderly people. The main objective of the study is to identify mortality and morbidity associated factors.

Materials and Methods: This was a retrospective study from January 2016 to September 2019 including patients who underwent UAS for complicated peritonitis at our institution. The following variables were identified: gender, age, American Society of Anesthesiologist classification (ASA), type of infection, infection source, surgical classification for complicated peritonitis and adequacy of empirical antibiotic treatment. The primary outcome of the study was in-hospital mortality. Secondary outcome was postoperative morbidity, we describe morbidity as major complications and length of stay. Statistical tests used: Chi-square test and t-test. Risk factors for mortality and morbidity were identified using multivariate regression analysis. Model discrimination was evaluated using the area under the Receiver Operator Characteristics curve (AUC).

Results and Discussion: 314 patients were registered, 62% men, median age was 65 years, 45% ASA III-IV class, 37% nosocomial, 44% non appendicular-biliary source, empirical antibiotic adequacy was 76%. Mortality risk factors were: male sex (OR:3.8), age over 75 years (OR:10.82), and 6.6), nosocomial origin infection (OR:4.5 and 3.2), non appendicular-biliary source, impaired functional status (OR:6.1 and 5.1), ASA III and 4.1), ASA IV (OR:11.6 and 12.3). The AUC was 0.91 for vasoactive support and 0.9 for mechanical ventilation. Kidney failure was significantly related to: age over 75 years (OR:14), non appendicular-biliary source (OR:5.9), fecal type (OR:3.6), ASA III

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Community-acquired meningitis caused by pseudomonas aeruginosa and enterococcus spp. not covered by standard empirical therapy: a retrospective study

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Background and Goal of Study: Role and prevalence of Enterococcus spp (ES) and P. aeruginosa (PA) isolation in intraoperative specimens in secondary community-acquired peritonitis (C-IIA) still remains unclear, and literature recommendations about its empirical antibiotic coverage is still uncertain. Our goal was to define not covering these pathogens with standard empirical therapy for C-IIA does affect postoperative outcomes.

Materials and Methods: We retrospectively collected data from all inpatients with community-acquired severe peritonitis (defined by intraoperative surgical criteria) from January 2014 to September 2019 in our surgical intensive care unit. Among them, all patients with presence of ES and PA in microbiological intraoperative cultures were divided in two groups according to the adequacy of the initial antimicrobial coverage. General data collected were, sex (mean and standard deviation, T student test), surgical severity (localized diffuse, fecaloid), ASA status (percentage, chi-square test). Our main outcomes were the need for re-intervention or abscess drainage, presence of postoperative acute kidney injury, postoperative vasopressor therapy (NA o PVT) or ventilator support (invasive or non invasive mechanical ventilation) calculated in univariate and a multivariate analysis with logistic regression.

Results and Discussion: We screened 161 patients. A total of 258 microbiological isolates (1.83 per patient) were founded. PA or ES were isolated in 31.6% of cases, for a total of 51 patients. Among these cases, mean age was 55.9 years, 52% were womans, 82.4% were diffuse peritonitis, 23.5% were ASA III-IV, and 80% of patients were not covered with correct ATB. For needs of re-intervention/drainage, no difference were founded for correct ATB coverage except for ASA status, and the OR for correct ATB coverage was 0.94 (CI 0.174.15, p=1.000). About the presence of NA infusion, VS or AKI, again no difference were founded in univariate analysis except for ASA status and age, and the OR for ATB coverage was 1.80 (CI 0.47-7.12, p=0.48).

Conclusion: With the limitations of the study (single-center, retrospective, small sample size), it seems that the non-coverage of PA and ES is not associated with worse postoperative outcomes, and empirical ATB choice should consider patient-related risk factor in agreement with current consensus.
Ultrasound guided CVC placement is recommended with guidance. CVC was successfully removed in a step-wise manner, using x-ray with contrast bleeding. Platelet count, INR and APTT were normalized before removal. The surgery with preparations for an emergency thoracotomy in case of mediastinal Trauma CT-scan showed a misplaced CVC causing pneumomediastinum. CVC Case Report: A 30 year old man was admitted to the ICU after a multi-trauma. is key and multidisciplinary involvement is frequently required for catheter removal extremely rare complication and reports on management are scarce. Early diagnosis Associated extravascular complications such as mediastinal perforation is an rockholt M. misplacement of a Central Venous Catheter

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Pneumomediastinum caused by mediastinal misplacement of a Central Venous Catheter

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Background: Central venous catheters (CVCs) are routinely placed in the ICU. Associated extravascular complications such as mediastinal perforation is an extremely rare complication and reports on management are scarce. Early diagnosis is key and multidisciplinary involvement is frequently required for catheter removal Case Report: A 30 year old man was admitted to the ICU after a multi-trauma. Trauma CT-scan showed a misplaced CVC causing pneumomediastinum. CVC removal was performed in the OR, equipped for interventional radiology and thoracic surgery with preparations for an emergency thoracotomy in case of mediastinal bleeding. Platelet count, INR and APTT were normalized before removal. The CVC was successfully removed in a step-wise manner, using x-ray with contrast guidance.

Conclusion: Mediastinal CVC malpositioning can cause pneumomediastinum and mediastinal hemorrhage – conditions which can lead to shock. If CRBSI occurs, the condition may be further complicated by mediastinitis and sepsis. Vessel perforation risk is increased when excessive force is applied while advancing the guidewire, dilator or catheter. Malpositioning is more common in the subclavian approach with left sided procedures due to vessel angulations. Because of the risk of intrathoracic hemorrhage when extracting the CVC, thoracic surgeons should be involved since surgical management is the preferred method of choice. An endovascular approach can also be considered – which is why we recommend involving interventional radiologists for a multidisciplinary discussion and plan.

References:

Learning points: Ultrasound guided CVC placement is recommended with guidewire visualization in real-time before placing the CVC. This can reduce the risk of mechanical complications. Avoid excessive force when advancing the guidewire. Radiologic assessment of CVC positioning is recommended before usage. If pneumomediastinum is present and CVC malpositioning is confirmed, stop fluid administration and make a thorough plan before catheter removal. Any coagulopathy should be corrected before CVC removal.

References:

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Does US-guided central vein catheterization decrease landmark catheterization competency?

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Materials and Methods: US using becomes a worldwide tendency in anesthesia and ICU. It definitely decreases the rate of completion during CVC. But does it decrease the competency in landmark CVC competency? It is a cross-sectional survey-based study to figure out if doctors who use US-guided CVC feel confident with the landmark CVC approach. A survey has been sent to the doctors with experience of more than 7 years in landmark CVC, familiar with US-guided CVC approach. More than 1 year and perform more than 25 CVC per year. 55 doctors took a survey and 25 met all criteria for inclusion.

Results and Discussion: More than 50 percent prefer to perform US-guided CVC and stop to use the landmark approach. After 2-4 months using US-guided doctors stopped using the landmark approach at all in most of the cases and have never been used it again because they did not feel confident with it anymore. 85 % of 25 doctors teach residents both approaches but hands-on CVC teaching performs only with US using. Also, doctors (73.6%) pointed out that even they have used landmarks they could perform it from the first attempt.

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Rare case of acute disseminated encephalomyelitis due to intrauterine infected device

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Background: Acute disseminated encephalomyelitis (ADEM) is an immune-mediated inflammatory demyelinating central nervous system disorder triggered by an infection or recent vaccination. Usually the neurological dysfunction develops few weeks following an acute infection.

Case Report: We present the case of a 49-year-old female admitted in our intensive care unit with septic shock and multiple organ dysfunction syndrome, sustained by an impressive inflammatory response. The patient presented disseminated bacteremia in the context of a 16 years old contaminated intrauterine device which has been removed 5 days before the admission. Under broad-spectrum antimicrobial therapy and intensive care management the multiple organ dysfunction dissolved including the septic encephalopathy. Due to the persistent neurological dysfunction (quadriplegia and encephalopathy) and negative cerebral CT scan and lumbar puncture, the magnetic resonance imaging (MRI) revealed multiple demyelinating lesions in the profound white matter, basal nuclei and the cerebellar hemispheres, consistent with the diagnosis of acute disseminated encephalomyelitis. The treatment imposed high dose corticosteroids and sustained physical therapy. After 60 days the control cerebral MRI revealed an important reduction in number and size of lesions along with clinical improvement of sensitive and motor functions. At discharge, after 90 days, her neurological exam has significantly improved with remaining left hemiplegia.

Discussion: This case of ADEM is a rare finding in middle-aged adult related to septic shock and bacteremia. Possible mechanism may include either molecular mimicry or direct inflammatory damage to myelinated neurones. Only few cases of ADEM were reported in children post viral infection or vaccination, but paucity data exists regarding clinical course and prognosis in adult patients.

References:

5772

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Materials and Methods: US using becomes a worldwide tendency in anesthesia and ICU. It definitely decreases the rate of completion during CVC. But does it decrease the competency in landmark CVC competency? It is a cross-sectional survey-based study to figure out if doctors that use US-guided CVC feel confident with the landmark CVC approach. Q survey has been sent to the doctors with experience of more than 7 years in landmark CVC, familiar with US-guided CVC approach. More than 1 year and perform more than 25 CVC per year. 55 doctors took a survey and 25 met all criteria for inclusion.

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Multivariate analysis of factors associated with the first-pass success of the blind method for post-pyloric feeding tube placement: a retrospective study

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Background and Goal of study: Enteral nutrition using the post-pyloric enteral feeding tube (EFT) has a low risk of aspiration, reflux, or gastrointestinal intolerance; however, the placement of the tube using the blind method can be difficult. Assist devices such as fluoroscopy or endoscopy are useful but may not be applicable in patients with hemodynamic instability or severe respiratory failure. This study aimed to explore the factors associated with the first-pass success of the blind placement of the post-pyloric EFT in critically ill patients.

Materials and Methods: Characteristics of patients, physical and radiograph findings, laboratory data, and drugs used were obtained retrospectively from the medical records of adult patients who underwent post-pyloric EFT placement at the intensive care unit of Yokohama City University Hospital from January 1, 2012 to December 31, 2018. Variables with a P value <0.2 in the univariate analysis and variables expected to be involved in the first-pass success rate based on the clinical perspective were defined as the independent variables. Thus, variables for the multivariate regression analysis included age, sex, height, fluid balance from baseline, number of sedative agents, body position, use of cardiac assist devices, use of intestinal periastitis promotors, presence/absence of intestinal peristatic movement, postcardiovascular surgery, use of renal replacement therapy, serum albumin level, and position of the greater curvature of the stomach caudal to the level L1-L2 estimated by the abdominal radiography. Primary outcome was defined as the first-pass success for blind placement.

Results: The data obtained from 442 patients were retrospectively analysed. The median (IQR) age and SOFA (sequential organ failure assessment) score were 68 (57-86) years and 10 (7-13), respectively. The success rate of the first attempt at insertion was 150/194 (77.2%). Logistic regression analysis demonstrated that the position of the greater curvature of the stomach with respect to L1-L2 was the only predictor for successful placement (odds ratio for first-pass success: 0.62, 95% CI: 0.40-0.95).

Conclusions: The position of the greater curvature of the stomach caudal to L1-L2 may be associated with lower success rate of the blind placement of the post-pyloric EFT in critically ill patients.

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Establishing sustainable and regular focused critical care echocardiography training in a developing world Intensive Care Unit

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Background: Achieving effective critical care in low and middle-income countries is a global health goal, which includes the provision of effective point of care ultrasound [1]. We sought to establish Zambia’s first focused critical care echocardiography training programme in a 16-bedded ICU at University Teaching Hospital, Lusaka.

Materials and Methods: The syllabus and accreditation pathway were adapted from the UK Intensive Care Society, adjusted for local disease patterns. The echo protocol used parasternal, apical and subcostal windows to assess for ventricular diastolic and systolic function, left ventricular ejection fraction, and transmural obliteration of diameters and related calculations of both IVC and IJV. Zambian doctors received an intensive one-day FICE course (the first in Zambia), followed by mentorship scanning through weekly workshops. Teaching was delivered by visiting fellows who are accredited in echocardiography.

Results: 29 Zambian doctors who work with critically ill patients were enrolled. Feedback indicated high satisfaction with the course. On a 5 point Likert scale (1 = disagree, 5 = agree) participants found skills learnt on the course relevant to clinical practice (median response 5, range 4-5); when asked if echo is a useful adjunct to patient assessment in critical care, median response was 5 (range 4-5). 89% of attendants wanted to formally accredit in echo, but barriers included a lack of formal training programme through didactic course delivery and frequent skill practice has proven to be feasible and well received, with a focus on sustainability and skill maintenance. Ongoing challenges are centered around provision of accreditation and local leadership.


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Is there any correlation between respiratory variation ratios of internal jugular vein and inferior vena cava?

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Background and Goal of Study: Diameter and respiratory variation ratio (RVR) of inferior vena cava (IVC) can be determined by ultrasonography (USG) for assessment of fluid responsiveness in critically ill patients. Internal jugular vein (IJV) RVR has been a new parameter for hemodynamic evaluation.[1] Aim of this study was to investigate the correlation between RVRs of IJV and IVC before and after passive leg raise (PLR) as well as the variability between USG measurements of different physicians.

Materials and Methods: After ethical committee approval, 44 mechanically ventilated, critically ill patients were enrolled into the study. We measured UJ diameter with USG in the short axis. IVC was visualized in the subxiphoid long axis. All measurements were done by three physicians with different experience levels. Measurements of IJV and IVC were done both in supine position and after PLR. Then distensibility (D) and collapsibility (C) indices were calculated. Spearman correlation test was used for correlation analysis.

Results and Discussion: The means SD, APACHE II and SOFA scores were 24±8 and 8±4, respectively. There were strong correlations between the physicians in all measurements (p<0.005). There wasn’t any significant correlation between D and C indices of IJV and IVC in patients in supine position except the moderate correlation in the subgroup of patients with PEEP≤5 cmH2O and strong correlation in patients on diuretics (p<0.05). There were moderate correlations between D and C indices of IJV and IVC after PLR in patients without vasopressors use and strong correlations in patients on vasodilators (p<0.05). There was no correlation in other groups after PLR.

Conclusion: The RVRs of IJV and IVC doesn’t correlate routinely in critically ill patients. The D and C indices of IJV and IVC correlate better when PEEP is low or when there is increased intravascular volume as in patients requiring diuretics or as after PLR and when there is no vasoconstriction as in patients without vasopressors or with vasodilators. There is high correlation between physicians in measurements of diameters and related calculations of both IVC and IUV.


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Validation of pulmonary artery catheter for continuous cardiac output measurement in left ventricular assist devices

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Background and Goal of Study: Left ventricular assist devices (LVADs) are a promising therapeutic aid for patients with advanced cardiac failure. Patients with LVAD need to follow a narrow haemodynamic supervision, being the pulmonary artery catheter (PAC) the reference method in the measurement of cardiac output (CO). In the last few years have emerged new methods for cardiac output monitoring such as the measure of continuous cardiac output (CCO) through PAC. Nevertheless, this method has not been yet validated in patients with LVAD. The aim of this study was to validate the CCO obtained with PAC in the continuous flow LVAD in partial assistance in an experimental porcine model.

Materials and Methods: The study was performed with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for partial left ventricular assistance. Cardiac output measurements were made simultaneously with PAC, continuous
cardiac output and bolus-based CO in four different moments of the study: immediately before entering into the LVAD (basal cardiac output), meanwhile the LVAD, in a hypervolemia status and finally in a model of hypovolemia. Bland-Altman method was used for validation of the CCO. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañón, Madrid, Spain.

Results and Discussion: Comparing CCO with bolus-based CO through the PAC, the Bland-Altman analysis demonstrated a percentage of error of 11% (Bias -0.47) in the basal moment, 22% (Bias -0.43) in the LVAD moment, 3% (Bias -0.02) in the hypervolemia status, and 21% (Bias -0.38) in the hypovolemia model. Conclusion: The results described above show that the CCO measured through PAC could be used as reliable method in determination of cardiac output in continuous flow LVADs in partial assistance in a porcine model.

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A central venous catheter showing arterial waveform but venous blood gas picture: - Where is the tip?

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Background: A 68 year-old patient who previously underwent laparotomy, limited right hemicolecystectomy with ileoecolic anastomosis for small bowel obstruction again presented with obstructive symptoms. Diagnosis was confirmed with gastroin test. The decision was made for exploratory laparotomy. A central venous catheter was inserted in view of pre-existing cardiovascular diseases and a high likelihood of enteral nutrition post-operatively.

Case Study: The CVC was inserted pre-operatively under ultrasound guidance. The left internal jugular vein was chosen after an unsuccessful attempt over the right. Intraoperatively, the CVC pressure transduced via the distal port remained in the 10-18mmHg range. Post-operatively in ICU, a routine chest x-ray showed the CVC tip in close proximity of the left carotid artery. Blood sampled from the distal port revealed a venous picture. However, now when the CVC distal port was transduced, it showed an arterial waveform with a mean pressure of 113. The conundrum of the exact location of the cvc tip had many implications. 1. If arterial, the use of this cvc must cease immediately. Depending on its location, we must modify the strategy and the venue to remove this CVC. Sufficient vascular surgery support must be available on-site if the tip is intra-arterial. 2. Interventional radiologist suggested accessing the left brachiocephalic vein via the groin, inserting a wire into the cvc and withdrawing the cvc gradually, while checking for extravasation under angiography. If bleeding is evident, to achieve control with balloon tamponade. 3. Urgent CT scan showed the CVC tip was breaching venous wall, but residing within fat, abutting the aortic arch. This explained why the blood gas showed venous results, but the transducer mimics an arterial waveform. CT angiogram showed the tip lying beyond the left brachiocephalic vein with no extravasation. Slight luminal irregularity consistent with perforation. The CVC was removed unequivocally, with a delayed venogram demonstrating lack of extravasation.

Discussion: The interesting amalgam of a venous blood gas with an arterial waveform presented a unique challenge to work-up the exact position of the CVC. It involved the efforts of a multi-disciplinary team to design a strategy to delineate the anatomy and placement and its subsequent removal, with a good back-up plan should an inadvertent arterial puncture has occurred.

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Level of agreement between cardiac output measurements using femoral or jugular catheter in a porcine model of hemorrhagic shock.

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Background and Goal of Study: Cardiac output (CO) monitoring is an increasingly useful tool for manage surgical patients at high risk of hemorrhage or hemodynamic instability. Transpulmonary thermodilution (TPTD) is a rapid, safe and easy-to-install method. Typically, superior vena cava (SVC) access has been used to the thermodilution, however under certain circumstances, SVC access might not be feasible and femoral vein has to be used. Our aim was to compare the influence of the venous catheter site thermodilution site on TPTD in a porcine model of hemorrhagic shock.

Materials and Methods: Nine minipigs were anesthetized, instrumentalized and mechanically ventilated. A VolumeView™ femoral arterial catheter was inserted. All animals were instrumented with identical Jugular (J) and femoral (F) catheter used for cold indicator injections and for central venous (CV) pressure monitoring. TPTD measurements were made through the catheter using a random crossover design at baseline and after inducing a controlled hemorrhage (CH) to decrease mean arterial pressure around 45 mmHg. We compared TPTD derived parameters via J access with F access at baseline (B) and during CH. Each TPTD measurement represents the mean of three consecutive TPTD indicator injections of 15 ml of 0.9% saline made with a mean time interval of time interval of 5 min. Statistics: Bland-Altman test for repeated measurements.

Results and Discussion: A total of 27 measurements were available for comparisons. There was no significant difference in cardiac index (CI) under both conditions. Femoral global end-diastolic volume index (GEDVI) was significantly higher in both conditions. (Δ 17% at B & Δ 29% at CH), as opposed to global ejection fraction (GEF) (Δ -14% at B & Δ -16% at CH). The Bland-Altman tests (bias, confidence interval and % error) were IC-B (-0.046, -0.40 to 0.31 ml.min.m², 12.58%), IC-CH (-0.07, -0.36 to 0.22 ml.min.m², 14.9%) GEDVI-B (-71.04, -181.0 to 38.8 ml.m², 26.64%), GEDVI-CH (-89.3, -156.6 to -22.0 ml.m², 22%) GEF-B (4.08, -2.9 to 11.0, 24.3%) and GEF-CH (3.71, 0.01 to 7.41, 18.9%). Conclusion: Femoral access for indicator injection results in altered values presented by the VolumeView™ system, particularly for GEDVI and during controlled hemorrhage. However, in this preliminary study, the percentage of error was below the clinically acceptable threshold value of 30%.
Electrolyte-based calculation of fluid shifts after a sodium chloride challenge in uncontrolled diabetes

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Background and Goal of Study: Early treatment of uncontrolled diabetes involves large shifts of body fluid volumes that are difficult to monitor, but entail a risk of hemodynamic instability. There is need for a simple bedside test that can be used to guide the fluid therapy.

Materials and Methods: The plasma and urinary concentrations of sodium and chloride were measured 30 min after a 30-min infusion of 0.9% saline on two consecutive days in 14 patients with uncontrolled diabetes (mean age 50 years). Using a mass balance equation, the size of the extracellular fluid space (ECF) and translocation of fluid to the intracellular fluid (ICF) were estimated. Insulin was not given during the first experiment.

Results and Discussion: The infused fluid volume distributed almost equally between urine, ECF, and ICF (mean 35%, 31%, and 33%, respectively) with considerable variation between patients and days. A decrease of the ECF volume occurred when more than half of the administered saline had been excreted 30 min after the infusion ended. Conversely, a large urinary excretion implied a greater expansion of the ICF volume. The decrease in plasma glucose during the first 3 hours was explained solely by osmotic diuresis. Very low ECF volumes before the infusions (< 9 L) was associated with biochemical evidence of the hyperosmolar syndrome, while patients with acidosis had normal ECF volumes (approximately 14 L).

Conclusion: One third of a saline infusion was allocated to the ICF even when insulin was not given. Only the patients with non-ketotic diabetes were depleted of ECF volume.

References:
3. Zdolsek J, Lisander B, Hahn RG (2005) Measuring the size of the extracellular fluid space (ECF) and translocation of fluid to the intracellular fluid (ICF) were estimated. Insulin was not given during the first experiment. ECF volume.

Acknowledgements: The authors are grateful to the staff of the ICU at the Vrinnevi Hospital in Norrköping, Sweden, for assistance during the data collection.

Total hepatectomy and liver transplantation as a two-stage procedure: our experience

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Background: Total hepatectomy and portocaval shunt, with an anhepatic phase, may be beneficial compared to maintaining a necrotic liver on-site. This "two-stage hepatectomy" may be a bridge therapy until the patient is transplanted again. We report our experience with total hepatectomy and portocaval shunt followed by a liver transplantation.

Case Report: Case 1: 68-year-old man who received a liver transplant. He developed primary graft dysfunction manifested by a great fragility of the liver with uncontrollable bleeding so was decided to perform the organ explant and a portocaval shunt. The patient was 15 hours in an anhepatic phase during which he developed severe hemodynamic instability and an ARDS. After the retransplantation the patient continued with a bad clinical situation and not improvement of the liver function. A thrombosis of the hepatic artery was observed. After saving this complication, the patient improved his situation, but acute renal failure developed and required HDFVVC sessions. The patient was released from the ICU after 46 days.

Case 2: 54-year-old woman who received a liver transplant. She developed an immediate graft dysfunction so she was reoperated. An ectatic liver graft was observed due to an obstruction of the venous anastomosis that could not be solved so an hepatectomy and portocava shunt was performed. The patient remained 9 hours in an anhepatic phase. During that time, she developed minimum hemodynamic instability and a moderate ARDS. After the retransplant, the patient improved in all aspects except the renal function that required renal replacement. The patient was released from the ICU after 21 days.

Discussion: Patients with fulminant liver failure or primary graft dysfunction can develop what is known as "toxic liver syndrome". Its mortality is close to 100%. The main objective of total hepatectomy is the stabilization of the hemodynamic and metabolic situation. If total hepatectomy is considered, the decision must be made before the patient has already developed an irreversible multi-organ dysfunction.

References:

Diaphragmatic paresis after lung transplantation diagnosed by ultrasound

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Background and Goal of Study: Diaphragmatic paresis after lung transplantation is an often underdiagnosed complication, its incidence varies between 3-30%. It is associated with longer intensive care unit stay and significant adverse outcomes (tracheobronchitis, pneumonia, tracheostomy, ....Ultrasound can be used to determine diaphragm excursion, which may help to identify patients with diaphragm dysfunction.

Materials and Methods: A 3.5-5 MHz probe is placed between the midclavicular and anterior axillary lines, in the subcostal area; B-mode is first used to find the best approach to see the cyclic movement of the diaphragm dome and after we use M-mode to measure the diaphragm excursion (E) and predict successful extubation or not.

Results and Discussion: The normal excursion is over 25 mm; it is defined diaphragmatic dysfunction by an excursion value between 11-24 mm for either hemidiaphragm and paralysis when E<11 mm; these last patients have longer weaning time and higher frequency of reintubation. We present three figures: normal right hemidiaphragm movement (figure 1) and images (figure 2) from two different patients after lung transplantation with right paresis (up side) and right paralysis (down side).

Conclusion: Ultrasound evaluation of the diaphragm movement is simple, non-invasive and readily available at the bedside. There are variables like diaphragm thickness that we do not use it because we think it has variability and not reliable.

References:
Gastrointestinal complications in lung transplantation

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Background and Goal of Study: Gastrointestinal complications are common after lung transplantation and are associated with an increased risk of mortality and morbidity. However, there are few studies that focus on these types of complications. The aim of the study is to describe and analyze gastrointestinal complications that occur after lung transplantation in a third level hospital.

Material and Methods: A prospective observational study was designed that included all lung transplant patients between October 2008 and October 2018. The incidence of gastrointestinal complications, their treatment and mortality were collected. Severe digestive or biliary tract complication was identified as one of the most important factors for survival or the need for invasive treatment. This does not include infectious causes.

Results and discussion: A total of 251 patients underwent lung transplantation during an observation period of 10 years. There were 16 (6.4%) gastrointestinal complications. The median age was 54 years (range 15-70). Serious complications included: intestinal perforation, acute/hemorrhagic cholecystitis, hemorrhage, intestinal ileus, intestinal pneumatosis. Other complications were: intestinal ileus, diarrhea, clostridium, hyperbilirubinemia, cholestasis + diarrhea, ileus + diarrhea.

Conclusions: The development of gastrointestinal complications is frequent after lung transplantation. Early recognition is necessary to avoid delays in treatment and with it, its high mortality, finding some prognostic predictor for the development of this morbidity: the indication of idiopathic pulmonary fibrosis transplantation and hyperventilation and having required continuous renal replacement therapy in the postoperative period.

In vivo kinetics of free haemoglobin, bilirubin and albumin during hemadsorption therapy with CytoSorb – case presentation

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Background: In ICU settings, hyperbilirubinemia is an independent factor of patient morbidity and mortality. Extracorporeal therapies can lead to hemolytic erythrocyte disruption, release of free haemoglobin and hyperbilirubinemia. CytoSorb was recently approved for reduction of elevated bilirubin levels. Relationship between kinetics of bilirubin and free haemoglobin removal during CytoSorb remains elusive.

Case Report: 52-year-old patient was admitted to tertiary hospital after initiation of V-V ECMO due to ARDS. Patient’s circulation was supported with infusion of norepinephrine and renal failure was treated with continuous veno-venous hemodialysis. Despite management of anticoagulation with daily doses of 0.4 ml heparin, anoxia or ischemic stroke, initial SBP below 150mmHg, and responsive pupils at admission were associated with late BD.

Discussion: In brain-injured patients, the median delay before BD was 2 days but the 75th percentile reached 4 days. Male sex, ischemic stroke or anoxia, initial SBP below 150mmHg and responsive pupils at admission were associated with late BD.

In these patients, intensive care should be continued, as so not to miss potential organ donors.
Hypernatremia and increased urinary output in brain-dead cardiac donors and recipient survival after heart transplantation

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Background and Goal of Study: Management of cardiac donors has an important role in the overall outcome. Several endocrinologic changes might occur during the management period. Posterior pituitary gland dysfunction can lead to central diabetes insipidus, which characterized by impaired hemodynamics. Hypernatremia and increased urinary output (IUO) are representing two of the main symptoms. We aimed to evaluate the relationship between the occurrence of hypernatremia and increased urinary output together and mortality after heart transplantation (HTX).

Materials and Methods: We conducted a retrospective, observational study among cardiac donors and recipients for HTX between January 2012 and September 2018 at the Heart and Vascular Centre, Semmelweis University. Basic demographic variables were collected for donors and recipients. Hypernatremia (>145 mmol/L), IUO (>2.5 ml/kg/h), vasopressin and desmopressin treatment were retrieved from donors. The United Network for Organ Sharing (UNOS) score was calculated for recipients. The median age of donors was 41 years (IQR25-75: 32.-49) for recipients it was 54 years (IQR25-75: 46.-63) with an increased mortality at different time points after HTX. Hypernatremia and IUO were observed in 30% of donors and recipients. Multivariable Cox regression analyses were applied.

Results and Discussion: We included 297 HTX in our final analyses. The median age of donors was 41 years (IQR25-75: 32.-49) for recipients it was 54 years (IQR25-75: 46.-63). Total ischemic time was 188 minutes (IQR25-75: 161.-240), gender mismatch was given in 47 cases (15.6%), 104 donors (35.0%) had hypernatremia and IUO, 202 donors (68.0%) received vasopressin or desmopressin treatment. Thirty-day, 1-year, and 2-year mortality were 10.8%, 18.9%, and 20.5%, respectively. Multivariable Cox regression analyses revealed no significant difference between patients with or without hypernatremia and IUO in 30-day mortality (OR: 1.17; 95% CI: 0.56-2.42; p=0.677), 1-year mortality (OR: 1.30; 95% CI: 0.76-2.23; p=0.344) and 2-year mortality (OR: 1.21; 95% CI: 0.72-2.04; p=0.466). We adjusted our multivariate models for the UNOS summary score and for vasopressin and desmopressin treatment of the donors.

Conclusion: Hypernatremia and IUO of cardiac donors showed no relationship with increased mortality at different time points after HTX. Hypernatremia and IUO together might be not defining the donors with posterior pituitary dysfunction precisely besides current treatment regimes.

Liver transplantation in case of Budd-Chiari syndrome. Case report

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Background: Budd-Chiari Syndrome was first described in 1845 by George Budd, who described the classic triad of symptoms: abdominal pain, hepatomegaly, and ascites. Budd-Chiari syndrome has a prevalence of 1-2 per million and is the most frequent cause of chronic liver failure in young adults. The treatment of Budd-Chiari Syndrome is dependent on the syndrome's inception. The treatment of Budd-Chiari Syndrome is independent of the syndrome's inception. The treatment of aHUS due to thrombolysis is time-consuming in the past years; initially discontinuing thrombolysis, then plasmapheresis, and most recently treatment with eculizumab. Learning points: aHUS should be considered in patients who are on tacrolimus and present with renal failure and anemia with an unknown cause. We consider vital to continue tacrolimus as the best immunosuppressant option for LT.

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Fulminant hepatic failure secondary to bariatric surgery. A case report

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Background: It has become apparent that some patients who undergo bariatric surgery, over time they have led to fullmam hepatic failure(FHF) that have resulted in the need for an liver transplant and the reversal of the malabsorptive component.

Case Report: 44 year-old patient who presented with jaundice and hepatitis, which had developed in the last week. As the only relevant prior procedure, I would highlight the gastro-intestinal bypass performed in June of 2018, which. Once admitted to the emergency room, there was an increase in liver enzymes, accompanied by changes in coagulation tests. During their admission, they remained stable until they began to show signs of worsening liver function and hepatic encephalopathy compatible with a FHF for which they were admitted to the ICU and put on the transplant list. She underwent a liver transplant, accompanied by the reconstruction of their previous gastric bypass. The surgery took place without any major complications. Due to a good evaluation, the patient was discharged. In subsequent revisions the patient notes an improvement of their overall state to this day.

Discussion: It is seen how the malabsorptive component of these techniques can provoke a deterioration in liver function by mechanisms that are still relatively unknown. At the moment, there are several different theories postulated on the mechanism of liver damage. It stresses bacterial overgrowth, that cause damage to the intestinal mucosa in the excluded zone, favoring the bacterial translocation. It has been observed that the protein deficiency could increase the lipid deposits in the liver, as well as produce an increased release of inflammatory mediators. Some authors consider the simultaneous reversal of the malabsorptive component necessary in patients who undergo a liver transplant. We do not know if the patient has a non-diagnosed steatohepatitis that was aggravated by the bariatric procedure or if that procedure through different mediators was the primary cause of this issue. There is no doubt that there is a relation between bariatric procedures and the liver damage associated.

Learning points: A better comprehension of the mechanisms of liver function disturbance, secondary to bariatric surgery, is needed in order to be able to introduce pertinent preventative measure.

References:

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Potential benefits of renal replacement therapy in combination with haemoadsorption in patients with acute pancreatitis

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Background and Goal of Study: Severe acute pancreatitis (SAP) represents a life-threatening disease associated with multiple system organ failure and increased mortality if intensive care measures are not applied promptly. The aim of this study was to assess the clinical and paraclinical effects of heamoadsorption in patients with SAP.

Materials and Methods: Seventeen consecutive patients with SAP admitted to the intensive care unit (ICU) of Fundeni Clinical Institute were included in the present study. Continuous venovenous hemofiltration in combination with haemoadsorption was applied as an adjunctive therapy in 3 consecutive sessions after ICU admission. Number of organ dysfunctions and SIRS criteria were recorded at ICU admission. The following data were recorded before and after the 3 haemoadsorption therapies: Glasgow coma scale, PaO2/FiO2, creatinine, 24-hours urine output, bilirubin, leucocyte and platelet count, heart rate, mean arterial pressure and vasopressor support, C-reactive protein and procalcitonine. SOFA score was calculated before and after the therapy. ICU length of stay and 28-days outcome was noted.

Results and Discussion: The mean age in the study group was 54±14 years. At admission the median number of SIRS criteria was 3 [1,4] with a median number of 3 [1,4] organ dysfunctions. The use of haemoadsorption was associated with a significant increase in mean arterial pressure (from 75±8 mmHg to 80±7 mmHtg, p=0.03), a decrease in creatinine levels (from 2.23±2.1 mg/dL to 1.22±0.6 mg/dL, p=0.01), leucocyte count (15284±6971/µL to 9852±3365/µL, p=0.04) and procalcitonine (from 9.7±3.5 ng/mL to 2.1±2.7 ng/mL, p=0.05). We also noted a non-significant decrease in SOFA score from 5.6±3.3 to 4.0±3.3 (p=0.79). 28-days survival was 88.8% (n=10). Factors associated with a worse outcome were: initial SOFA score (p=0.05), low pH (p=0.05), leucocyte count (p=0.02), renal dysfunction (p=0.03), low Glasgow coma scale (p=0.02) and high C-reactive protein (p=0.05).

Conclusion: Hemoadsorption is associated with improved hemodynamics and decrease in inflammatory markers in patients with SAP. These results may offer a new therapeutic option in modulating inflammation in patients with SAP and should be further assessed in a randomized control trial.

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Mirror writing in the emergency room: an unusual case of epilepsy

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Background: Mirror writing is the script which runs in the opposite direction to normal, with individual letters also reversed, nearly always undertaken with the left hand. It can be seen in healthy individuals or associated with various focal lesions that most commonly involve the left hemisphere. However, it has not yet been described in people with epilepsy.

Case Report: 42-year-old right-handed female patient, with non-lesional left frontal epilepsy diagnosed at age 16, currently on topiramate 200mg bid, lacosamide 200mg bid and levetiracetam 1500mg bid. She had multiple previous hospitalizations due to refractory disease requiring coma induction and presented to our emergency with another episode of focal seizures (right upper limb) with secondary generalization. Infectious and metabolic causes of decompensation were excluded. Despite the administration of diazepam 40mg IV and levetiracetam 1500mg IV, the seizures continued. Between seizures, the patient presented with an episode of mirror writing (Fig 1) with left hand. Anesthetic induction and deep sedation were required to manage refractory convulsive status epilepticus, monitored with bispectral index. In the ICU, under deep sedation with propofol perfusion, electroencephalography study showed no paroxysmal activity. Relatives reported mirror writing after previous seizures. She has no memory of that and is unable to write like that out of seizures.

Discussion: Unaware mirror writing was present in this right-handed patient with refractory epilepsy affecting the right upper limb. Stroke patients with right-sided paresis can rarely present with spontaneous and mirror writing during early attempts of writing with the left hand. We hypothesize that our patient, while feeling impaired to write with her right hand during seizures, attempts to do so with her left hand, and mirror writing occurs.

References:
1. Doi: 10.1136/jnnp.2006.094870.

Learning points: To the best of our knowledge, this is the first case of mirror writing reported in a patient with epilepsy. Physicians should be aware of this condition, which may be underreported.
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Varicella-zoster encephalitis or acyclovir neurotoxicity: that is the question

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Background: Clinically differentiating varicella-zoster virus (VZV) encephalopathy from acyclovir neurotoxicity is very challenging. Zoster encephalopathy should improve with acyclovir, while aciclovir toxicity will get worse if the medication is continued.

Case Report: A 56-year-old woman admitted to the intensive care unit after left nephrectomy because a renal abscess and with septic shock; she had the von Hippel-Lindau disease and right nephrectomy before, so she was anephric and continuous venovenous hemodiafiltration was started. One week later, when clinical and analytical situation was improving, she was diagnosed an ophthalmic herpes zoster and placed on intravenous acyclovir 300 mg every 8 hours. The next day she reported confusion, dysphasia and visual hallucinations and finally she was found unconscious with Glasgow coma scale 9. Computed tomography (CT) and magnetic resonance imaging (MRI) of the head were normal. Urgent lumbar puncture was managed also. We continued aciclovir with the diagnosis of VZ encephalopathy. After one week of treatment, neurological situation did not improve so we decided to discontinue aciclovir and the recovery of consciousness and normal neurological situation were in 36 hours.

Discussion: It has been proved possible dissemination of VZV from a root to the central nervous system. Treatment of VZV encephalitis is with intravenous acyclovir neurotoxicity is a not common side effect of acyclovir. This is seen often in patients with renal impairment. Some authors have described visual hallucinations and dysphasia as unique features of acyclovir toxicity. As opposed to zoster encephalitis, aciclovir toxicity is associated with normal cerebral spine fluid findings and normal CT scan and MRI findings. Withdrawal of aciclovir often leads to resolution of neurological symptoms in 48–72 h. In our patient, we finally decided to discontinue aciclovir because she did not improve clinically with aciclovir; the clinical signs were suggestive of toxicity (visual hallucinations, confusion and subsequent coma) and her images studies were normal.

Learning points: Differentiating acyclovir neurotoxicity from zoster encephalitis can be challenging and management of the two conditions is diametrically opposite. Acyclovir neurotoxicity is seen more often in conjunction with renal dysfunction and with visual hallucinations and dysphasia.

References:
2. Learning points: NMS is a rare but potentially lethal entity related to the use of antipsychotics. People with predisposing factors such as chronic substance abuse are at higher risk of presenting NMS. Early diagnosis and treatment are both essential to improve its prognosis.

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Use of IgM-enriched immunoglobulin preparation as adjuvant therapy in E. Coli meningoecephalitis

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Background: Gram-negative bacteria are an uncommon etiology of spontaneous community-acquired adult meninigitis and meningoecephalitis. We describe the case of a 48-year-old woman with meningoecephalitis, with a marked alteration of consciousness on admission, and septic shock secondary to pyelonephritis caused by Escherichia Coli, treated with targeted antimicrobial therapy and immunoglobulin IgM-enriched (Penatglobin) preparation as adjuvant therapy.

Case Report: A 48-year-old woman (weighing 60 kg) was transferred from the Emergency Room (ER) to the Intensive Care Unit (ICU) of University of Campania “L. Vanvitelli” for suspected pyelonephritis with systemic impairment, fever, (sepsis) and altered mental state (coma). The hemodynamic parameters monitored with Vigiléo® showed: Cardiac Output (CO) 2.1 liters/minute (normal range 4.0-8.0 L/minute). Systemic Vascular Resistance (SVR) 350 dynes second/cm5 (normal range 800 -1200 dynes second/cm5) (MAP 53 mmHg). Early fluid resuscitation began with a bolus of 30 ml/kg of crystalloid into three hour, and Norepinephrine infusion began at the rate of 0.2 mcg/kg/min. Empirical antibiotic therapy with Ceftazoline/Tazobactam (1g / 0.5g every 8 hours), Meropenem (1g every 8 hours) and Aciclovir (250mg) was administered. Dexamethasone was added as adjuvant therapy (10 mg qid for 4 days). Procalcitonin (PCT) 61 ng/ml (normal range <0.5), C-Reactive Protein (CRP) 17.5 mg/dl (normal range <0.5). Furthermore, blood PCR analysis resulted positive for E. Coli. It was decided to introduce an IgM-enriched intravenous immunoglobulin (IVIG) preparation (Penatglobin®) at the dose of 250 ml/kg per day for 5 days. After 24 hours of therapy, the patient had an improvement in blood chemistry and hemodynamic parameters. 96 hours after Penatglobin® introduction, there was an evident improvement in the patient’s clinical condition. GCS scored raised to 10 (E3, V1, T6). The patient was also able to be extubated, breathing spontaneously; blood chemistry values were: CPR 5.18 mg/dl, PCT 1.2 ng/ml. Hemodynamic values were: CO 5.4 l/min, SVR 1200 dynes second/cm5, MAP 90 mmHg.

Discussion: Despite the conflicting data on the use of immunoglobulins in septic shock, we obtained an improvement of her clinical conditions.

References:

5706

Role of dexmedetomidine in the treatment of delirium in critically ill patients: A systematic review and meta-analysis

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Background and Goal of Study: Dexmedetomidine has been found to prevent delirium in critically ill patients; however, whether it could treat delirium in these patients is uncertain. Therefore, this meta-analysis aimed to assure the efficacy and safety of dexmedetomidine in adult critically ill patients with delirium.

Materials and Methods: Randomized controlled trials and observational studies based on the use of dexmedetomidine in adult critically ill patients with delirium were retrieved from PubMed, Embase, Cochrane Library, Web of Science, the Cochrane Library, and ClinicalTrials.gov until January 27, 2019.

Results and Discussion: A total of 861 patients in 13 studies met the selection criteria. The results revealed that dexmedetomidine was associated with a lower point-prevalence of delirium after treatment (odds ratio (OR), 0.31; 95% confidence interval (CI), 0.15, 0.65; P = 0.002), but a slightly higher incidence of bradycardia (OR, 2.91; 95% CI, 0.93, 9.04; P = 0.07) compared with placebo and other drugs.
No statistical differences were found in the incidence of hypotension or arrhythmia; the length of intubation, intensive care unit (ICU) or in-hospital mortality; or the length of ICU or hospital stay between dexmedetomidine and placebo and other drug regimens.

Conclusion: Dexmedetomidine might promote the resolution of delirium but increase bradycardia in critically ill patients with delirium. This trial was registered in PROSPERO (CRD42018107797).

Acknowledgements: This study was supported by the National Science Foundation of China (Grant Nos. 81771958 and 81960357), the Key Special Project "Active Health and Scientific and Technological Response to Ageing" of the National Key R&D Program (2018YFC2001904), the Special Fund of Wu Jieping Medical Foundation for Clinical Scientific Research (320.67 50.18001); and the Doctoral Start-Up Fund of the Affiliated Hospital of Guizhou Medical University (I-2017-06).

Predictive factors of disability at 6 months after spontaneous intracerebral hemorrhage in icu patients

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Background and Goal of Study: Spontaneous intra cerebral hemorrhage (SICH) has a very high mortality and morbidity rate. The aim of this study was to evaluate functional outcome at 6 month after admission in ICU and to identify predictive factors of severe disability.

Materials and Methods: We performed an observational prospective monocentric study, in a surgical ICU. Every patient admitted for SICH was included from November 2016 to November 2018. Clinical and radiological data were obtained from electronic medical records. Functional outcome was estimated using the modified Rankin Scale (mRS) at 6 months after ICU. Results were expressed in median and interquartile range.

Results and Discussion: Eighty six patients were included (mean age 66 years, 35.5% males). Medical history of hypertension was found in 62% of this population. Coagulation abnormalities were detected in 52% Glasgow Coma Scale (GCS) before endotracheal intubation was 6 [4-8]. Signs of intracranial hypertension on admission were recorded in 60.5% patients. Hematoma volume was 60 [25-83] ml. Intracerebral hemorrhage Grading Scale (ICH-GS) was 11 [10-12]. Most patients (51.2%) underwent urgent neurosurgical procedure. Global mortality rate was 62.8% of which more than half patients died within the first 48 hours from admission. Survival rate at 6 months was 32.6% (28 patients): mRS at 6 months was 4 [3-5], with mRS≤3 in 44.4% and mRS> 3 in 55.6% of the survivors. The only independent predictive factor of severe disability was the occurrence of sepsis during ICU hospitalization (p=0.012).

Conclusion: SICH in ICU patients is associated with very high mortality rate. Survivors have a high risk of severe disability at 6 months after admission. Sepsis seems to worsen functional outcome. In this setting, sepsis should be aggressively treated to limit secondary brain inflammation.

The seasonal effects on delirium in critically ill surgical patients: a retrospective analysis

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Background and Goal of Study: Postoperative delirium is common in hospitalized patients, with a reported prevalence of 11% up to 80% in critically ill patients. Recovery is slow especially in cognitively impaired patients, and that cognitive performance may have a more dysfunctional pattern during winter. We, therefore, intend to test whether the seasonal variation is associated with the occurrence of delirium and length of stay (LOS) in critically ill non-cardiac surgical populations.

Materials and Methods: We conducted a retrospective analysis of adult patients recovering from non-cardiac surgery at Cleveland Clinic, between March 2013 and March 2018 who remained at least 48 hours in the surgical intensive care unit. The delirium was evaluated daily using CAM-ICU. The incidence is summarized during ICU hospitalization (p=0.012).

Conclusions: One year of observation is a sufficient period to estimate delirium incidence and prevalence. This study suggests that hospital location may affect the delirium incidence.

No statistical differences were found in the incidence of hypotension or arrhythmia; the length of intubation, intensive care unit (ICU) or in-hospital mortality; or the length of ICU or hospital stay between dexmedetomidine and placebo and other drug regimens.

Conclusion: Dexmedetomidine might promote the resolution of delirium but increase bradycardia in critically ill patients with delirium. This trial was registered in PROSPERO (CRD42018107797).

Acknowledgements: This study was supported by the National Science Foundation of China (Grant Nos. 81771958 and 81960357), the Key Special Project "Active Health and Scientific and Technological Response to Ageing" of the National Key R&D Program (2018YFC2001904), the Special Fund of Wu Jieping Medical Foundation for Clinical Scientific Research (320.67 50.18001); and the Doctoral Start-Up Fund of the Affiliated Hospital of Guizhou Medical University (I-2017-06).

Prolonged pharmacoresistant dystonia of a child successfully solved by deep brain stimulation

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Background: Dystonias are referred to as involuntary permanent contractions of muscles or muscle groups that bring limbs or other body parts to twisting tonic contractions of varying intensity and abnormal and involuntary positions. This condition is more frequent in children and the etiology is heterogenous. Currently there is no causative therapy of dystonia and the pharmacotherapy is based on benzodiazepines, neuroleptics and antiepileptics, however with only minimal effect on disease presentation. This case report presents a child patient suffering from a secondary form of dystonia in which all conservative forms of treatment have been exhausted without effect.

Case Report: A 12-year-old patient, successfully treated long-term with baclofen and diazepam for dystonias manifestations of extrapyramidal form of cerebral palsy, was admitted to PICU for acutely worsening generalized dystonia due to an ongoing gastrointestinal infection. Only transient control of dystonia manifestation was achieved with high dose sedatives and antiepileptics (midazolam 5ug/kg/min + valproate 2mg/kg/h), with serious side effects of treatment. Deep brain stimulation (DBS) was indicated after failure to wean the pharmacotherapy to acceptable level (15th day after admission). The condition was further complicated by hospital-acquired pneumonia, with the need for intubation and mechanical ventilation (20th day). For presumed prolonged ICU stay, surgical tracheostomy was performed (33rd day) and after circumspect consideration involving the uncertain outcome patient underwent deep brain stimulation electrode implantation (39th day). Neurosurgical procedure including postoperative course proceeded without complications. The stimulation was started on the 5th postoperative day and the stimulation energy was progressively increasing through one month with the positive effect on dystonia symptoms. Gradually, sedative medication was completely discontinued. Patient was dismissed to home care on 76th day with only minor local dystonia symptoms.

Discussion: Deep brain stimulation can be one of the possible treatments of patients with status dystonicus.

Learning points: Status dystonicus is most severe and life-threatening form of dystonia presentation. The treatment options are limited to sedatives, neuroleptics and antiepileptics. DBS can be considered as one of the possible "off-label" treatment option in patients with pharmaco-resistant status dystonicus.
Development of focal neurological deficit associated with the intake of ergotics in a patient with vasospasm criteria. A case report

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Background: Ergotics are a group of drugs used, among other indications, for the treatment of acute migraine headache. This group has a cerebral arterial vasoconstrictor effect. It is important to know the toxicity of these drugs, although it is not usual. An overdose or pharmacological interaction can cause hypertension, tachycardia, and cerebral vasospasm. Vasospasm is the most frequent complication of aneurysmal subarachnoid hemorrhage (SAH). It is important to identify risk factors or possible precipitants related to vasospasm in patients with SAH, to establish preventive measures or start treatment as early as possible.

Case Report: 48-year-old woman who has grade IV subarachnoid hemorrhage of the Fisher scale. A diagnostic and therapeutic arteriography is performed on admission, with endovascular embolization of a right middle cerebral artery aneurysm (MCA). During her stay in the ward, the patient keeps suffering from headaches, for which a transcranial Doppler is requested, where there is an objective increase in velocities in right MCA but without figures compatible with vasospasm. A wait-and-see approach is taken, the evolution being favorable. On the 4th day post-embolization, the headache persists and the patient takes her usual medication for migraine (Ergotic), and the pain abates. Hours later, she starts suffering form headaches again, with associated neurological focus in the upper left limb with loss of strength and paraesthesia, which diminishes naturally. A new transcranial Doppler is performed and a pattern compatible with vasospasm is observed, so she is transferred to the ICU. After drug withdrawal and support with triple H therapy, neurological focus disappeared.

Discussion: There is evidence that Ergotics are associated with an increased risk of ischemic complications, including cerebral arterial area. Risk factors and precipitants must be taken into account to prevent and treat them early. We must treat the headache but without using ergotics in patients who are in risk of vasospasm after suffering an SAH, even if it is the usual treatment used by the patient.

References:
2. Learning points: Ergotamine-type drugs and derivatives should be avoided in patients with SAH, since they may precipitate cerebral vasospastic complications.

Management of neuropathic pain in ICU-related polyneuropathy – a case report

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Background: Intensive care unit-acquired weakness (ICU-AW) is a common impairment in critically ill patients. Critical illness polyneuropathy (CIP) and myopathy are strong contributors to this condition.1 We present a case of neuropathic pain (NP) in a patient admitted in the ICU with sepsis and multiorgan failure (MOF).

Case Report: A 47-years-old man, ASA V. was admitted in the ICU with tachycardia, thrombosis or cerebral vascular vasospasm. Vasospasm is the most frequent complication of aneurysmal subarachnoid hemorrhage (SAH). It is important to identify risk factors or possible precipitants related to vasospasm in patients with SAH, to establish preventive measures or start treatment as early as possible.

Discussion: We exhibit the concomitance of these entities with opposite goals regarding hemostatic state.
Factors XIII activity in patients requiring surgical re-exploration for bleeding after elective cardiac surgery – a prospective case control study

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Background and Goal of Study: Surgical re-exploration due to postoperative bleeding is associated with increased morbidity and mortality. The aim of our study was to assess a potential association between the level of postoperative FXIII activity and need for re-exploration due to bleeding in patients undergoing cardiothoracic surgery.

Materials and Methods: In our prospective single center observational cohort study, we enrolled patients who underwent elective cardiothoracic surgery. Patients who required re-exploration (RE) group were matched to patients from the study population (non-RE group).

Results and Discussion: The study included 678 patients, of whom 32 required surgical re-exploration due to bleeding within the first 24h. Between patients of the RE and non-RE group, a significantly reduced FXIII activity was observed postoperatively (59.0 vs 71.1; p=0.014). Multivariable analysis revealed reduced FXIII activity (p = 0.048) as a parameter independently associated with surgical re-exploration. Further, reduced FXIII activity (p=0.037) and surgical re-exploration (p=0.01) were significantly associated with increased 30 day mortality. In multivariable analysis re-exploration was independently associated with increased risk of 30 day mortality (p = 0.003, HR 10.75).

Conclusion: Reduced postoperative FXIII activity may be associated with the need for surgical re-exploration. Postoperative assessment of FXIII activity should therefore be considered in patients undergoing elective cardiothoracic surgery.

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Prognostic role of neutrophil to lymphocyte ratio and mean platelet volume/platelet ratio for 6 month mortality in critically ill patients

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Background and Goal of Study: The neutrophil to lymphocyte ratio (NLR) and mean platelet volume (MPV) have been reported to be associated with poor prognosis in various cohorts. We hypothesized that NLR and MPV could be used as predictive marker for mortality in critically ill patients.

Materials and Methods: We retrospectively reviewed 1154 patients admitted to ICU between January 2017 and December 2017. Patients were divided into two groups according to 6 month mortality. The NLR and MPV/platelet ratio on each day of ICU admission were compared. Patients were classified in to tertiles according to NLR and MPV/platelet ratio. The incidence of 6 month mortality was compared, and multivariate Cox proportional hazard model was performed to evaluate the risk factors for 6 month mortality.

Results and Discussion: NLR and MPV/platelet ratio were greater in the non-survivor group than the survivor group (16.89±27.01 vs. 10.34±10.98, p<0.001,
Background and Goal of Study: Local and systemic inflammatory responses in major surgery contribute to wound infection, prolong healing, and worsen post-operative pulmonary functions. Neutrophils are major immune cells involved in local and systemic inflammatory responses. The proinflammatory mediators and proteolytic enzymes secreted from activated neutrophils in response to inflammatory stimuli may damage surrounding tissues and even induce organ dysfunction. N-formyl peptides, from either bacterial peptides or mitochondrial proteins, are recognized by formyl peptide receptor (FPR)1 of neutrophils to induce sterile and infective inflammation. Therefore, it is important to know how N-formyl peptides activate neutrophil inflammatory process, and FPR1 has become a target for developing new anti-inflammatory diseases.

Materials and Methods: Human neutrophils were isolated from healthy volunteers, which have been proven by local IRB. Supernoxide generation and elastase release were measured by spectrophotometry.

Results and Discussion: Our previous studies have screened a series of marine bacteria metabolites and found that IA-LBI-07-01, extracted from marine Bacillus sp., showed most significant inhibitory effects on respiratory burst and degranulation in activated human neutrophils. Further studies suggest that inhibition of neutrophil activation by IA-LBI-07-01 may act by blocking FPR1. Accordingly, the active compounds of IA-LBI-07-01 will be identified by bioactivity directed fractionation and isolation. We have identified the natural product, anteoiso-C13-surfactin (IA-1) from the extraction IA-LBI-07-01. Our results showed IA-1 significantly inhibited neutrophil immune functions specially induced by the FPR1 agonists.

Conclusion: Considering the importance of activation of neutrophils in inflammatory responses, the results will indicate that metabolites of marine Bacillus sp. may have therapeutic potential to attenuate neutrophil-mediated inflammatory diseases. Finally, our results will provide the lead candidates form marine bacteria metabolites for development of new anti-inflammatory drugs.

Background: Acquired hemophilia A is a very rare condition resulting from autoantibodies against factor VIII. We present a case of acquired hemophilia diagnosed during perioperative course after revascularization surgery for peripheral arteriopathy.

Case Report: 83-year-old man with history of hypertension, diabetes, hypercholesterolemia, ischemic coronary disease and chronic kidney failure was scheduled for revascularization surgery for ischemic peripheral arteriopathy. An endovascular approach was aborted because significant hemorrhage associated to hemodynamic deterioration. 24 hours later patient presented hemorrhagic shock requiring blood transfusion and urgent surgery. Nevertheless, the hemorrhage continued without hemodynamic deterioration but requiring daily transfusions of red blood cells. Coagulation panel showed a persistent prolongation of activated partial thromboplastin time with normal prothrombin time. Hematology consultation determined autoantibodies of FVIII bringing to the diagnosis of acquired A hemophilia. A multidisciplinary decision was made and the infusion of concentrate of FEIBA (antibodies against anti-FVIII) in two times and corticoids were required. Thereafter the patient presented gastrointestinal bleeding secondary to active hemorrhage of inferior mesenteric artery requiring embolization and acute hemorrhage of surgical wound requiring the infusion of three more doses of FEIBA and corticoids.

Discussion: We present a case of acquired A hemophilia diagnosed during perioperative course of revascularization surgery. This setting is especially challenging because the risk of hemorrhage and thrombosis should be balanced. For this reason, in our case a multidisciplinary team of vascular surgeons, anesthesiologists and hematologists made the management decisions just administrating specific treatment in cases of a severe hemorrhagic complications with vital risk.

vital signs, standard arterial blood gas analysis, complete blood cell count, coagulation profile, CT angiography scan. Patient has still been at our ICU (28th day of hospitalisation) with continued intensive resuscitation treatment, including total parenteral alimentation.

Discussion: Clinical diagnosis of mesenteric ischemia is difficult, especially in young patient, but in most cases abdominal pain is cardinal symptom in 94%, accompanied by nausea 56%, vomiting 38%, diarrhea 31%, and tachycardia 31%. Radiological images are different when differentiating etiology of vascular event: in arterial etiology, progression of the damage is slower and thinning of the intestinal wall is typical, but difficult to recognize. In ischemia of venous origin progression of damage is faster even when symptomatology is less dramatic and thickening of intestinal wall is easy to observe and detect.

References:

Learning points: Acute mesenteric ischemia is challenging clinical problem with diverse causes, which often results in delayed diagnosis and treatment. Mesenteric vein thrombosis is increasingly recognized as cause of mesenteric ischemia, but still atypical in young, healthy patient. Mortality rate has still been high (50%-90%). Modality of reference for diagnosis of AM is contrasted tomography (gold standard).

5884
ICU mortality related to admission source - retrospective study
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Background and Goal of Study: Intensive care medicine is characterized as being the most complex specialty with the most critically ill patients. Patients admitted to ICU need support for organ/system failure, continuous monitoring and permanent nursing care. The majority of the patients are admitted to ICU after unexpected situations, and only a small part of them as an elective admission. The aim of this study was to quantify mortality differences among patients admitted to ICU from hospital ward, emergency department, operating theatre or from other hospital.

Materials and Methods: We evaluate the ICU mortality during 1 year, from December 2018 until December 2019 in a retrospective study which included a total number of 429 patients admitted from the hospital wards, emergency department, surgical theatre or other hospitals using ICU record data obtained from a clinical database from an Irish hospital. Our study was approved before by the local audit committee.

Results and Discussion: From a total of 429 patients admitted in ICU, the majority of the patients came from emergency department (47%) followed by ward admission (28%), theatre admission (21%), and from other hospitals (4%). The ICU mortality during 1 year was 17.25%, and the highest mortality rate of the patient was found on the patients admitted from emergency department (9.1%). 72% of the ICU patients went back on the ward, and 4.4% were discharged directly home after ICU admission.

Conclusions: These findings indicate that there might be differences in the mortality rate dependent on the admission source, and the patients admitted from ED directly to ICU, have the worst prognostic regarding the survival rate. We are looking forward to find the correlation between mortality regarding the time from emergency department to ICU admission.
<table>
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<th>Ward with RRT</th>
<th>p-value</th>
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<tr>
<td>180</td>
<td>4.41 ± 0.59</td>
<td>4.17 ± 0.78</td>
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</tbody>
</table>

Conclusion: Further study as planned with the same survey in a year could provide improvement of nurse’s perception and satisfaction to contacting RRT among the same population.

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Lipofundin induced anaphylactic reaction due to parenteral nutrition

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Background: Lipofundin is a soybean oil based preparation for parenteral nutrition. (1) Only very few seldom allergic reactions to lipids infusions were described in the literature.

Case Report: We present a 42 years old female patient with spontaneous subarachnoid haemorrhage due to cerebral artery aneurism rupture with anaphylactic reaction during Lipofundin 20% infusion. The patient was intubated and sedated, demanding mechanical ventilatory support from the beginning of the ICU stay. At 3 days since admission in the ICU we started Lipofundin 20% infusion due to the parenteral nutrition in our patient. Few minutes after starting the slow Lipofundin 20% infusion using a infusomat with an infusion rate of 50ml/h and a central vein as a route of administration, the patient became tachycardic with progressive rise of the heart rate >145, hypotensive with blood pressure 55/30 followed with bronchospasam, desaturation (SpO2 58%) and generalized urticarial rash. The Lipofundin 20% infusion was immediately stopped. We gave the patient 0,5mg diluted Adrenaline (i.v), chloropiraminum 40mg, Methylprednisolone 80mg and Aminophillin 500mg which relived the signs of anaphylaxis.

Discussion: Soy-protein, in small quantities, can be detected in soy-oil, while allergic reactions to soy-proteins is well-known and described in the literature (1). In their study Pollini GP et al. suggest a good tolerance to Lipofundin S intravenous administration among surgical patients (2). But even if they are rare, allergic reactions to Lipofundin 20% are still possible. We found only one case report of anaphylactic shock to Lipofundin which was described by Andersen HL in a patient with Hodgkin lymphoma back in 1993.

References:

Learning points: We can conclude that seldom anaphylactic reactions due to Lipofundin infusion are still possible even if only few were described in the literature.

5989

Clinical role of novel biomarkers in the prediction and differentiation of acute kidney injury in the ICU: a preliminary observational study

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Background and Goal of Study: AKI occurs in >50% of ICU patients. Over 60% of episodes evolve into transient AKI. The product of Tissue Inhibitor of Metalloproteinase-2 (TIMP-2) and Insulin-like Growth Factor Binding Protein-7 (IGFBP-7) concentrations in urine has been validated as the best AKI predictor, but there is poor evidence for its use in differentiation. We present preliminary data on the use of biomarkers and their variation over 12 hours for AKI prediction and differentiation in a general ICU population.

Materials and Methods: In a mixed ICU, we retrospectively collected data of adult patients with renal risk factors. Two urine samples for [TIMP-2][IGFBP-7] measurement were available for each subject (one at the admission -T0-, one after 12 hours -T12-), along with blood samples for creatinine levels. Primary endpoints were markers absolute values and deltas (T12-T0) performances in AKI prediction and differentiation, assessed with Mann-Whitney U-test and ROC curves. We assessed clinical validity of biomarkers monitoring in comparison with creatinine deltas (T12-T0 and T24-T0) using Spearman’s correlation.

Results and Discussion: Twenty-one subjects were included in final analysis: 12 of them (57%) had AKI, 8 (66.7%) transient and 4 (33.3%) persistent. We found no differences in baseline characteristics between groups. Markers values at T0 did not differ between AKI and non-AKI, although ROC analysis showed AUC 0.75 (p = 0.037). Marker at T0 was higher in persistent AKI (p = 0.04) and helpful to predict transient injury (AUC 0.87; p = 0.003). [TIMP-2][IGFBP-7] showed moderate correlation with dCrea(T24-T0) (rs 0.5; p = 0.025).

Conclusion: The use of [TIMP-2][IGFBP-7] can reliably differentiate persistent from transient AKI. Biomarkers variation correlates with that of creatinine over longer intervals, revealing useful implications in ICU patients.
Hypertension treatment is a goal of care after mechanical thrombectomy especially in patients with chronic hypertension history not reported previously as far as we know.

We conducted a retrospective, multicenter study in 21 ICUs of the research network of the French Society of Anesthesia and Intensive Care Medicine (SFAR). All patients admitted to the ICU for anaphylaxis from January 1, 2012 to December 31, 2017 were included. The data were collected using an electronic database after approval by the local ethics committee.

Results and Discussion: During this period, 339 patients were included in this study with 222 grade III anaphylaxis and 51 grade IV anaphylaxis. Main triggers were drugs (77%), iodinated contrast media (11%) and food (7%). Epinephrine was administered prior to ICU admission in 88% of grade III anaphylaxis and 100% of grade IV anaphylaxis. Vascular filling was insufficient with a median vascular filling volume less than 30 ml.kg^-1.4 hours after ICU admission. Seventeen patients (5%) died during their ICU stay. The time to epinephrine administration was not statistically different between survivors and non-survivors, but non-survivors received a higher dose of epinephrine (median 5[3-10] vs 3[2-7.3], p<0.0001) which confirms that some forms of anaphylactic shock are resistant to epinephrine. The lactate level at admission was the best predictor of death during ICU stay.

Conclusion: If epinephrine is widely used during anaphylaxis, the use of vascular filling should be improved. The mortality rate remains high, at 5%, despite appropriate treatment of the reaction. This should motivate further studies, both experimental and clinical, to identify new therapeutic targets.
Iatrogenic Injury and Intensive Care Follow-up After Foreign Body Removal from Esophagus in a Child Patient

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Background: Esophageal perforations are rare, but morbidity and mortality are high in these cases, as they lead to mediastinal and / or pleural inflammation and infection followed by sepsis. Symptoms and signs of esophageal perforation vary depending on the location, development and duration of perforation. In this case, we wanted to emphasize the importance of early intervention in the esophagus.

Case Report: A 5-year-old female patient was taken to the operating room for esophagogram and esophageal rupture and mediastinal leakage was detected. The patient was referred to the external center for stent placement in the absence of typical symptoms. We present a case of spontaneous oesophageal rupture complicated by postoperative cardiac tamponade.

Case Report: A 5-year-old female patient was taken to the operating room for esophagogram and esophageal rupture and mediastinal leakage was detected. The patient was referred to the external center for stent placement in the absence of typical symptoms. We present a case of spontaneous oesophageal rupture complicated by postoperative cardiac tamponade.

Discussion: Iatrogenic injuries are the most common cause of esophageal perforations. Symptoms and signs may vary depending on the cause, location and time of perforation. Especially in cases with iatrogenic development and no oral intake, as in our case, pathological findings may not be detected. If time passes over perforation and oral food is taken after perforation, general condition deterioration, fever, tachypnea and hypotension occur. In conclusion, early diagnosis and treatment of esophageal perforations is life saving.

Amniotic fluid embolism followed by necrotizing fasciitis: Can this life be saved?

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Background: Amniotic fluid embolism (AFE) is a rare but potentially catastrophic medical emergency caused by entry of amniotic fluid contents into maternal circulation. Here, we present a case of amniotic fluid embolism with cardiac arrest followed by necrotizing fasciitis after vaginal delivery.

Case Report: A 36-year-old female which at 36 weeks of gestation, vaginally delivered a 1,550-g female infant. Shortly after delivery vaginal hemorrhage increased rapidly with patient's systolic arterial pressure decreasing to 75 mmHg and heart rate increasing to 150 beats/min. The patient was transferred to the operating room where, minutes after general anesthesia induction, immediate cardio pulmonary resuscitation was initiated. Cardiopulmonary circulation resumed after administrating 1.5 mg of epinephrine. Although a B-Lynch suture was attempted, atomic hemorrhage remained unconcluded and the decision to perform hysterectomy was made. Bleeding from the nose and the tracheal tube was observed. Coagulation tests showed decreased levels of fibrinogen. The patient was maintained on vasopressors and transferred to the ICU before her coagulation profile improved. Treatment with broad spectrum antibiotics and continuous venovenous hemodialfiltration were started. Second day post admission the patient's condition was complicated by multiple epileptic seizures and progressive necrotizing fasciitis of anterior abdominal wall. Pu culture showed Acinetobacter baumannii and appropriate antibiotic therapy was administered. Multiple and aggressive surgical debridement were done in following days despite patient's unstable condition. Due to surgical complications appendectomy, bilateral ureterostomy and transversostomy were done. After 24 days of extensive therapy patient was weaned from ventilator support, coagulopathy resolved and cardiovascular status stabilized with no neurological deficits.

Discussion: Here, we reported of complicated obstetric patient with many complications after vaginal delivery, which were propitiously recognized and treated. Reported and similar cases often show that anesthesiologists are not just anesthesiologists, but the silent force watching over patient's life in the OR and ICU.

Learning points: 1) AFE is a diagnosis of exclusion which should be considered early. 2) Anesthesiologists role as natural leader of interdisciplinary team treating life threatening conditions.

PINK1/PARK2-mediated mitophagy during slow rewarming after hypothermia contributes to neuroprotection in a rat model of cardiac arrest

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Background and Goal of Study: Identifying the mechanism of rewarming is of great importance to minimize adverse effects and guide clinical decisions for hypothermia treatment. Besides, whether PINK1/Parkin-dependent mitophagy is also involved in rewarming after hypothermia following CA has not been investigated. We sought to investigate the differences in the survival rate and neurological outcome of different rewarming schedules and to evaluate the role of PINK1/Parkin-mediated mitophagy in rewarming after hypothermia.

Materials and Methods: Asphyxial cardiac arrest was induced for 5 min before rewarming. Sprague-Dawley rats were randomized into the following groups: (1) normothermia (37.0 ± 0.5°C), (2) hypothermia without rewarming (34.0°C), (3) hypothermia + slow rewarming (0.5°C/h), and (4) hypothermia + rapid rewarming (4°C/h). Cooling was maintained for 4 h immediately after the return of spontaneous circulation. Here, we present a case of amniotic fluid embolism with cardiac arrest followed by necrotizing fasciitis after vaginal delivery.

Results and Discussion: Slow rewarming rates showed improved survival and neurologic recovery compared to rapidly rewarmed rats. PINK1/PARK2-mediated mitophagy was activated during slow rewarming. Mitophagy inhibition in the neurons of slowly rewarmed rats resulted in severe apoptosis and cell death. Moreover, the rapid rewarming group exhibited a loss of PINK1 and mitophagy markers, highlighting the necessity of a critical oxygen species (ROS) and motor cortex apoptosis. Furthermore, exogenous PINK1 overexpression in the rapid rewarming group reduced cell death and restored mitophagy.

Conclusion: PINK1/Parkin-dependent mitophagy was activated and played a protective role during slow rewarming at 0.5°C/h, while fast rewarming at 4°C/h decreased PINK1 levels and mitophagy, a result that may be related to the

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Boerhaave’s syndrome: A race against time

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Background: Boerhaave’s syndrome is a life-threatening oesophageal perforation that carries a high mortality rate, up to 50%. Diagnosis is difficult by its rarity and the absence of typical symptoms. We present a case of spontaneous oesophageal rupture complicated by postoperative cardiac tamponade.

Case Report: A 61-year-old female with an unremarkable medical history presented to ED with a sudden onset of severe chest pain radiating to back, after a meal, followed by forceful vomiting. At admission she was conscious, tachycardic and dyspnic with laboratory values within normal values. A chest CT scan revealed left pleural effusion with pneumothorax, pneumomediastinum with extensive subcutaneous emphysema and hiatal hernia without contrast extravasation. Ten hours after the onset of rupture patient was intubated and admitted to the ICU where intensive cardiac monitors and ventilator were used, including mechanical ventilation, fluid resuscitation with isotonic support, and administration of broad-spectrum antibiotics, was initiated. Seventeen hours after the onset of rupture, emergency surgical intervention was performed. Left-sided thoracotomy revealed a 4-cm-longitudinal laceration of lateral wall of the lower oesophagus which was repaired by primary suture. A gastrostomy for gastric drainage and jejunostomy for nutrition was performed, including mechanical ventilation, fluid resuscitation with isotonic support, and administration of broad-spectrum antibiotics, was initiated. Seventeen hours after the onset of rupture, emergency surgical intervention was performed. Left-sided thoracotomy revealed a 4-cm-longitudinal laceration of lateral wall of the lower oesophagus which was repaired by primary suture. A gastrostomy for gastric drainage and jejunostomy for nutrition was performed.

Discussion: Boerhaave’s syndrome is often treated in a timely manner, and patients are usually extubated and weaned from ventilator support within 24 hours. However, we wanted to emphasize the importance of early intervention in the esophagus.

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negative consequences of hypothermia. Thus, enhancing PINK1/Parkin-dependent mitophagy and improving mitochondrial turnover are promising therapeutic approaches for rewarming following hypothermia.

Acknowledgements: This work was supported by the National Natural Science Foundation of China (No. 81671879) and a grant (No. 201740118) from the Shanghai Municipal Commission of Health and Family Planning.

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Mean amplitude of glycemic excursions (MAGE) and its association with outcomes in patients with sepsis: a prospective observational study using continuous glucose monitoring

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Background and Goal of Study: Mean amplitude of glycemic excursions (MAGE) measured using continuous glucose monitoring (CGM) was a surrogate of glycemic fluctuations, which was reported to be associated with oxidative stress in patients with diabetes. Although glycemic variability has been reported to be a relevant index associated with worse outcomes in critically ill patients, there is little information on MAGE in septic patients and its associations with outcomes. This prospective study aimed to observe MAGE using CGM in early phase of treatment in septic patients, and assess its association withouts and oxidative stress (ethics No 170053).

Materials and Methods: We included adult patients admitted to our ICU with a diagnosis of sepsis from December 2017 to November 2019, and were expected to need intensive care for >48 hours. After obtaining informed consent from each patient or the patient's legal representative, we continuously measured blood glucose level for first 48 hours of the patient's stay in ICU using FreeStyle Libre®. MAGE was calculated using glycemic information obtained by CGM. The primary outcome in this study was 90-day all-cause mortality. The secondary outcomes were 90-day ICU free days and the concentration of urinary 8-iso-prostaglandinF2α measured 48 hours after commencement of the study as a biomarker of oxidative stress. We compared MAGE in survivors and non-survivors using the t-test. The correlation of MAGE with 90-day ICU free days and urinary 8-iso-prostaglandinF2α level were assessed with Pearson’s correlation coefficient. A p-value >0.05 was considered to indicate statistical significance.

Results and Discussion: We included 39 patients. The mean age of the patients was 65.9 years. The mean APACHE score was 27, the number of patients in septic shock was 20 (51.3%), and 90-day all-cause mortality rate was 30.8%. The mean of MAGE in non-survivors was 3.61±1.79 mmol/L, which was significantly higher than that of 2.16±1.28 mmol/L in survivors (p=0.01). An increase of MAGE was significantly associated with a lower rate of 90-days ICU free days (r=0.22, p<0.01) and a higher urinary 8-iso-prostaglandinF2α level (r=0.21, p=0.02).

Conclusion: In the current study in septic patients, MAGE for the first 48 hours measured by using CGM was shown to be associated with 90-day all-cause mortality, 90-days ICU free days and urinary 8-iso-prostaglandinF2α level.

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Clevidipine for acute hypertension management in aneurysmal subarachnoid hemorrhage

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Background: Hypertension treatment is a goal of care for subarachnoid hemorrhage management. Clevidipine is a short action calcium channel blocker with rapid onset of action and ultra-short half life, making it a good choice especially when rapid and safe treatment of hypertension is required. For this reason, we hypothesized that clevidipine could be effective and safe for hypertension treatment in this population.

Materials and methods: We conducted a retrospective review of medical records of patients admitted to Reanimation Unit of Cruces University Hospital between 2017 and 2018 after subarachnoid hemorrhage. Age, Sex, Glasgow Coma Scale, Fisher score, location of aneurysma, Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean Blood Pressure (MBP) and previous history of hypertension, stroke or cardiovascular risk factors were recorded. Primary endpoint was observing the effectiveness of clevidipine for acute hypertension treatment. Secondary endpoint was observing the safety of clevidipine. Statistical analysis was performed by SPSS using Fisher test for qualitative variables and U Mann Whitney for quantitative variables with a significance level of 5%.

Results and Discussion: We included 5 patients. Clevidipidine was effective for acute hypertension treatment achieving the target level between 10 and 45 minutes in 100% of patients. SBP target was kept for a mean of 59 hours in 100% of patients. Nevertheless 40% required additional intravenous treatment and 80% required transition to oral treatment probably resulting of the higher incidence of chronic hypertension (80%) in our study. Clevidipine was also safe without hypotension or adverse events in none of our patients. Mortality was related to Fisher (p=0.01), SBP (p=0.01), Glasgow Coma Scale (p=0.01), time of SBP maintenance (p>0.05) and Reanimation stay (p>0.01). Complications were presented in 60% of patients probably resulting of the higher incidence of Fisher IV scores in our study (80%).

Conclusion: Our study showed that clevidipine is effective and safe for acute hypertension treatment after aneurysmal subarachnoid hemorrhage. Our study supports the result of a previous pilot study and adding evidence especially in patients with higher Fisher scores and chronic hypertension history which makes blood pressure control more difficult and the complications risk very high. Nevertheless the little size and retrospective design of our study will require further validation.

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The overview of in-hospital cardiac arrests in a year

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Background and Goal of Study: Studies have shown that those who suffer out-of-hospital cardiac arrest (OHHCA) during the weekend were 20% less likely to survive to hospital admission. There is a few ideas about why survival drops during the weekend. While out-of-hospital codes are less successful during the weekend, we carried out retrospective reviews of in-hospital cardiac arrest (IHCA) records to see if there is also lower odds during the weekends. We also looked into matters relating to IHCA which may be utilized in improving the present CPRC guide-lines and monitoring patients whose cardiac arrests may occur in hospital.

Materials and Methods: Electronic medical records of 327 patients who experienced IHCA were retrospectively reviewed, identified only by anonymous patient identification numbers. In order to investigate probable factors that may influence the occurrence of IHCA and survival, we analyzed one year of data for the following factors regardless of medical causes for hospitalization: clinical department, the where (wards or ICUs) and the when (weekdays, weekends, and time of day), time to CPRC code announcing and CPRC start from IHCA, prior intubation before the IHCA, number of intubation attempt after IHCA, and CPRC end status (the dead and the survivor).

Results and Discussion: The data included some patients whose IHCA repeatedly occurred (2-5 times depending on the patients). Of 327 IHCA cases 65.8 % (212 cases) survived, a rate that matches the other previous studies. There was no differences in survival rate between weekday and weekend (chi-square test), and the place and the time of day that IHCA occurred did not also affect survival. Of those who had IHCA only two patients had been intubated before cardiac arrest.

Conclusion: Weekend survival odds were not lower in IHCA. However, pre-IHCA intubation seems to be of greater value than ever considered so far in preventing sudden cardiac arrests. For this reason more careful and meticulous patient care and monitoring should be advised in terms of oxygen therapy whatever it is intra-pulmonary or extra-pulmonary, in addition to promoting CPRC equipment availability and quick responses by rescuers to address IHCA.
Brain oxygenation during prehospital anaesthesia: an observational pilot study

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Background and Goal of Study: Many patients anaesthetised in prehospital setting are at risk of inadequate cerebral oxygenation. We aimed to estimate the frequency of cerebral desaturation events during prehospital anaesthesia.

Materials and Methods: We performed a prospective, observational pilot study in two physician-staffed Helicopter Emergency Medical Services (HEMS) units. Adult patients who underwent rapid sequence intubation and prehospital anaesthesia of any reason were included by the HEMS team. NIRS monitoring of left frontal cerebral regional oxygen saturation (rSO2) with Nonin H500 oximeter was started before induction of anaesthesia and continued to hospital arrival. The treatment of the patients followed routine practice.

Results and Discussion: Of 128 eligible patients, 97 (61 male, age 55±10 years) were enrolled in the study and rSO2 data from 83 patients were available for analyses. There was significant variation in the baseline oxygenation and in the change in oxygenation due to prehospital anaesthesia within the patients (Figure 1). The incidence of cerebral desaturation of 10%, 20% and 30% from baseline for at least 5 minutes occurred in 19 (23%), 4 (5%) and 1 (1%) patients, respectively. Figure 1. Baseline cerebral oxygen saturation and change of saturation after induction of prehospital anaesthesia as comparison to the baseline. OHCVA=Out-of-hospital cardiac arrest (patients anaesthetised after return of spontaneous circulation).

Conclusion: A substantial proportion of the patients anaesthetised in prehospital setting suffer a cerebral desaturation event. The consequences of these events need to be assessed further.

Refactory tachycardia with hemodynamic compromise in the prehospital due to Disulfiram-Reaction: a case report

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Background: Disulfiram is a drug used for chronic alcohol abuse, as it interferes with the metabolism of ingested alcohol. We report a refractory tachycardia in an unconscious patient managed in the prehospital setting, being only correctly diagnosed accessing medical history in the hospital. This unusual combination of conditions as no pair in the scientific literature, being the only case in this nature to be described.

Case Report: A 56 years old male was found unconscious. Emergency services were activated, and the first team to arrive at the scene identifies a narrow QRS complex tachycardia with severe hypotension. First thought to be a supraventricular tachycardia, adenosine, electrical cardioversion and betablockade were tried without major improvement. Only with access to medical history at the hospital, it was possible to diagnose a Disulfiram-reaction. Afterward, the patient began fluid therapy, thiamine, and Dextrose 5%, with asymptomatic discharge several hours later.

Discussion: Disulfiram-reaction caused a severe narrow QRS complex tachycardia and altered state of consciousness. As an uncommon drug, it wasn’t suspected as a possible cause until access to medical history. We report this case as a way of alerting to this rare and unexpected cause of tachycardia in the management of critically ill patients, which may lead to confusion during medical approach.

References:

Hypothermia combined with xenon reduces secondary injury development and enhances neuroprotection by preventing neuronal cell loss in a rat model of traumatic brain injury

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Background and Goal of Study: The secondary injury that develops after traumatic brain injury (TBI) is potentially preventable and underlies most of TBI patients’ functional impairments. Current TBI treatment is mainly supportive and no specific neuroprotective drugs are available. Excitotoxicity associated with over-activation of NMDA receptors plays a crucial role in secondary injury development. Xenon (Xe), a general anaesthetic and NMDA receptor antagonist, is neuroprotective in preclinical TBI1,2,3. Hypothermia (HT) is a standard neuroprotective treatment in neonatal asphyxia & post-cardiac arrest. Although the mechanisms of HT neuroprotection are not fully understood, HT is believed to reduce excitotoxicity. Current evidence on HT neuroprotection after TBI is still conflicting. The aim of this study was to evaluate the neuroprotective efficacy of HT combined with Xe using the reproducible & well-established controlled cortical impact model of blunt TBI.

Materials and Methods: Young adult Sprague-Dawley male rats (n=24) were intubated & mechanically ventilated (with propofol & buprenorphine anaesthesia) while undergoing right parietal cortical impact and during treatment. Animals were randomly assigned to control (30%O2 balanced N2; 38°C), HT (30%O2 balanced N2; 34°C), Xe (50%Xe:30%O2 balanced N2; 38°C) or HT-Xe (50%Xe:30%O2 balanced N2; 34°C) groups. Physiological monitoring included: core body temperature, peripheral O2 saturation, heart rate, invasive blood pressure and arterial blood gases. Histological outcomes were measured at 30 min (contraction volume, CV), and 24 hr (CV, neuronal cell count) by researchers blinded to treatment. Statistical significance was assessed using Kruskal Wallis test with Benjamini, Krieger, Yekutieli correction.

Results and Discussion: Both HT combined with Xe and Xe alone significantly (p<0.01) reduced secondary injury (total CV at 24 hrs minus CV at 30 min). A significant reduction (p<0.05) of neuronal cell loss in the ipsilateral hippocampal CA2 area was achieved using both HT combined with Xe and Xe alone. Interestingly, in the contralateral retrosplenial cortex a significant reduction (p<0.05) in neuronal...
Alveolar ventilation and the risk of hypoventilation - transport ventilators in a Thiel's cadaver study of simulated cardio-pulmonary resuscitation

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Background: Previous studies have posed that hyperventilation occurs commonly in cardio-pulmonary resuscitation (CPR) mainly due to excessive frequencies, especially when a manual valve bag is used [1]. Although hyperventilation is widely perceived as a common occurrence in CPR, actual tidal volumes (VT) have just been measured rarely. We sought to investigate whether common portable ventilators are able to provide meaningful alveolar ventilation during continuous chest compressions.

Materials and Methods: A three-period crossover study with three common transport ventilators in a cadaver model of CPR was conducted. The three ventilators MEDUMAT Standard², Oxylog 3000 plus and Monnal T60 resembled three different treatments providing volume controlled mandatory ventilation (VC-MVV) via an endotracheal tube with 6 ml/kg IBW. Maximal airflow was measured by a mass flow meter. For each respiratory cycle net VT was derived, deviation to predetermined VT was calculated and analysed. Several mixed linear models were calculated with the cadaver as random factor and a combination of ventilator, height, gender, crossover period and number of breath in period as covariate.

Results and Discussion: We found all tested transport ventilators to be able to provide alveolar ventilation in a human cadaver model of CPR even though tidal volumes were considerably decreased by chest compressions. Overall observed net VT (n=715) was in median -21.2 cmH2O (IQR: 19.6, Range: -97.9% to 25.8%) less than the predetermined volume. In a mixed linear model ventilator, crossover period and height were significant factors for decreased VT. We found significant differences between the ventilator models. The estimated effects for each ventilator were -14.5 cmH2O (p<0.0001) for Medumat Standard², -31.0 cmH2O (p<0.0001) for Oxylog 3000 plus and -30.6 cmH2O (p=0.0004) for Monnal T60, -38.6% (p<0.0001) for MEDUMAT Standard² and -38.5% (p=0.0001) for Oxylog 3000 plus and -38.2% (p=0.0001) for Monnal T60.

Conclusions: Our results support the concept of using ventilators to avoid excessive ventilation rates in CPR. If doing so, healthcare professionals should carefully review actual tidal volumes to recognise the occurrence of hypoventilation. Future CPR studies should examine VT during CPR in vivo.

Reference:

6176

Effects of Intrathoracic Pressure Regulation on Respiratory Function and Mechanics in Hypovolemic Mechanically Ventilated Pigs – A Pilot Study

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Background and Goal of Study: Intrathoracic pressure regulation (IPR) with sub-atmospheric end-expiratory pressure improves hemodynamics during hypovolemic hypotension, but its effects on the respiratory system are elusive. We aimed to describe the effects of IPR on lung function and mechanics during hypovolemia.

Materials and Methods: After approval by the local animal welfare committee (DDD2.4-1.513/1474/22), six pigs (45.4±3 kg) received anesthesia and volume-controlled ventilation (VCV) with tidal volume (VT) of 8 ml/kg and positive end-expiratory pressure (PEEP) of 5 cmH2O. Hypovolemia was obtained by drawing 30% of the calculated total blood volume. Animals were randomly assigned to one of two groups (n=3/group): 1) VCV with PEEP, or 2) IPR of -5, -8, and -12 cmH2O (ZOLL, USA; 60-120 min each, 4 h total), followed by 30 min VCV+PEEP. Respiratory and hemodynamic variables were recorded, including distribution of ventilation and continuous cardiac output. Computed tomography (CT) was used to quantify lung aeration at end-expiration. Postmortem, lung wet/dry ratio (W/D) was determined. Statistics included repeated measurements ANOVA with baseline values as covariate and linear modeling.

Results and Discussion: VT, respiratory rate, peak and plateau airway pressure, as well as gas exchange and arterial pH did not differ between groups. While heart rate and mean arterial pressure did not differ significantly, IPR reduced the central venous pressure (P=0.048). Also, IPR increased cardiac output (P=0.018) as well as global end-diastolic (P=0.045), intrathoracic blood (P=0.043), and stroke volumes (P=0.042). IPR was associated with non-aerated and poorly aerated lung tissue mass (slope=1.89 %/cmH2O, P<0.001, and 0.80 %/cmH2O, P=0.046, respectively), as wells as normally and hyper-aerated compartments (slope=-2.7 %/cmH2O, P=0.001, and slope=-0.01 %/cmH2O, P=0.002, respectively). In addition, IPR shifted the center of ventilation towards non-dependent regions (P=0.001). VCV+PEEP reverted these effects. Extravascular lung water was significantly increased under IPR (P=0.007), but W/D did not differ between groups.

Conclusion: In hypovolemic pigs, IPR improved global blood flow without impairment of the respiratory function. The decrease in aeration lung tissue by IPR could be promptly reversed by VCV+PEEP.

Acknowledgements: We’d like to thank I. Wittig and L. Hölker for operating the CT scans.
Bi-Level ventilation mitigates neuroinflammation and pulmonary shunt in a cardiopulmonary resuscitation model

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Background and Goal of Study: Optimal ventilation strategies during cardio-pulmonary resuscitation are still heavily debated. So far, no convincing evidence could be presented in favour of outcome relevance and necessity of specific ventilation patterns. In recent years, alternative models to the guideline-based intermittent positive pressure ventilation (IPPV) have been proposed. In this randomized controlled trial, we evaluated a bi-level ventilation approach in a porcine model to assess possible physiological advantages for the pulmonary system as well as resulting changes in neuroinflammation compared to standard measures.

Materials and Methods: 16 male German landrace pigs were anesthetized and instrumented. Ventricular fibrillation was induced and the animals were left untreated for 4 minutes. After randomization, the animals were assigned to either the guideline-based group (IPPV, tidal volume 8-10ml/kg, respiratory rate 10/min, FiO2 1.0) or the bi-level group (inspiratory pressure levels 15-17cmH2O/5cmH2O, respiratory rate 10/min, FiO2 1.0). Mechanical chest compressions and interventional ventilation were initiated and after 5 minutes, blood samples were taken. Afterwards, advanced life support was started for up to 4 cycles. Animals achieving ROSC were monitored for 6 hours and lungs and brain tissue were harvested for further analyses.

Results and Discussion: 5 of the IPPV and 4 of the bi-level animals achieved ROSC. While there were no significant differences in gas exchange or hemodynamic values, bi-level treated animals showed less pulmonary shunt directly after ROSC and a tendency to lower inspiratory pressures during CPR. Additionally, cytokine expression of tumour-necrosis factor alpha was significantly reduced in hippocampal tissue compared to IPPV animals.

Conclusion: Bi-level ventilation with a constant positive end expiratory pressure and pressure-controlled ventilation is not inferior in terms of oxygenation and decarboxylation when compared to guideline-based IPPV ventilation. Additionally, bi-level ventilation showed signs for a potentially ameliorated neurological outcome as well as less pulmonary shunt following experimental resuscitation. Given the restrictions of the animal model, these advantages should be further examined.
determined in all 24 patients as edema, venous hemostasis and ischemia because of traumatic dislocation syndrome from the first day after TBI (Fig.1,2; yellow cursor). SIRS started from the 2d postoperative day and was transformed to sepsis on the 5th-7th postoperative day independently of surgery factor (p<0.05).

Conclusion: Hippocampus and parahippocampus gyrus injury as blood circulation disturbances in consequence of dislocation syndrome in patients with TBI can be predictive factor of sepsis development in acute period of traumatic disease.

References:

**Background and goal of the study:** A disaster is defined as a sudden event causing an imbalance between needs and available resources. In March 2019 a tropical cyclone hit Mozambique requiring international medical support. Aim of the study is to report the anesthesiological experience at the level 2 Italian Emergency Medical Team.

**Materials and Methods:** In our descriptive cross-sectional study we collected all patients readmitted to the operating room in the field hospital from March 30th to April 26th 2019 in Mozambique. We became operative within 7 days. Main end point is to describe the anesthesiological experience in this emergency. Data collected: age (years), male gender, triage score (immediate, delayed, minimal, expectant), unscheduled admission, if cyclone-related event, cause of surgery (post-traumatic, regional anesthesia, general anesthesia with or without intubation), complications occurred during anesthesia, mortality rate. Statistical: numerical data summarized as mean ± standard deviation (SD) while ordinal data as percentage. Windows Excel® was used.

**Results and discussion:** 1171 admitted patients; 65 surgical treatment realized (5.5% of all activity). Age: 33±21 years, 46.2% male. 10% immediate, 59% delayed, 29% minimal and 2% expectant. 66.2% unscheduled interventions. 36.9% cyclone-related events. 48.4% post-traumatic, 26.6% gynecological, 9.4% visceral, 15.6% other. 9.2% of patients had preoperative exams. Regional anesthesia was applied in 72.4%, general anesthesia without intubation in 21.5% and with intubation in 6.1%. 3.1% severe hypotension. 1 case (1.5%) died due to hemorrhagic shock. Firstly we describe a less severe picture than other reports2 (lower traumatic patients, 48.4% vs. 80%) due to type of disaster (flood vs. earthquake) and time required for the endorsement. Secondly in our experience regional anesthesia was more frequently used than other teams3 (72.4% vs. 46%) due to skilled anesthesiologists and available resources (ultrasound device).

**Conclusions:** The anesthesiological preparedness for different scenarios of disaster is a great challenge. It depends on type of disaster, delay in responding and human and technical available resources.

References:

**Implementation of a critical response team in an Romanian Tertiary University Hospital – Conceptualization of an American model.**

**Impact on major outcomes**

**Background and Goal of Study:** Following a 3 weeks experience at North Shore Medical Center, Salem, US, a critical response team (CRT) project was implemented on the Neurosurgery (NSG) department of our hospital with the aim of bringing critical care expertise and optimizing standards of care to patients on the ward. The goal of the study was to evaluate the impact of CRT on major outcomes.

**Materials and Methods:** Prospective, observational, non-randomized study carried out at the Emergency County Hospital Timisoara, Romania. We created 2 study groups, pre-CRT (October 2018-March 2019) and CRT (April-September 2019). We evaluated the impact of CRT on the following outcomes: the number of cardiopulmonary arrests on the NSG ward, the ICU readmission rate, the mortality among readmitted patients to ICU and the global mortality. The results were analyzed for statistical significance.

**Results:** 136 patients were included to pre-CRT and 153 patients to CRT. There were no significant differences regarding demographics or clinical pathologies between groups. Cardiopulmonary arrest incidence was decreased in CRT vs pre-CRT (1.84% vs. 4.92%; p=0.06, 95%CI -16.63% to 14.91%, difference 3.13%). Readmission rate to ICU was similar between groups, but the mortality of readmitted patients was significantly decreased in CRT compared to pre-CRT (42% vs. 73%; p<0.0437, 95%CI 1.4572% to 55.2159%, difference 32%). Global mortality on the NSG ward was reduced in CRT but this reduction was not statistically significant.

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5633

An Italian prehospital blood program for remote damage control resuscitation

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Background and Goal of Study: Haemorrhagic shock is the most frequent cause of medically preventable deaths after injury and these deaths occur predominantly in the prehospital phase of resuscitation. Prehospital blood transfusions have been adopted by many civilian helicopter emergency medical service (HEMS) agencies across Europe, early outcomes show that this practice is feasible and safe. The Lombardy Regional EMS Trust (AREU) operates five HEMS bases in the most populated Italian region with nearly 10 million inhabitants (2% of the European Union population). The aim of the present study is to detail the development and implementation of an Italian “Blood on Board” programme for remote damage control transfusion.

Materials and Methods: The HEMS base in Bergamo is located at the center of Lombardy and next to Papa Giovanni XXIII Hospital. Close cooperation and good relations with the local transfusion medicine department is of paramount relevance. A portable temperature controlled bag (4 liters capacity GrEdo ProMed, PediBioThermal) will be tested by qualified personnel of the blood bank to determine the best standardized method for packing and storage of 2 units of packed red blood cells (group 0 Rh negative) and 2 units of thawed plasma (group AB) at 4±2°C. A fluid warmer device (MEGU warm system, MEGU Denmark) will be used for blood components to maintain the temperature. Immediate resuscitation is encouraged based on available evidence from a randomized clinical trial 3.

Results and Discussion: Our work started in January 2019. Together with Papa Giovanni XXIII Hospital Department of Immunohaematology and Transfusion Medicine we have approved a prehospital blood components transfusion protocol in adherence to National standards. We are completing equipment supply and we are planning to start in March 2020.

Conclusion: We have described the process to set up the first Italian civilian prehospital blood transfusion programme. Stewardship processes will minimise wastage of blood components while keeping them immediately employable to provide haemostatic resuscitation for bleeding patients in remote and austere environments.

References:

Acknowledgements: Dr Rachel Hawes and Andy Mawson, Great North Air Ambulance (UK) and the Transfusion Team at Royal Victoria Infirmary, Newcastle (UK).

4871

Shock treatment of acute hand ischemia

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Background: The World Health Organization estimates for 2014 that there are globally around 16 million people who use injectable drugs, which leads to a high incidence of accidental or intentional intraarterial injection in drug abuse. The therapeutic management consisted of restoring the arterial circulation at the ischemic segment to prevent the propagation of thromboembolic complications by using i.v. heparine and to preserve the function of the hand by preventing delayed ischeamia and compartment syndrome followed by necrosis.

Case Report: A 31 years old man extraventricular drug abuser who for the past 6 years has been treated with Methadone (3-6 pills/day). The patient came to the emergency department 6 hours after injecting himself into the radial artery with a suspension composed of 10 pills of Methadone (2.5 mg) and 4 pills of Alprazolam (Xanax 1 mg). The diagnosis of acute right hand ischeamia was established after a Doppler ultrasound of the radial, ulnar and arterial arches of the hand. The medical treatment included: continuous anticoagulation therapy for 14 days, antispasmodic and anti-inflammatory drugs, as well as psychiatric drugs. Unfortunately, the necrosis started and continued until it reached the distal metacarpal level, resulting in amputation of all fingers of the right hand.

Discussion: Intra-arterial injection among drug addicts becomes frequent when there are no more viable veins left for them to insert a needle. Even more dramatic is their attempts to inject crushed pills in peripheral arteries. The result may be reversible ischaemia, distal to the site of injection or, as in this case, necrosis and loss of body parts. The particularity of the case consists in the presence of microemboli that cause ischeamia from the microcirculation from the level of the digital collateral arteries and the arteries for the intrinsic muscles of the hand, resulting in a high level of necrosis. In this case repeated excisions were performed, which latter allowed graft adhesion.

Learning points: The progression of the ischeamia depends on the physiological reaction, which varies according to the vascular spasms, thrombosis and emboli derived from the non-solvable drugs. The case described the successful thrombolytic medical management of an ischemic hand using the continuously anticoagulation therapy for 14 days, antispasmodic and anti-inflammatory drugs therapy.

4975

First pass success in prehospital intubation in resuscitations performed by a non-physician based emergency medical system

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Background and Goal of Study: Endotracheal intubation (ETI) is the gold standard in maintaining the airway. First pass advanced airway insertion is associated with fewer adverse effects. Jarvis et al. 2019 described a first pass intubation success (FPS) in adult patients during resuscitation of 72.7% performed by emergency medicine (EMS) personnel. Bernhard et al. 2019 entitled a comparable FPS in the resuscitation room performed by physicians in German emergency departments. The aim of this study was to evaluate the first pass intubation success of prehospital endotracheal intubations (ETI) in patients undergoing advanced life support (ALS) in a non-physician based emergency system (EMS). The secondary aim is to determine the additional value of videoendoscopy (VLS) in this setting using a questionnaire.

Materials and Methods: Data from all resuscitations performed by a non-physician ambulance professional between December 2017 until March 2018 spent at the primary care facility was 157 minutes (IQR 115-222) and median time spent on transportation was 32 minutes (IQR 18-47). We found that 67 patients (27 %; CI 21.7-32.6) arrived in our trauma centre later than 6 hours from time of injury. Patients arriving after and before 6 hours spent a median of 305 minutes (IQR 219-444) and 136 (IQR 89-198) minutes in the primary facility, respectively. The patients arriving after 6 hours were significantly older (P = 0.004) but there was no significant difference in 30-day mortality (OR: 0.99; CI 0.3-3.2).

Conclusion: Time from injury to arrival in our facility exceeded 6 hours for 67 patients (27 %) who were significantly older.

6011

Time from injury to arrival in the trauma centre in patients undergoing secondary transfer

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Background and Goal of Study: Trauma patients may require secondary transfer to definitive care after initial assessment and resuscitation at a primary facility. Prolonged time to transfer may be detrimental and may worsen outcome. A study from 2006 found that trauma patients spent a median time of 150 minutes in a local hospital and 48 minutes on transportation before arrival in the trauma centre. The aim of this study was to determine time from injury to arrival in trauma patients undergoing secondary transfer to the Level I trauma centre at Copenhagen University hospital, Rigshospitalet, in Copenhagen, Denmark. We considered that an adequate level of quality would correspond to a maximum of 10 % of the patients arriving later than 6 hours after time of injury.

Materials and Methods: Data was collected from our local trauma registry. We included patients admitted to the trauma centre with a full trauma team activation in a 3-year period between November 1st, 2016 and November 1st, 2019. Data are presented as median values with interquartile range (IQR).

Results and Discussion: In the study period 250 patients underwent secondary transfer to our trauma centre. The median age was 47 years (IQR 26-65), 15 % were <18 years and 31 % were women. A total of 111 (44.4 %) patients had an Injury Severity Score >15 and 30-day mortality was 6 % (n = 15). The median time from injury to arrival in the trauma centre was 255 minutes (IQR 192-371); median time

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in the region North Limburg were collected. Data consisted of patient file report and a questionnaire. Patients younger than 18 years were excluded. Due to the Netherlands ambulance guidelines, an attempt to intubate during resuscitation is indicated if EMV score is 3. The number of intubation attempts per patient were reported. The Cormack-Lehane score (C-LH) was used for evaluation of the laryngoscopy. The involved non-physicians ambulances professionals were asked to complete the questionnaire regarding the additional value of VL.

Results and Discussion: Inclusion criteria were met by 120 patients, 89 patients had an indication for endotracheal intubation. FPS succeeded in 70 cases (78.6%) whereas 19 cases (21.3%) demanded a second attempt and in one case a third attempt. The average number of endotracheal intubation attempts was 1.22 per patient. Airway conditions were graded by the Cormack and Lehane scale: in 35 cases the score was grade I (30.3%), in 31 cases grade II (34.8%), in 13 cases grade III (14.6%), in 9 cases grade IV (10.1%) and in one unknown. All non-physician ambulance professionals completed the questionnaire, additional value of VL was seen by 64 (55.6%) whereas 51 (44.6%) did not.

Conclusion: The first pass success of endotracheal intubation in the prehospital setting performed by non-physician ambulance professionals is 78.6% and comparable to the FPS if intubation performed by EMS personal described in recent literature.

References:

5072

ECMO Mobile and Organ Donation in Donor Cardiac Death
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Background and Goal of Study: Scarcity of potential dead brain donors and the data capture paperwork. This ensures the appropriate patients are safely transferred to an adequately prepared operating theatre in a timely manner. All available DCS protocol and corresponding ORSOS data were captured from Nov 2017 - Sep 2019. Data was reviewed and patient demographics analysed.

Results and Discussion: The DCS protocol was put on standby 42 times and activated in 21 cases. Patient data was held for 38 cases, 30 male and 8 female, median age 37 years (IQR 22-64). Data deficits were identified for future process refinement. Median Injury Severity Score was 29 (IQR 0-36) with patients sustaining injuries from RTC (37%), falls (26%), unknown mechanism (21%), and other (11%). 12 DCS patients remained intubated for a median of 12 days (IQR 7-26.5), with a 29% 30-day mortality. Together this shows that despite prompt surgical intervention, DCS in a young patient cohort carries a significant mortality.

Conclusion: We have established the demographics of those who trigger DCS protocol use in a regional trauma centre. The resultant database will enable prospective data collection for future DCS patients. Data deficiencies were identified and future mitigation strategies implemented. Such data will afford our region a greater understanding of the DCS population.

References:

5629

Successful VA-ECMO resuscitation after 191 minutes of cardiac arrest due to severe accidental hypothermia
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Background: In Spain, there are up to 23.7 deaths per year due to accidental hypothermia.1 Patients under cardiac arrest induced by severe hypothermia improve their survival if extracorporeal life support (ELS) is performed 2,3.

Case Report: A 34-years old female admitted under cardiac arrest due to a severe accidental hypothermia for VA-ECMO placement. Initially, the rescue team transferred the patient to a primary hospital where they secured the airway, they started CPR 38 minutes after witness cardiac arrest and they measured 18ºC of tympanic temperature. The patient was transferred to our hospital by helicopter. The first arterial gases showed pH 7.47, K 4.61 mg/dL, glucose 246 mg/dL, lactate 1.5 mmol/L. A peripheral femoro-femoral VA-ECMO was placed at the operating room after 153 minutes of CPR (a total transfer time of 273 minutes since the emergency call). The central temperature was 19.7°C with maintained ventricular fibrillation. ECMO management during initial phase was based in slow rewarming and progressive correction of hemodynamic and metabolic parameters. Defibrillation was performed at core temperature of 30ºC, recovering sinus rhythm. The ECMO could be withdrawn after 44 hours with a previous EEG without any signs of neurological damage.

Discussion: Deciding which are the most suitable candidates for ELS is challenging. ECMO has been an update in the management of accidental hypothermia, allowing both progressive rewarming and hemodynamic support. Resuscitation objectives have to be based on the hypothermia pathophysiology and prognostic factors (metabolic biomarkers and withdraw cardiac arrest). Patients with neither trauma nor primary hypoxia have successful outcomes if ELS is performed even though CPR starting is delayed.2,3

References:

5556

Damage Control Surgery in a Regional Trauma Centre – Defining the Population: A Pilot Study
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Background and Goal of Study: Trauma has a major disease burden, causing death and morbidity through physiological disruption.1 Damage Control Surgery (DCS) minimises physiological disruption.2 At present, the demographics of patients who undergo DCS within our institution are unknown. This study aims to characterise our DCS cohort and potential for prospective study.

Materials and Methods: Our hospital has developed a DCS protocol3 and ORSOS data capture paperwork. This ensures the appropriate patients are safely transferred...
Concomitant traumatic atlantooccipital dissociation and atlantoaxial rotatory subluxation. A case report
de la Rosa Estadella M.1, Masó Serra A.2, Artigas Soler A.2, Vallejo Tarrat A.1,2, Gasullia Rodriguez A.2, Serrano Martin M.2
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Background: Craniovertebral junction (CVJ) injuries were once believed to uniformly lead to death at the scene where the injury occurred due to its highly unstable nature and proximity to critical neurologic and vascular structures. Nevertheless, these lesions are increasingly found in the emergency department as a consequence of a better prehospital care and cervical immobilization(1).

Case Report: 45-year-old female, victim of a car accident (lateral impact). She is initially found by emergency services with GCS 9 but recovers fully awareness in a few minutes. Once at the emergency department she explains dyspnea, dysphagia, diplopia and hypoacusia. Neurological examination identifies a bilateral sixth nerve palsy and a right peripheral facial nerve palsy. The cranial and neck CT scan showed an atlantooccipital dissociation (AOD), a retropharyngeal hematoma with mass effect and a right vertebral artery dissection. Given the potential airway compromise added to the impossibility of neck hyperextension we performed an awake fibroscopy-guided intubation. The posterior cervical MRI showed the AOD as well as an unstable atlantoaxial rotatory subluxation (AAS), so she underwent an occipital-C2 arthrodesis and a tracheostomy. Sixteen days later a neck CT scan informed of the resolution of the hematoma so the patient was successfully decannulated. A month later no improvement is still seen in the neurological exploration.

Discussion: This is a case of a patient with an AOD and an AAS. Both are relatively rare injuries but the association of both in the same patient is extremely unusual. The early diagnosis and stabilization surgery were crucial for the survival of the patient, as well as the rapid airway protection. Furthermore, the initial neurological exploration could not be explained neither with the findings on the CT nor the MRI so it led us to believe that the injury of several cranial nerves was due to a nerve traction because of the trauma(2).

References:

Learning points: The management of the craniovertebral junction injuries that arrive to the hospital, the role of the prehospital emergency services and the importance of an early diagnosis and surgical stabilization.

6194

Trauma in “the very old age”: experience at a spanish level I trauma center
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Introduction: The number of elderly people will increase during the next few decades. More importantly, the number of people aged 80 or above are projected to increase 100% in developed countries. In Spain, people over age 80 were 4.68% of the population in 2009, and this will increase to 6.19% in 2019. That has implications in the health services and in the management of trauma patients.

Material and methods: We did a retrospective cohort analysis of trauma patients ≥ 80 y.o. admitted to our Level I Trauma Center during the time-period of 2009-2019. Demographic data, ICU care, and mortality were assessed.

Results: 109 trauma patients ≥ 80 y.o. were admitted during that period. This is a 200% increase compared with the number of patients admitted during the previous decade (1999-2009). Mean age was 84.8±2.4 years, and median New Injury Severity Score (NISS) was 17 (interquartile range 13 to 27). 46% were male. The mechanism of injury was 50% falls, and 47% pedestrian runovers. 45 patients were admitted to ICU, with median NISS of 25 and mortality rate of 38%. Among severely injured trauma patients (NISS ≥35) the hospital mortality rate of those ≥80 years was 90%, much higher than in the age group of 65-79 years (40%), with a significant difference (p<0.05). No differences mortality rates between 65-79 years and younger with the same NISS.

Conclusion: The geriatric trauma patient population is on the rise worldwide. This should be taken into account in our trauma centres in order to be able to adapt and try to improve trauma care in these patients.

References:

4752

Started basic life activity in the rural Dutch province of North-Limburg. Results of the preliminary Prehospital Resuscitation Analysis Limburg (PRAL)
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Background and Goal of Study: Aim of this study is to achieve information about theprehospital started basic life activity (BLS) and connection with an AED before Emergency Medical Service (EMS) arrival (EMSA).

Materials and Methods: Data from december 2017 until march 2018 are analysed by standard registration consisting of patient file report and a questionnaire. Patients younger than 18 years were excluded.

Results and Discussion: In total 120 emergencies fulfilled the criterias of resuscitation (chest compression and ventilation). The average age was 62.56 years, 19 (15.85) patients were older than 80 years. The cardiac arrest was witnessed in 71 cases (59%). In totally 85 patients (54,17%) died on scene, 55 patients (45.8%) were transferred to the hospital. Documentated heart rhythm by arrival of the EMS was asystole in 44 (36.3%) cases, Pulseless Electrical Activity(PEA) in 37 (30.6%) cases, Ventricular fibrillation (VF) in 33 (27.3%) cases. Basic life support was started in 83 cases (69.16%) before EMSA. The average time of arrival of the EMW was 8 minutes and 25 seconds. An AED was connected in 59 cases (49.16%) before ambulance arrival. In 20 cases the first shock was given by an AED. This means that in 32% the first AED rhythm was a shockable rhythm. In 39 cases a non shock rhythm was detected as first rhythm. VF was registred by 14 patients without an AED. In 20 cases the first defibrillation was given by an AED. Compared to the data of the German Resuscitation Registration (1) a difference is seen in the rate of started BLS by EMS arrival (47.4% versus 69%).

Conclusion: The established combination of well trained citizens, professional and voluntary organizations e.g. police agents, firefighters and civil first responders can achieve a high start quote of Basic Life Support in case of Out-of-hospital Cardiac Arrest (OHCA).

References:
Laryngeal mask facilitated bronchoscopic intubation in a case of scleroderma

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Background: Scleroderma is a connective tissue disorder. Its name depicts the primary sign, which is hard (sclero-) skin (dermis- in Greek). Characterized by an excessive production of collagen, results in tissue fibrosis and thickening. There are two main types of scleroderma, localized and systemic. In the latter, heart, digestive tract, lung and renal involvement may present. Head and neck region is involved in approximately 70% of cases. Characteristic orofacial features comprise a mask- or mousse-like face due to the pinched nose, atrophy of the nasal ala, thin and rigid lips and loss of normal for age facial wrinkles or sagging. Other features are inability for wide mouth opening, reduced inter incisor gap, tongue rigidity and xerostomia. All the above represent an anaesthetic challenge, when intubation is considered.

Case Report: A 60y old woman, with a 6-years history of scleroderma, controlled arterial hypertension and dyslipidaemia, presented for scheduled laparoscopic cholecystectomy. As expected, the patient had a difficult airway (Mallampati III) with an thyromental distance below 4cm. Anaesthesia was induced with propofol, fentanyl and rocuronium. Laryngeal mask (#4 i-gel®, Intersurgical, UK) was successfully inserted and a 7cm I.D. endotracheal tube was passed through the mask, guided and confirmed over a single use flexible videoscope (AMBU® a Scope,Denmark). Nasogastric tube was also inserted through the i-gel mask, since the operation table was lateral, in order to avoid the cardiac compression. The patient’s recovery was excellent and she was extubated with no airway trauma or complaint.

Discussion: Scleroderma is a challenge for intubation. Successful attempts have been made with the use of optical stylets. Fibreoptic-guided tracheal intubation using a supraglottic device as a conduit has also been used, with no difference between LMA Protector and i-gel devices.


Learning points: New generation supraglottic and bronchoscopic devices provide an excellent alternative for difficult airway problems as scleroderma.

Conclusion: Blind intubation with an I-gel® as intubation conduit is not recommended.

Usage of Supreme laryngeal mask for optimization of the respiratory support in a multidisciplinary hospital

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Background and Goal of Study: There is still a question how to solve the problem in the absence of modern devices for tracheal intubation (TI) with a patient having “difficult airway”. We wanted to evaluate the efficiency and safety of Supreme LM (SLM) in case of total myoplegia and mechanical ventilation while performing planned laparoscopic cholecystectomy for patients with predictable and unpredictable difficult TI.

Materials and Methods: 102 patients with signs of predictable difficult TI - 77, with unpredicted - 23. CORMAC 3-4; I – II class ASA; 56.2±12.2 years, 98.5±9.6 kg. Examination was performed using the Mallampati and Wilson scales, the Patla test, and the determination of the atlanto-occipital angle. In the presence >4 predictors of difficult TI, patients underwent direct laryngoscopy. Induction: diprivan 182.0±11.5 mg, fentanyl 0.14±0.05 mg, rocuronium 65.0±11.3 mg. Maintenance: Sevoran 1.5±0.5 ml, SpO2 = 98-100%, EtCO2 = 34.5 ±1.6 mmHg After applying the CP there was no leakage. The duration of the surgery is 38.1 ±12.5 min, general anesthesia is 58.3±13.6 min. At the end of the surgery, SLM was removed at TOF ≥90%. The leak, the drainage canal was “sealed” and, after application of carboperitoneum (CP), a gastric tube was installed. CP exposure time> 30 min. in the Fowler position. At the end of the surgery, all patients were injected with Sugammadex 2 mg/kg at TOF 1-2.

Results and Discussion: 79 patients (77.5%) had 4-5 signs of predicted difficult TI, 23 patients (22.5%) had 2-3 signs. In 100% of cases, SLM was established on one try after 4.3 ± 0.4 min. Ventilation through SLM was adequate without audible and visible leakage. 

Respiratory Mechanics: P< 15-18 cmH2O, VT med. = 515.5 ± 65.0 ml, SpO2 = 98-100%, EICO2 = 34.5 ± 1.6 mmHg After applying the CP there was no leakage. The duration of the surgery is 38.1 ±12.5 min, general anesthesia is 58.3±13.6 min. At the end of the surgery, SLM was removed at TOF ≥90%. The time from the end of the surgery until the removal of the SLM was 160.5 ±32.5 sec. 25% of patients indicated slight sore throat, which passed in 5-10 min. after removing the SLM. There was no regurgitation and aspiration, as well as respiratory complications.

Conclusion: SLM has established itself as a highly efficient, simple andatraumatic device. The usage of SLM in the combination of rocuronium + Sugammadex for "difficult airway" allows you to quickly start surgery, avoid residual curarization and increase the turnover of the operating table.

4528

Blind intubation through an i-gel® in prone position: a prospective case series

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Background and Goal of Study: Accidental extubation in prone position is an emergency in which quick and low-resource demanding airway management is required. Regain of oxygenation is the goal, but intubation may be required for patients with ARDS in prone position to regain oxygenation. Blind intubation through an i-gel® may be such a quick and low-resource demanding method. This study aims to determine the success rate of intubation through an i-gel® in prone position.

Materials and Methods: Patients scheduled for short lasting lumbar surgery were eligible for inclusion in this prospective study. Exclusion criteria were BMI > 32, edentulous state, mouth opening < 3 cm, professional voice usage or increased aspiration risk. Patients laid on the operation table in prone position and general anaesthesia was induced with propofol and remifentanil. An i-gel® was inserted and a correct position was confirmed by obtaining etCO2 and low leakage volume. The first two attempts were blinded for the anesthesiologist, but an anesthetic nurse followed the on-screen intubation and was able to stop intubation if harm was imminent. The first attempt was with the head in neutral position and the second attempt was with the head rotated to a lateral position. The third attempt was an on-screen intubation for the anesthesiologist and every maneuver to facilitate intubation was allowed. Once a tube was placed endotracheally, no further attempts were performed.

Results and Discussion: The study was terminated early because the success rate of 70% was not achievable. 73 patients were screened for inclusion, 18 patients met exclusion criteria and 14 patients agreed to participation. Ventilation using the i-gel® was successful in 13 patients (93%, 95%CI: 79-100%). Intubation was successful in 1 patient in the first attempt (8%, 95%CI: 0-22%), 1 patient in the second attempt (8%, 95%CI: 0-24%) and in 3 patients in the third attempt (27%, 95%CI: 1-53%). The overall success rate was 36% (95%CI: 11-61%).

Conclusion: This study shows that in emergency airway situations in prone position insertion of an i-gel® may be considered, but blind intubation with an i-gel® as intubation conduit is not recommended.
**4782**

The comparison of 2-n generation laryngeal tube vs laryngeal mask in paralysed patients undergoing laparoscopic hysterectomy with controlled ventilation

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**Background and Goal of Study:** Tilt date, the endotracheal tube was considered as the gold standard for laparoscopic procedures under general anaesthesia. The disadvantages of tracheal intubation are haemodynamic responses, trauma of oropharyngeal structures, failed intubation and hypoxia. This requires a better and safe alternative. Goal of study - to compare the laryngeal tube (LTS-D) and Supreme laryngeal mask airway (SLMA) in patients undergoing laparoscopic hysterectomy under general anaesthesia.

**Materials and Methods:** prospective single-center randomised study was conducted on 100 ASA II female patients, 50 each in two groups, who were posted for laparoscopic hysterectomy. Patients with anticipated difficult airway, morbid obesity, oropharyngeal pathology or at increased risk of aspiration were excluded. Preoxygennation and induction of anaesthesia LTS-D (group 1) or SLMA (group 2) were inserted and cuff inflated. The outcomes measured were as follows: successful placement of the devices from 1-st attempt, time required for insertion; oxygen saturation (SpO2) and end-tidal carbon dioxide (EtCO2); oropharyngeal seal pressure (the PAP was not allowed to exceed 40 cm H2O); the PAP at the intra-abdominal pressure (IAP) 14 mm Hg; incidences of gastric distension (by surgeon), intraoperative and postoperative complications.

**Results and Discussion:** There were no significant differences between groups by success rate for the first attempt 96% in group 1, 92% in group 2 (p=0.86), 100% successful insertion was in both groups from two attempts. Mean time for insertion was 16.7 s (12-20.3 s) and 19 s (15.4-22.6 s) for group 1 and group 2, respectively (p=0.079). There were no statistically significant differences in SpO2 or EtCO2 between the two groups before or during peritoneal insufflation. Maximal PAP at IAP 14 mm Hg during 5 min was 19 (18-20) cm H2O and 18 (16-20) cm H2O for 1 and 2 groups, respectively, (p=0.68). Oropharyngeal seal pressure was higher (p=0.011) for LTS-D group (33 cm H2O; 27-38) than in SLMA group (26 cm H2O; 23.5-29). There was no case of regurgitation, or aspiration recorded. No significant difference in laryngopharyngeal morbidity was noted.

**Conclusion:** A properly positioned LTS-D and SLMA provided high degree protection of airways against aspiration and equally effective ventilation during laparoscopic hysterectomy.

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**4869**

A randomized controlled trial comparison of LMA Gastro, classic LMA and endoscopy mask for anesthesia during adult gastroscopy

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**Background and Aim:** The use of endoscopy masks during monitored anesthesia care for routine gastroscopy is very prevalent due to the ability to combine spontaneous breathing with moderate to deep sedation. Endoscopy masks are associated with disadvantages for both patient and anesthesiologist. There is growing anesthetic interest in the use of the classic laryngeal mask and the recently developed dual channel LMA®GastroTM during gastroscopy under anesthesia. The latter device is equipped with a second channel for gastrointestinal insertion, while maintaining an unobstructed airway. This single blinded randomized controlled trial is aimed to investigate whether LMA®GastroTM is equally efficient in maintaining safe oxygenation compared to the endoscopic mask and the classic laryngeal mask during anesthesia for elective gastroscopy in adults.

**Method:** After Ethical Committee approval and obtaining informed consent, 65 patients scheduled for elective gastroscopy were included between July and September 2018. Patients were randomly assigned to endoscopy mask (N=22), classic laryngeal mask (N=20) or LMA®GastroTM(N=23). Sedation was with BIS adjusted IV propofol (BIS 45-55). SpO2 and FiO2 were automatically registered every 30 seconds. The area under the curve was calculated for both SpO2 and FiO2. ANCOVA was performed to detect group-related differences in saturation while controlling for relevant variables that could influence patients' saturation: BMI, smoking behaviour and FiO2.

**Results and Discussion:**

**Table 1. Descriptive statistics of the sample**

<table>
<thead>
<tr>
<th></th>
<th>Endoscopy mask (N = 22)</th>
<th>Classic laryngeal mask (N = 20)</th>
<th>LMA®Gastro™ (N = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (Mean, %)</td>
<td>9 (4.0)</td>
<td>10 (47.8)</td>
<td>12 (52.6)</td>
</tr>
<tr>
<td>Age (Mean, SD)</td>
<td>49.3 (14.9)</td>
<td>58.5 (16.5)</td>
<td>54.7 (11.4)</td>
</tr>
<tr>
<td>BMI (Mean, SD)</td>
<td>25.7 (6.8)</td>
<td>26.3 (7.5)</td>
<td>26.7 (7.6)</td>
</tr>
<tr>
<td>SMDeter (Mean, %)</td>
<td>11 (50.0)</td>
<td>11 (55.0)</td>
<td>15 (65.2)</td>
</tr>
<tr>
<td>Duration gastroscop (Mean, SD)</td>
<td>10.4 (4.2)</td>
<td>12.3 (4.1)</td>
<td>12.5 (5.3)</td>
</tr>
</tbody>
</table>

Table 1 provides the patient's characteristics.

After checking for assumptions, ANCOVA was conducted. Results indicate no significant differences in patients' SpO2 between the three groups after controlling for BMI, smoking and FiO2(F(2,51)=0.16, p=.85). Both BMI (F(1,51)=8.20, p<.006) and FiO2 (F(1,51)=14.78, p<.001) were significantly related to patients' SpO2, smoking behaviour was not (F(1,51)=3.20, p=.08).

**Conclusion:** No overall difference in patients' saturation could be found between the endoscopy mask, the classic laryngeal mask and the LMA®GastroTM even after taking into account other parameters such as the percentage of inspired oxygen, BMI and smoking behaviour.

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**4580**

Respiratory complications in pediatric anesthesia associated with the removal of ProSeal™-Laryngeal Mask Airway (PLMA) during immediate postoperative period

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**Background and Goal of Study:** Respiratory complications are the most common and feared problem in pediatric anesthesia. The type of device used to secure the airway is identified as one of the risk factors. This study was conducted to determine possible respiratory complications that can occur in immediate postoperative period after removal of PLMA in the pediatric population.

**Materials and Methods:** A group of a hundred and ten patients with ages between 0 to 15 years, for various procedures requiring general anesthesia with minimum duration of 2 hours, were included in a prospective observational study during 2015 to 2017. They were induced with sevoflurane and the ProSeal™-LMA, was put following the instructions of the manufacturer, according to patient's weight. The anesthesia technique and controlled ventilation were standardized. The muscle relaxant was used only for respiratory complications or inadequate mechanical ventilation. The PLMA was removed as soon as patients regain spontaneous breathing with expired sevoflurane less than 0.3. Any occurrence after the PLMA removal was recorded (laryngospasm, bronchosomus, cough, desaturation <95%, stridor, bleeding, sore throat) then the data was analyzed using Statistical Package for the Social Sciences (SPSS).

**Results and Discussion:** The laryngospasm was seen in 8 cases out of 110 (7.27%); in 6 cases patient recovered with positive pressure ventilation. The other 2 patient required deepening of sedation with propofol and administration of succinylcholine. In this group, 5 patients were younger than 3 years old and had a history of respiratory infection within 10 days. The cough was most common complication. No bronchosomus, sore throat nor bleeding was present in our patients, which are possible complications of tracheal intubation.
Comparison of the air-Q® sp versus the LMA® Supreme™ in adults undergoing gynecological laparoscopic surgery: A single-blind, Randomized Controlled Trial

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Background and Goal of Study: The supraglottic airway device (SAD) is a good alternative to endotracheal intubation in general anesthesia. The LMA® Supreme™ has been shown in previous studies to be clinically useful in laparoscopic surgery under general anesthesia, but little research has been performed on the usefulness of the self-pressurized air-Q® sp. The purpose of this study was to compare the clinical suitability of the air-Q® sp and the LMA® Supreme™ in gynecological laparoscopic surgery.

Materials and Methods: Fifty-two patients (American Society of Anesthesiologists class I-II) scheduled for gynecological laparoscopic surgery were randomly assigned to one of two groups: the air-Q® sp group or the LMA® Supreme™ group. We evaluated perioperative ventilatory parameter including the airway leakage pressure, peak inspiratory pressure, leakage rate and other signs over time evaluated.

Results and Discussion: The air-Q® sp has lower airway leakage pressure than the LMA® Supreme™. However, there were no significant differences in peak inspiratory pressure and leakage rate between the two groups. The airway leak pressure was higher than the peak inspiratory pressure at all times in both groups.

Conclusion(s): The results produced by air-Q® sp were comparable to those of LMA® Supreme™. Therefore, the use of air-Q® sp is considered clinically useful and safe.

| Sex (M : F) | 28 : 4 |
| Age (years) | 46.1 ± 11.8 |
| Height (cm) | 171.0 ± 6.6 |
| Weight (kg) | 69.9 ± 15.2 |
| Disease duration (Month) | 13.9 ± 17.2 |
| Site (UE : LE) | 8 : 24 |
| Diagnosis (CRPS 1 : CRPS 2 : non CRPS) | 13 : 9 : 10 |

Two right crico-arytenoid subluxations after l-gel laryngeal mask insertions

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Background: Persistent crico-arytenoid subluxations are a rare complication of laryngeal mask insertion. On literature search only one case of left crico-arytenoid subluxation and three cases of right crico-arytenoid subluxation were retrieved with no information of what type of laryngeal mask was used.

Case report: There are two cases of right cricoarytenoid subluxations within one year-period after the l-gel laryngeal mask insertion in a regional hospital. These 2 cases were a 50 years old male and a 69 years old female underwent operations under general anesthesia with l-gel laryngeal mask. Hoarseness of voice was noticed at post-operative care and video-laryngoscopic examination revealed erythematous edematous right vocal cord with limitation of movement of the cord and its joint in both case.

Results and Discussion: Patient 1 received the right humerus head fracture fixation with arthroscopy under general anesthesia. The patient progressively recovered after 3 months, but still had residual hoarseness of voice and cough on drinking. After half a year, the patient’s hoarseness improved and recovered completely after a year. Patient 2 received the breast tumor removing surgery under general anesthesia with l-gel laryngeal mask. The patient recovered after one week but retained hoarseness of voice. This patient recovered fully after a month. By observation of the video image of these two patients, both of the vocal apertures are inclining to the left side with the esophageal aperture situated postero-laterally at the left side of the midline. In a study that was still collecting cases of CT image of the laryngeal mask we found that most of the patients had the esophageus aperture at the left side of the midline with the vocal cord inclining to one side with the right vocal cord situated slightly posterior to the left vocal cord anterior to the cervical vertebral body. This means that if a laryngeal mask is put into the pharynx and if it is forced to fix at the midline anterior to the cervical vertebral body, it will eventually push the posteriorly placed right vocal cord and its cricoarytenoid joint anteriorly. It will potentially cause subluxation of the joint but may not essentially cause a persistent subluxation. Some cases may turn to persistent subluxation if the effect lasts longer in prolonged operation time.

Learning points: These two cases and the three cases in the literature give some clue to the right-sided selection of this rare complication.

Application analysis of the spatula-assisted technique in placing a flexible laryngeal mask airway

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Background and Goal of Study: This study aimed to explore the feasibility of placing a flexible laryngeal mask airway (fLMA) with the spatula-assisted technique. Materials and Methods: A total of 64 patients scheduled for elective surgery under general anesthesia with fLMA, aged 18-80 years old, ASA III. The patients were randomly divided into standard finger-guided group and spatula-assisted group using random envelope method, with 32 cases in each group. The insertion time of fLMA, oropharyngeal leak pressure were measured, the fiberoptic view score, first insertion success rate and sore throat were recorded in two groups.

Results and Discussion: Sixty-two patients were available for final statistical analysis, with 31 cases in each group. Fiberoptic view score and oropharyngeal leak pressure were significantly higher in the spatula-assisted group than those in the standard finger-guided (t=4.241, P<0.001; t=-4.474, P<0.001). There was no significant difference in the first insertion success rate between two groups. The insertion time was significantly longer in the spatula-assisted group than that in the standard finger-guided (t=-15.171, P<0.001). There was no sore throat within 24 hours in both groups.

Conclusion: The spatula-assisted technique can significantly improve the efficiency of fLMA, and it can be promoted in clinical anesthesia.
Comparison of ultrasound and fibre optic bronchoscope guided percutaneous tracheostomy

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Background and Goal of Study: Percutaneous tracheostomy is among the most commonly performed procedures in critically ill patients in intensive care units. It has many potential advantages over endotracheal intubation such as reduced laryngeal ulceration and respiratory resistance, early weaning and easier nursing care, ability to perform bedside. Despite numerous advantages, this may also cause serious complications due to its invasive nature. It can be performed under ultrasound or fibreoptic bronchoscope guidance to minimize complications. Recent data suggest that ultrasound can be alternatively used in percutaneous tracheostomy, hence our aim is to compare posterior tracheal wall hit total time taken for each procedure, cannulation site in relation to carina, number of needle puncture attempt.

Materials and Methods: This prospective randomised study was conducted in critical care unit of Department of Anaesthesia, JN Medical College, Amritsar, in total 50 patients, 25 in each group after ethical clearance (CTRI number CTRI/2019/11/021669). They were randomised by chit in the box method into USG group who received ultrasound guidance and FOB group who received Fibreoptic guidance and underwent percutaneous tracheostomy using Griggs technique. In USG group, we included a third physician who is not part of the study and he used fibreoptic to observe complications and noted them only and the performing physician was blinded from this. SPSS software of latest version was used for statistics. Mean, percentages, independent student’s t-test were used for comparison in between groups.

Results and Discussion: The mean number of posterior tracheal wall hit either introducing needle or griggs forceps tip was significantly higher in USG group than FOB group (1.47±1.06 vs 0.9±0.35). Posterior tracheal wall hit in USG group was observed in 7, 7, 2 in 7, 6, 4 and 4 in 5 cases. Cannulation site in relation to carina was more towards laterally in USG group than FOB group (19.76% vs 4.16%, p=0.05). Total duration was higher in FOB group than USG group (0.05) and number of needle puncture attempt was more in USG group (2.13±0.74 vs 1.06±0.62, p=0.05).

Conclusion: USG group may have advantage of lesser time duration and better neck anatomy examination but more posterior tracheal wall hit, cannulations away from centre and needle puncture attempt results in support of use of bronchoscope to enhance the reliability of the percutaneous tracheostomy.

Physiology in Anaesthesia Regarding Apnoeic Oxygenation during nasal cannula therapy at different flow rates (PHARAO)

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Background and Goal of Study: Oxygenation via high-flow nasal cannula (HFNC) postulates a ventilatory effect and thus increased elimination of CO2. Recently, we demonstrated the absence of significant differences between high- and low-flow oxygen in children regarding the rates of CO2-increase per minute and apnoea time [1]. This study investigates apnoeic oxygenation and the effect of different O2 flow rates on the rate of increase of CO2 in adult patients undergoing general anaesthesia.

Materials and Methods: With ethics committee approval and written informed consent, this single-centre, single-blinded, randomised controlled trial compares five groups: 1) Minimal-flow group: 0.25 l/min via a tracheal tube; 2) Low-flow group: 2 l/min using jaw thrust; 3) Medium-flow group: 10 l/min using jaw thrust; 4) High-flow group: 70 l/min using jaw thrust; 5) Control group: high-flow 70 l/min using continuous laryngoscopy. After induction of standardised anaesthesia including preoxygenation and neuromuscular blockade the groups were allocated to the randomised intervention. Every two minutes, arterial blood gases were analysed. The study intervention ended with either SpO2 <92 %, PICCO >100 mmHg or if 15 min of apnoea time were reached.

Results and Discussion: To date, 98 patients have been included (minimal-flow 10 patients, low-flow 20, medium-flow 21, high-flow 22, control 23). The patients were male [36] (49% [30-62] years old, weight 67 ±48 kg, and 45 were female. In the control group, the model revealed an arterial CO2 increase of 2.0 [1.9-2.3] mmHg/min-1. None of the four intervention groups showed significantly different rates of increase: minimal-flow 2.0 [1.9-2.4] mmHg/min-1, low-flow 2.1 [1.9-2.3] mmHg/min-1, medium-flow 1.9 [1.7-2.4] mmHg/min-1, and high-flow 2.0 [1.8-2.3] mmHg/min-1.

Conclusion: Our preliminary results show no significant difference between the 5 groups regarding arterial CO2 increase. This challenges the "ventilatory effect", the idea that the clearance of CO2 is linearly dependent on oxygen flow rates during HFNC.


Apnoeic Oxygenation in Intubation: Prolonging the Time of Safe Apnoea. A Systematic Review and Meta-Analysis

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Background and Goal of Study: The management of the airway is a fundamental part of the anaesthetic act, multiple strategies have been proposed enhance safety during laryngoscopy to achieve a definitive approach of the airway, i.e., tracheal intubation. Our aim is to evaluate the effect of apnoeic oxygenation in the safe apnea time in patients older than 18 years scheduled for elective surgery with general anesthesia.

Materials and Methods: We reviewed the MEDLINE/PubMed, EMBASE, Cochrane Library, Scopus, and Google Scholar databases, Mesh terms "apnoeic oxygenation", "nasal cannula", "randomized controlled trial" with unlimited start date to April 2019, unlimited start date to April 2019, there wasn’t restriction on language for randomized-controlled trials (RCTs). Eligibility criteria: RCTs of adult patients (age older, 18 yr) who received general anaesthesia for elective surgery, who required Orotracheal Intubation, that compared apnoeic oxygenation with nasal cannula or nasopharyngeal catheter against Traditional preoxygenation strategy. Which reported results in severe desaturation>80% SpO2, Safe apnea time SpO2>92%, and complications of any etiology. All statistics were performed using Review Manager 5.3 (Cochrane Collaboration, Oxford, UK).

Results and Discussion: Our primary Outcome was Safe apneoa time is the result reported in all 6 articles (n = 205) patients who were intubated for elective surgery without prior respiratory failure, in the group using nasal oxygenation with nasal or nasopharyngeal catheter with low oxygen flows, a significant increase safe apnea time to 1.97 minutes is achieved (85% CI 1.38, 2.55) with heterogeneity (I2 = 93%, P <0.01).

Conclusion: Apnoeic Oxygenation is associated for prolonging the time of safe apnea by 1.97 minutes, time that can make a difference in situations in which a longer airway is addressed since a longer period of time will be obtained to offer a secure intubation without desaturation. Our study showed that using this strategy is simple, economical and safe.

Shuttlescope®, a novel laryngoscope. Is one-handed endotracheal intubation feasible?

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Background: Despite the fact that video-laryngoscopes have largely improved laryngoscopy, endotracheal intubation (ETT) is still a two-handed procedure, as the second hand is required for the actual introduction of the endotracheal tube (ETT). Shuttlescope® is a novel laryngoscope that allows performing both laryngoscopy and delivering of the ETT using one hand, leaving an extra hand free.

Hypothesis: Shuttlescope® videolaryngoscope allows effective and safe ETT by ensuring laryngoscopy and delivering of the ETT with only one hand. It also improves safety by leaving an extra hand free.

Objective: To compare efficacy and safety of ETT with Shuttlescope® and Macintosh laryngoscope by anaesthesiologist in a manikin model.

Methods: We conducted a randomized cross-over trial to assess efficacy and safety of Shuttlescope® videolaryngoscope compared to Macintosh laryngoscope in a manikin model (AirSim, TureCorp®). Primary endpoints were time to intubation and success rate after three attempts with each device. Secondary endpoints quantified the necessity of the right hand to manipulate the ETT during ETI and availability
Clinical examination and radiographic studies
We included a total of 6 patients. VL in 5 of 6 patients was progressed until 2 cm proximal to carina. After positive capnography was the airway. The trachea was identified and entered without problems and the ETT mouth to tolerate VAMA® canula. The SAYGO technique was used to anesthetize 5% lidocaine. In the operation room (OR) topic 10% lidocaine was applied in the isolation. The patient was premedicated with atropine, midazolam and nebulized

We decide to realize awake fibreoptic oral intubation with a flexometallic and extension.
Mallampati, normal thyromental distance, mandibular length and cervical flexion
Preoperative airway evaluation: class III bite test, limited mouth opening, class IV surgeries, obesity grade III, obstructive sleep apnoea and Crohn’s disease.

Background:
Treacher Collins syndrome (TCS) is a congenital malformation of craniofacial development where conventional direct laryngoscopy is difficult and often unsuccessful because of the upper airway malformation. 

Case Report: 30-year old woman with TCS needed surgery for left lower pulmonary lobe adenocarcinoma. Her medical history includes numerous craniofacial development where conventional direct laryngoscopy is difficult and often unsuccessful because of the upper airway malformation. 

Discussion: The difficult airway in thoracic surgery is a challenge. Double-lumen endobronchial tubes may be difficult to place in anticipated and non-anticipated difficult airway. Awake fibreoptic intubation is the gold standard for anticipated difficult airway in patients with limited mouth opening. When anticipated, awake fibreoptic intubation followed by EB placing is a safe choice for the non-expert in thoracic anaesthesiology. 

References:

Learning points:
1. The fibreoptic bronchoscopy is a gold standard for awake difficult airway intubation in patients with limited mouth opening. 2. EB is a good alternative to double-lumen endobronchial tubes in difficult airway.

The role of virtual laryngoscopy in preoperative airway assessment.

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Background and Goal of Study: Clinical examination and radiographic studies play a significant role in the airway evaluation of the head and neck tumor (HNT) surgery patients but have flaws as predictors of intubation difficulty. To overcome these obstacles a comprehensive airway assessment with free online imaging software was performed. Images from patients diagnostic computed tomography (CT) study were obtained to reconstruct three-dimensional virtual laryngoscopy (VL). The goal of the study was to determine whether VL is capable of predicting precisely the view of the larynx during direct laryngoscopy.

Materials and Methods: The study was performed at Oncology Centre of Latvia and included patients with the HNT. The selection criteria for inclusion were upper respiratory tract tumor and a pre-operative CT scan which was used to create virtual laryngoscopy three-dimensional images using RadAnt DICOM Viewer 5.0 (Medixant, Poland). Preoperative assessment of airways was performed using EI-Ganzouri index and when available images of nasendoscopy were obtained. After the induction of anesthesia, a photograph of the direct laryngoscopy view was recorded. Cormack-Lehane laryngoscopy view, ability to identify obstructive hypopharyngeal lesions precluding intubation and presence of supraglottic lesions were compared between VL images and photographs of direct laryngoscopy view.

Results and Discussion: We included a total of 6 patients. VL in 5 of 6 patients precisely identified laryngeal view during laryngoscopy. Hypopharyngeal airway obstruction was seen on VL reconstructions in 3 of 4 cases. In all cases, airway anatomy information obtained from VL was inferior to unprocessed diagnostic CT and nasendoscopy.

Conclusion: VL as a single technique is not successful in predicting difficult airways in patients with HNT tumors. Multidisciplinary assessment with involvement of radiologists and surgeons allows to anticipate possible problems better.

Assessing improvement of intubation skills with flexible bronchoscopy (FB) by training on an airway simulator

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Background and Goal of Study: The difficult airway remains challenging not only for novices, but also for experienced anaesthesiologists. With current airway equipment, exposure to using FB for intubation decreases constantly. We investigated whether regular training with a bronchoscopy simulator of experienced users in FB improves fibreoptic skills.

Materials and Methods: Using the ORSIM bronchoscopy simulator1, 24 volunteers with some skills in using FB performed 6 exercises (one game, followed by two basic and three difficult airway procedures) at baseline, at 6 and 12 months. At baseline, volunteers were randomized to either no training (control), or practicing with the ORSIM (intervention) every 6 weeks for 10 minutes using a game to hit targets. Main outcome was difference in time to successful management of difficult airways at 12 months. Secondary outcomes included difference in distance with fiberoptic, rotation, direction changes, tissue collisions, and confidence in own skills at 12 months.
Results and Discussion: Duration to finish difficult airway cases at baseline (cases a-c, fig. 1a) and at 12 months (cases g-l, fig. 1b) we’re not different between control and intervention group.

Figure 1a. Duration (min) at baseline, Cases ABC
Figure 1b. Duration (min) at 12 months, Cases ABC

Conclusion: Training fiberoptic skills by a game on an airway simulator did not overall improve performance for FB, although it improved some handling aspects during FB.

References:

5166

Ultrasonic verification of intubation tube
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Background: Confirmation of the endotracheal tube (ETT) position in the trachea is important for the safety Protocol in maintaining upper airway patency. The search for new perspective methods of ETT visualization allowed to pay attention to ultrasonic visualization. The goal of the study was to determine the features of ultrasonic verification of the intubation tube (IT) in the trachea.

Materials and methods: The study was performed in 20 patients. All patients underwent ultrasound scanning of the trachea before, during and after endotracheal intubation. Ultrasound research was performed from four positions of the ultrasound sensor: in the longitudinal, suprasternal, transcricoid and transthoracic positions. During intubation the endotracheal tube location was verified by direct and indirect methods. Direct took all the methods when it is possible to see ETT or its parts on ultrasound. Indirect included methods when it wasn't possible to determine the ETT, but it was possible to suspect the location of the ETT in the trachea. Indirect methods included: pleural sliding, detection of the esophageal ring during esophageal intubation, the phenomenon of “double path” (the appearance of a second echogenic shadow during esophageal intubation).

Results: Ultrasound studies have shown that the direct method in the longitudinal position of the sensor was able to visualize ETT in 100% of patients (n=20). Visualization became possible due to the use of reinforced ETTS and filling the cuff with 0.9% NaCl. The presence of a spring in the wall of the reinforced ETT allowed to differentiate the tissue-air border, filling the cuff created the possibility of visualization of the ETT from the front to the back wall. From suprasternal and transcricoid position to visualize ETT was possible only in 80% (n=16) cases. Indirect methods were able to determine the location of ETT in 100% (n=20) patients, which led to timely detection of esophageal intubation.

Conclusions: It is possible to see the intubation tube in the trachea by direct methods but it is difficult because it is easily confused with the tissue-air border or other anatomical structures. The use of reinforced tubes or filling the cuff with fluid greatly facilitates the finding of the intubation tube in the trachea by ultrasound, especially in the longitudinal position of the sensor. 3. Ultrasound is the fastest method of detecting esophageal intubation by detecting the phenomenon of “Double path”.

5018

Voice Analysis as a Preoperative Prediction Method of a Difficult Airway, preliminary results
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Background and Goal of Study: The occurrence of an unpredicted difficult airway is one of the greatest challenges faced by anesthesiologists. These situations are rare, as the prevalence is 2.2% in the general population. However, might entail severe complications. Therefore, a preoperative airway assessment is paramount. Traditional predictive tests evaluate multiple anthropometric characteristics in which the physical presence of the patient is mandatory. Nevertheless, none can predict a difficult airway based on a single characteristic nor remotely. In this pilot study, we propose that voice characteristics analysis could reflect airway’s anatomy and correlate with Mallampati. Building on this, future studies will be performed on a remote voice airway assessment method to replace anthropometric parameters evaluated in traditional tests to predict a difficult airway

Materials and Methods: We recorded 5 vowels (A,E,I,O,U) of 54 patients in neutral, extension and hyperextension positions with a smartphone located 15cm from the mouth in sitting position. Mallampati grade and clinical characteristics of the patients were collected during the preoperative visit. Voice signal was labeled, and parameters related to frequency, morphology and perturbation were extracted employing Matlab®. To determine the statistical significance of the differences within parameters the non-parametric test of Kolmogorov-Smirnov was used. These variables were introduced into several classification algorithms based on machine learning. Patients were classified into expected easy airway (grades I-II) and expected difficult airway (grades III-IV) according to Mallampati scale.

Results and Discussion: The final sample was divided in 34 easy airway patients and 20 difficult airway patients. The ensemble method algorithm yielded the best results obtaining a 70.0% of sensitivity, 79.0% of specificity and 75.9% of accuracy. Even though, the data obtained is encouraging, not having achieved greater results may be due to Mallampati’s considerable variability and the study’s small sample size.

Conclusion: We can confirm a statistically significant relationship between voice characteristics and Mallampati. Further studies including a larger sample size, testing other classification algorithms and correlating the voice signal with a difficult airway defined by the Cormack-Lehane scale, might enable the development of a voice-based airway assessment method facilitating a remote airway evaluation.

4497

AutoFlow® vs. volume-controlled ventilation for laparoscopic gynaecological surgery using LMA® ProSeal™: A randomised controlled trial
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Background and Goal of Study: LMA® ProSeal™ (pLMA) has been used in laparoscopic gynaecological surgery. During surgery, pneumoperitoneum and the Trendelenburg position would increase the peak airway pressure (PAWP), which can cause airway leak during pLMA anaesthesia. Ventilation-mode AutoFlow® (AF) delivers the set tidal volume at the lowest PAWP (PAPW), which may prevent the increase of PAWP and airway leak of pLMA. We hypothesised that AF would decrease PAWP compared with volume-controlled ventilation (VCV) during laparoscopic gynaecological surgery using pLMA.

Materials and Methods: After the approval by the institutional review board and registration to the UMIN Clinical Trials Registry (identifier: UMIN000023173), this study was conducted in a single tertiary hospital in Japan. Eighty adult women were recruited and randomly allocated into two groups as AF group and VCV group. pLMA fitting was evaluated using the bubble test, ease of gastric tube insertion, oropharyngeal leak pressure (OLP), and fibroscopic score. Further, 8 ml/kg tidal volume and 5 cmH2O positive end-expiratory pressure were used and the respiratory rate was adjusted between 12 and 16 per minute to maintain the end-tidal carbon dioxide at 35–40 mmHg in both groups. PAWP and the audible leak of pLMA were measured at four time points (after insertion of gastric tube, after administration of neuromuscular blocking drug, after initiation of pneumoperitoneum, and after change to Trendelenburg position). The primary outcome was PAWP at both pneumoperitoneum and the Trendelenburg position.
Laparoscopic surgery, which has increased in frequency in recent years, results in less bleeding, less postoperative pain, shorter hospital stay and better cosmetic results compared to open technique. However, although less invasive, lung dynamics can be affected by the pneumoperitoneum. After laparoscopic surgery, atelectasis develops firmly. In our study we aimed to compare the effect of different ventilation modes to prevent atelectasis that develops during perioperative period by using pulmonary ultrasonography in patients undergoing laparoscopic surgery.

**Materials and Methods:** After approval of the ethics committee (KIA 2018/260) (NCT03614845) and written patient approval, totally 60 ASA I-II patients between the ages of 18 to 75 undergoing laparoscopic cholecystectomy under general anesthesia, were included in the study. The patients were randomly assigned into two groups: volume-controlled ventilation (VCV) group (group V) or pressure-controlled-volume guaranteed ventilation (PCV-VG) group (group PV). Preoperative (L1) and postoperative at min. 0 (L2) and min.30 (L3). LUS (lung ultrasonography score) was obtained by lung ultrasonography. In the intraoperative period, hemodynamics data (T1-6) and mechanical ventilation parameters (T2-T3-T4) were recorded at different times.

**Results and Discussion:** Demographic data, length of operation/anesthesia/pneumoperitoneum, hemodynamic data of the intraoperative period and tidal volume were similar between the groups. Peak inspiratory pressure (PIP) was found statistically higher in the group V than the group PV before pneumoperitoneum (T3). Plateau pressure was found higher in the group V than the Group PV at all the times (T2,T3,T4). Compliance was found statistically higher in the Group PV than the Group V at all the times. At T3 and T4 the compliance was determined lower in the group V than the group PV respectively 15% and 14%. LUS score was similar between the groups at all the times. Change of LUS score of right lower anterior chest is statistically higher in the group V than the group PV (p<0.05).

**Conclusion:** We are in the opinion that PCV-VG mode provides optimal ventilatory pressures and maintains high compliance. Additionally, PCV-VG mod might be superior to VCV mode in preventing from atelectasis of lower lung areas, in particular in the right lower lung areas which is exposed to high surgical mechanical pressure during laparoscopic abdominal surgery.

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**6043**

**Does oxycarbon improve cerebral oxygenation during apnea? A mono-center randomized cross-over trial inspired by aviation-research**

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**Background:** Several projects in aviation and high-altitude research have demonstrated improved cerebral perfusion, performance, and oxygenation by adding CO2 in hypobaric hypoxia [1]. Hypoxia is of concern also in anesthesia, especially in patients with a decreased oxygen reserve. This study aimed to test whether 5% CO2 in O2 increases the time until significant cerebral hypoxia was detected by near-infrared spectroscopy (NIRS) in bariatric patients under normobaric conditions.

**Methods:** After ethical approval, patients (18-65 years), BMI >35kg/m2 requiring anesthesia for bariatric surgery at the University Hospital Zurich were included in this mono-centric, single-blinded, controlled, crossover proof-of-concept study. According to the randomization, patients received first oxycarbon (5%CO2, 95%O2) or the comparator (95%O2). After a wash in of 10 minutes, apnea was performed by disconnecting the ventilator from the endotracheal tube until NIRS value dropped by 20% from baseline, or until SpO2 decreased to 80% (as a safety termination criterion). Reventilation was then performed until parameters returned to baseline. With the crossover design, the procedure was repeated with the other substance (oxycarbon or comparator). During apnea, NIRS, vital signs, and bispectral index were recorded permanently, blood samples were drawn at the beginning and the end of the apnea.

**Results:** Based on the power calculation, 30 patients were enrolled. Tissue oxygenation drop by 20% was not reached in this patient population, as the safety termination criterion was reached first. The time until oxygen saturation dropped to 80% was similar after both interventions (mean difference -6s [95%CI from -19 to 7]; p=0.37), but both cerebral tissue oxygenation index and PaO2 were higher after oxycarbon administration (difference of 1.46% [95%CI from: 0.33 to 2.59]; p=0.016, and 0.6 kPa [95 CI: 0.12 to 1.09], p=0.021, respectively).

**Conclusion:** This study demonstrates improved blood and cerebral tissue oxygenation with oxycarbon administration. The possible link to a clinical scenario for improvement of cerebral oxygenation could be investigated in future trials.

**References:**


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**4797**

**Quantitative assessment of atelectasis formation under high frequency jet ventilation during liver tumour ablation**

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**Background and Goal of Study:** Liver tumour ablation treatment has many advantages. The ablation procedure however demands immobilisation of the liver to avoid harm. Total intravascular general anaesthesia, intubation and the use of high frequency jet ventilation (HFJV) has been shown to improve the ablation procedure (1). The formation of atelectasis during general anaesthesia is known, the effects of HFJV during anaesthesia for liver ablation is not well investigated. The aim was to study a) the formation of atelectasis and b) the displacement of the diaphragm over time during general anaesthesia and HFJV.

**Materials and Methods:** This is a prospective, observational study, where computer tomography scans (CTs) of the lung aeration were analysed both manually and in software programme MATLAB during HFJV and general anaesthesia. All patients had i.v. anaesthesia; propofol, remifentanil and rocuronium. They were intubated and ventilated with HFJV (HFJV catheter through the tube). CTs were taken during HFJV; baseline, 15', 30' and 45'. Atelectasis was defined as radiological density of Hounsfield Units -100 to +100. One-way RM ANOVA was used to analyse the results.

**Results and Discussion:** 25 patients above 50 years of age were studied. A decrease in atelectasis volume (p<0.001) and a caudal displacement of the right diaphragm (p=0.047) was observed during the study period, see fig. The reason for the decrease is unclear but might be an effect of intrinsic PEEP known to occur during HFJV. The caudal displacement of the diaphragm, observed in consecutive CT scans was small but significant and could be an effect of less atelectasis as well as other variables such as muscle relaxation, BMI and liver elasticity.

**Conclusion:** HFJV do not have any negative effects on lung aeration, the formation of atelectasis was found to decrease during the HFJV period studied.

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**6030**

**Evaluation of effect of PCV-VG mode vs. VCV mode on atelectasis in patients undergoing laparoscopic surgery: a prospective randomized controlled clinical trial**

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**Background and Goal of Study:** Laparoscopic surgery, which has increased in frequency in recent years, results in less bleeding, less postoperative pain, shorter hospital stay and better cosmetic results compared to open technique. However, although less invasive, lung dynamics can be affected by the pneumoperitoneum.
Automated control of mechanical ventilation during general anaesthesia (AVAS-Study)

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Background and Goal of Study: Automated ventilation has been established in critical care setting for years. With Smart Ventilation Control (SVC, by Drägerwerk AG & Co. KGaA), a system for automated intraoperative ventilation was introduced. Safety as well as efficacy of the use of this system during general anaesthesia have been investigated in this study.

Materials and Methods: SVC controls the patient’s respiratory settings by adjusting respiratory rate, inspiratory pressure, inspiratory time and trigger sensitivity in order to keep the ventilation within adjustable physiological target zones (VT, etCO2). In this prospective bicentric observational study 100 patients were ventilated with SVC. Inclusion criteria were: elective limb or peripheral vascular surgery under general anaesthesia, ASA classification I-III, Age>= 18 years and written informed consent. For the duration of the entire anaesthesia, continuous recording of all respiratory parameters was carried out. A singular arterial blood gas analysis was performed to objectify the ventilatory situation. Primary endpoints were the occurrence of the following adverse events: Hypoventilation (MV < 40 ml/kg IBW or etCO2 > 5 mmHg above the target corridor for more than 5 min.); Hyperventilation (etCO2 > 5 mmHg below the target corridor for more than 5 min.); Apnoea > 90 s; Tachypnoea (RR > 35 min-1); Manual override by the anaesthetist in charge.

Results and Discussion: In the population of 100 included patients (49 female, 51 male; in average 65 years old), n=18 hypoventilations (14 defined by low minute volume, 4 defined by increased etCO2), n=12 hyperventilations, no apnoeas and no tachypnoeas were recorded. SVC was capable of regulating the occurring hyper- and hypoventilations back into the target corridor. A manual override was not necessary in any case. The following medians and interquartile ranges were

Conclusion: According to the collected data, SVC provides safe and presumably lung protective automated ventilation during general anaesthesia.

5083

Monitoring of the respiratory health and detection of postoperative respiratory complications using respiratory variability

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Background and Goal of Study: The incidence of Postoperative Pulmonary Complications (PPC) after non-thoracic surgery varies between 2 and 19% and are associated with an increase of morbimortality. However, few non-invasive monitoring possibilities are available to identify PPC during the postoperative recovering period. Respiratory variability reflects ‘healthy’ breathing, whereas decreasing variability of the breathing pattern components is a reflection of “poor health”. This decrease may be due to the “filtering” of the central variability changes in regards to the mechanical loads. Breath-by-breath variability is related to the neuro-mechanical coupling and the load-capacity adequacy. In intensive care, low ventilatory variability predicts mechanical ventilation weaning failure and is also an independent risk factor of death. Monitoring of respiratory variability during the postoperative recovery period may be useful for early non-invasive detection of PPC.

Materials and Methods: Interventional noninvasive prospective monocentric non-blinded study in adults undergoing emergency or elective abdominal surgery with laparotomy. Measurement of the Coefficient of Variation of breathing pattern variables preoperative for baseline (T0), conscious after extubation (T1) and within the first 24h after surgery (T2) using thoracic chest movement measurement with a non-invasive respiratory belt. PPC (defined as respiratory failure, pleural effusion, respiratory infection, atelectasis, pneumothorax or bronchospasm) were screened during 7 days following surgery. Comparison of the CoV of breathing pattern variables (Tidal Volume, VT) between the group of patients with (PPC+) and without (PPC-) complications using Mann Whitney and Friedman test for statistical analysis.

Results and Discussion: preliminary results; 19 patients included; 7 with complications (PPC+) between day 0 an day 3 after surgery.

Conclusion: CoV of VT at T2 decreases in the group with respiratory complications during the first 3 days following surgery. Monitoring of respiratory variability in the postoperative recovering period might be a potential technique for detecting PPC.
Retrograde intrarenal surgery (RIRS) has been proven to be an effective treatment in management of intrarenal lithiasis. However, the movement of stones associated to ventilation-induced kidney movement during surgery remains a challenge. The aim of the study was to compare two ventilation strategies to minimize stone movement: low ventilation (LV) and the use of apnea (A).

Materials and Methods: After informed consent was obtained, patients were prospectively randomized in one of the two groups: LV (tidal volumes5ml/kg and respiratory rates10) or A (5 min apneas). These ventilatory strategies were started when laser shooting began. Demographic data and stone characteristics (number, size, density and location) were recorded. Precision before and after initiation of LV or A (number of successful shots out of 5 attempts), fragmentation, removal and surgical time, as well as end-tidal CO2, oxygen saturation, need to convert to standard ventilation, or other adverse effects or complications. The use of apnea seems to reduce fragmentation time in our preliminary results, though larger studies are required.

Results and Discussion: A total of 34 patients were included. There were no statistical differences between groups in demographic data or lithiasis characteristics. No complications occurred throughout the duration of the study. The A group showed lower fragmentation time. However, there were no statistical differences in surgical time, end-tidal CO2, oxygen saturation and need to convert to standard ventilation. A better precision was detected with both LV and A compared to standard ventilation but no differences were found between groups. Conversion to standard ventilation was necessary only in 2 patients in LV and A group, respectively.

Conclusions: The use of ventilatory strategies to minimize renal movement during RIRS appears to increase surgical precision and is not associated with respiratory adverse effects or complications. The use of apnea seems to reduce fragmentation time in our preliminary results, though larger studies are required.

References:

Diaphragm ultrasonography as a method to confirm ventilator-induced diaphragm dysfunction: the prospective observational cohort study

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Background and Goal of Study: Mechanical ventilation can cause diaphragm injury. The aim of this study was to find out whether ventilator-induced diaphragm dysfunction led to prolonged ventilation. The study hypothesis was that the duration of mechanical ventilation, and the frequency of complications in children depend on duration of diaphragm inactivity, low (<15%) or high (>30%) diaphragm thickness and presence of patient–ventilator dysynchrony.

Materials and Methods: We examined data of 57 patients at the age 1 month-3 years who needed invasive mechanical ventilation. In 4 patients ultrasound investigation was impossible. 53 patients were included in the study results analysis. The presence of diaphragm inactivity, the diaphragm thickness (Tdi) at the end of inspiration and the presence of patient–ventilator dysynchrony were investigated. The primary outcome was the time to liberation from mechanical ventilation. Secondary outcomes were complications: prolongation of ventilation, reintubation, tracheostomy or death. Statistical Package for the Social Sciences was used and the results were presented using median (IQR), adjusted hazard ratio (HR), duration ratio.

Results and Discussion: 61.4% of patients at day 1st had diaphragm inactivity. Presence of diaphragm inactivity during first 5 days after admission was associated with lower daily probability of liberation from ventilation (adjusted HR 1.87, 95%CI 1.62-2.15, p<0.001). 38.6% of patients at day 1st had Tdi less than 15% (Tdi 9% [11% to 8%], at days 3rd and 5th there were 35.1% (Tdi 11% [8% to 12%]) and 21.1% (Tdi 10% [8% to 14%]) of patients, respectively. It was associated with lower daily probability of liberation from ventilation (adjusted HR 1.34, 95%CI 1.22-1.95, per 10% decrease). There were no patients at day 1st who had Tdi more than 30%, however, at days 3rd and 5th there were 21.1% (Tdi 41% [38% to 46%]) and 24.6% (Tdi 48% [34% to 51%]) of patients with Tdi more than 30%. There were no incidences of patient–ventilator dysynchrony at day 1st, however, at days 3rd, 5th and 10th the incidences were 28.1%, 35.1% and 14% respectively. It was associated with a prolonged mechanical ventilation (duration ratio 0.42, 95%CI 0.22-0.97).

Conclusion: Diaphragm inactivity, low level of diaphragm thickness might impact clinical outcomes.

Flow-controlled expiration during laparoscopic surgery diminishes intratidal derecruitment – a randomized controlled cross-over study

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Background and Goal of Study: Intraoperative mechanical ventilation with flow-controlled expiration (FLEX) showed dorsal lung recruitment in lung-healthy patients undergoing cranial surgery.1 We hypothesized that FLEX may counteract impaired lung mechanics during laparoscopic surgery. Therefore, we examined the effects of FLEX on tidal lung derecruitment and oxygenation during laparoscopic surgery.

Materials and Methods: After ethical approval, 26 patients undergoing laparoscopic surgery received conventional volume-controlled ventilation (VCV) and FLEX in a randomized cross-over design. Each ventilation-phase lasted 20 minutes with identical ventilation settings (tidal volume 7 ml kg-1, positive end-expiratory pressure (PEEP) 7 mbar). Peak expiratory flow (PEF), inspiratory plateau pressure (Pplat), mean airway pressure (Pmean) and respiratory system compliance (CRS) were calculated offline. The intratidal compliance profiles were determined. Statistical analyses included linear mixed models and chi-square tests.

Results and Discussion: FLEX decelerated PEF (-305 ± 64 vs. -513 ± 79 m/s±1, p=0.001). Pplat (21 ± 4 vs. 21 ± 3 mbar, p=0.76) was comparable. With FLEX, Pmean was higher (14 ± 2 vs. 12 ± 1 mbar, p=0.001), strong expiratory derecruitment was rarer (30% vs. 57%, p=0.026), CRS (41 ± 7 vs. 38 ± 10 ml·mbar-1, p=0.038) and the PaO2/FiO2 ratio were higher (451 ± 31 vs. 437 ± 82 mmHg, p=0.023) than with VCV.

Conclusion: During laparoscopic surgery, ventilation with FLEX counteracts impaired lung mechanics by diminishing tidal derecruitment. This leads to an improved lung compliance and oxygenation.

References:

Take a deep breath: cross-sectional study of volume-related ventilation practices in the light of new mechanical ventilation guidelines

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Background and Goal of Study: Modern-day mechanical ventilation guidelines (1) suggest “lung-protective ventilation strategies” as optimal for all patients, as the opposite was shown to increase postoperative pulmonary complications (PPC). Their fundamental component is ventilation with low tidal volumes (VT) of 6–8 ml/kg predicted body weight (PBW). In order to examine compliance with lung-protective ventilation guidelines, we conducted a cross-sectional study operating theaters in University Hospital Centre Zagreb.

Materials and Methods: Ventilation parameters and physical characteristics were recorded invasively in all adult patients under general anesthesia, ventilated in controlled modality, during one day, for all types of surgeries. We noted patient’s age, weight, height (from which PBW and BMI were calculated), ventilation modality and set VT. If the patient was ventilated using pressure-controlled mode, mean VT was calculated based on three consecutive breaths.

Results and Discussion: In 36% of cases, ventilation settings were not consistent with lung-protective ventilation strategies (while allowing for +/-0.5 ml/kg deviation from the guidelines). Patients ventilated with more than 8.5 ml/kg had higher BMI.
6145

Recovery After Cardiopulmonary Arrest (CA) During the Approach of a Difficult Airway Planned in Patient with Acute Respiratory Distress Syndrome secondary to Severe Pneumonia

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Background: We present a clinical case on the approach of difficult airway management in a patient with Acute Respiratory Distress Syndrome (ARDS). Complications due to severe hypoxia were respiratory acidosis, hemodynamic instability and subsequent CA.

Case report: 26-year-old patient with Childhood Cerebral Palsy was diagnosed with ARDS due to severe pneumonia. She was taken to the operating room for lung resection surgery.

Complications during the procedure included instability and subsequent CA. Thoracic drainage was placed and 25 days later she was discharged.

Learning Points:
- Adequate criteria and was evaluated to perform awake fiberoptic intubation.
- The tube was exchanged with a Frova guide to a left double-lumen tube. The patient started with stability.
- Oxygenation control in these patients (3)
- Subsequently, direct laryngoscopy was performed and it could be intubated without difficulty with a left double-lumen tube.
- During the airway approach, the patient presented a severe desaturation and CA recovering to sinus rhythm 8 min later.
- Pulmonary recruitment maneuvers were initiated and the oxygenation improved.

Discussion: Although Arne Test is a good tool for predicting the VAD, in some cases it doesn’t correlated. It is important to perform an adequate approach to the airway according to current guidelines (1). ARDS management includes pulmonary recruitment maneuvers, protective ventilation and adequate driving pressure control (2). In this way, we improve oxygenation, alveolar ventilation and avoid pulmonary overdistension.

Learning Points:
- Secure the airway is vital to ventilatory control. It is important to make the right approach to the airway based on current guidelines. Adequate management plan reduces morbidity and mortality in patients with ARDS. Pulmonary recruitment maneuvers and driving pressure control are currently validated for oxygenation control in these patients (3).

References:

Conclusion: We conclude that MMP-9 could be included in postoperative acute lung injury related to mechanical ventilation.

6065

Driving pressure and its relation to matrix metalloproteinase-9 expression in bal after one lung ventilation period in lung resection surgery

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Background and Goal of Study: Inflammatory injury to the alveolar epithelial and endothelial capillary membrane is a central event in the pathogenesis of acute lung injury (ALI). Matrix metalloproteinase-9 (MMP-9) has been implicated in ALI associated to mechanical ventilation. Driving pressure (DP) is defined as the End-Inspiratory Plateau Pressure (EIPP) minus Positive End-Expiratory Pressure (PEEP). Previous studies have shown association between DP>15cmH2O and lung injury and mortality. We hypothesized that DP is associated with increased levels of MMP-9 at the end of one-lung ventilation period (OLV).

Materials and Methods: Our study, approved by local Ethics Committee, included 174 patients undergoing a lung resection surgery with an OLV longer than 1 hour. The anesthetic protocol was as follows: after intubation ventilation was initiated with a TV 8 ml/Kg, PEEP 5 cmH2O and FiO2 0.4–0.5. Respiratory rate was set to keep an ETCO2 of 30–35 mmHg. During OLV, TV was reduced to 6 ml/kg and FiO2 increased at 0.6–1 to keep a SatO2 > 90%. BAL was performed in dependent lung before and after OLV period to quantify the levels of MMP-9, that were measured using Western Blot test. Haemodynamic and respiratory parameters were registered 5 min before OLV (baseline), 30 min after initiating it, and at the end of it. Patients were divided into 2 groups: one with a DP>15 and another one with a DP<15 during OLV. The Pearson correlation test was used to analyze the relation between MMP-9 values in BAL and pressures in airway and lung compliance. We also compared MMP-9 values in patients with DP>15 and DP<15 during OLV using the Mann-Whitney test. Statistically significant p < 0.05.

Results and Discussion: MMPs are known to be involved in several physiopathological processes, but the role of MMP-9 during OLV has not been analyzed. We demonstrated the influence of ventilatory set in the expression of this protein in BAL (table 1 and figure 1).

Conclusion: With the awareness of the importance of lung-protective ventilation, our results show that there are discrepancies between guidelines and clinical practice. Furthermore, patients with above-normal BMI have higher risk of receiving inadequate VT, compared to patients with BMI within normal ranges. Anesthesiologists must take greater care to calculate PBW for each patient and adjust ventilation settings accordingly, as to not predispose our patients to PPC.

References:

R COEFFICIENT P VALUE
DrivingPressure OLV 0.254 <0.001
Peak_base 0.183 0.055
Plateau_base 0.266 0.003
Peak_10min OLV 0.212 0.005
Lumbar_10min OLV 0.243 0.056

MMP-9 at the end of OLV in bronchoalveolar lavage

P=0.008

DP<15 during OLV

DP>15 during OLV
6046

Video Laryngoscopy associated injury of the Anterior Tonsillar Pillar: a case report

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Background: In predictably difficult airways, the use of videolaryngoscopy (VLG) is a useful adjunct. During insertion of the endotracheal tube (ETT), oral or pharyngeal cavity lesions may occur, with a prevalence of complications estimated at 1% for small lesions and 0.3% for more complex lesions.1 Case Report: 63 years old male, ASA physical status 3, was scheduled for a laparoscopic total gastrectomy due to a tumor. The airway evaluation showed a mallampati 3 score and macroglossia. The team approached the airway with a GlideScope® VLG blade 4 and a 7.5 mm internal diameter ETT with the Gliderite® rigid stylet, correctly placed. After the first attempt at orotracheal intubation, without difficulties, it was observed that the ETT had crossed the right tonsillar pillar, without edema or active bleeding (picture 1). The surgery was performed and an otolaryngology observation was requested. A small laceration of the right anterior tonsillar pillar without active hemorrhage was reported. The patient was uneventfully extubated and maintained under antibiotic prophylaxis and surveillance at the intermediate care unit for 24 hours. At the time of discharge, the lesion presented good healing, without signs of infection or asymmetries (picture 2).

Discussion: Several factors contribute may to increase the risk of injury in orotracheal intubation. The way the ETT and stylet are introduced into the oral cavity, the direct visualization of their passage, stopping and improving conditions if any resistance is felt and using a more malleable stylet are some of the strategies used to reduce that risk.2 References: 1. Thorley DS, Simons AR, Mirza O, Malik V: Palatal and retropharyngeal injury secondary to intubation using the GlideScope® video laryngoscope. Ann R Coll Surg Engl 2015; 97:667–9. 2. Pacey JA: Anterior Tonsillar Pillar Perforation During Glidescope Video Laryngoscopy. Anesth Analg 2007; 104:1611.

6211

How good sense could be important with airways challenges – a case report

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Background: Deep neck infections (DNI) present challenging airways for anesthesiologist. Although various techniques are available to secure the airway, their success in DNI have not yet been established. A clear algorithm with multiple airway management plans is critical.1 Case Report: A 72-year-old obese female, presented with a progressive submandibular swelling following dental infection. She was classified as ASA II E. The diagnosis of Ludwig’s Angina was postulated by clinical signs and the evidence of infection from parapharyngeal space until the hyoid bone. She was scheduled for emergency drainage of the abscess. Difficult airway was identified during the anesthetic examination. A nasotracheal awake fiberoptic intubation was initially planned. Patient was sedated with a perfusion of remifentanil and local anaesthetic to reduce that risk.2 The reasons were the impossibility of overcoming the epiglottis (n=5) and esophageal intubation (1) for Airtraq, the fogging for McGrath (1), the lack of visualization of the glottis (1) and the tubular epiglottis (1). In uncomplicated cases of rapid TI, the hemodynamic response during VL procedure was unexpressed. Conclusion: The i-view for single use is only available with one type and size of blade and not for really difficult intubation. McGrath and i-view do not allow making photos and videos for the complete training of beginners. The VL Airtraq channel has a unique geometry, an excellent camera with the ability to remotely view and record, but for reliable use with the functions of the epiglottis, the development of special methods of rotation of the ETT is required. C-MAC is easy to learn, provides excellent image quality, speeds up the process of learning for beginners, allows for various combinations of techniques for the most difficult situations.

5861

Which one can be more convenient for the airway management of a patient who has a huge maxillary tumor; fiberoptic intubation or videolaryngoscopy?

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Background: Awake fiberoptic intubation (FOB) is the gold standard approach for the management of a predicted difficult airway. However anesthetists need to perform at least 25 intubations to obtain the competence with FOB. Once learned, regular practice is still required to maintain this skill (1). Recent reviews revealed that when awake intubation is performed by experienced operators, videolaryngoscopy (VL), with a shorter intubation time, is as effective and safe as FOB (2). Case Report: We report a case of 24-years-old man with an aggressively growing maxillary tumour. The patient has a past medical history of pregabalin use and IV drug addiction for 2 years. The patient’s mouth opening was limited (2.1 cm) and the tumour narrowed the oral cavity so that mallampati score couldn’t be evaluated. CT was reported as; an exophytic mass lesion starting from the uvala level, narrowing the pharyngeal airway to the right, extending to the anterior and lateral parts of the maxillary bone; closing left nasal passage. The mass size was 15x12x13 cm. Awake intubation couldn’t be planned because of rejection of the patient. After preoxygenation, sedation was started with 3mg midazolam and 50mcg fentanyl.
Conscious sedation was continued with propofol infusion according to Bis monitor. When achieved the targeted Bis, laryngoscopy performed with VL and vocal cords seen clearly, than rapid sequence induction (RSI) performed and the patient was intubated successfully within 38 seconds. During the procedure the patient's hemodynamic and vital signs were stable.

**Discussion:** In these cases we thought that in patients whose mallampati score can't be evaluated, the mouth opening is narrow and the extension of the intraoral mass can't be evaluated, awake airway evaluation and adequate vision of vocal cords with VL may be a good option to secure the airway and decide on the following steps.

**References:**
2. Jia Jiang, Da-Xu Ma, Bo Li et al. Videolaryngoscopy versus fiberoptic bronchoscope for awake intubation – a systematic review and meta-analysis of randomized controlled trials Therapeutics and Clinical Risk Management 2018:14

**Learning points:** When the patient predicted as difficult airway refuses to be awake, RSI after visualisation of the airway under deep sedation by VL can be an alternative to awake technique.

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**Association of the use of video laryngoscopy and the interpretation of a difficult intubation**

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**Background and goal of the study:** The current definition of a difficult intubation is largely based on direct laryngoscopy (DL). Video laryngoscopy (VL) has shown to facilitate tracheal intubation, and has been gaining popularity in airway management. Therefore, we designed this study to examine if anaesthesiologists' interpretations of a difficult intubation are consistent with current guidelines, and if they are affected by the extended use of VL.

**Materials and Methods:** Tracheal intubation records for adult patients from January to March 2018 were analyzed. The documentation of intubation difficulty was compared with the defined intubation difficulty based on current guidelines for any discrepancy. Two different criteria of a difficult intubation were used for analysis: 1) 3 or more attempts to achieve tracheal intubation, or 2) Cormack-Lehane grade 3-4 view with direct laryngoscopy. The reasons for such discrepancy were further investigated. We also conducted a survey among anaesthesia providers on their interpretation of a difficult intubation.

**Results and Discussion:** Analysis of 250 records has shown that documentation of intubation difficulty in over 95% of records were consistent with current definitions. However, there was evidence of disagreement between each definition and documentation (p=0.002 and p=0.001 for definitions based on the number of attempts and Cormack-Lehane grade during DL, respectively). We also found that the use of VL, when compared to DL alone, was associated with higher probabilities of discrepancy. When questioned about the definition of a difficult intubation, 66.4% of anesthesia providers considered 3 or more attempts for intubation as difficult and only 10.9% considered Cormack-Lehane grade 3-4 view during DL as difficult. Moreover, over 50% of anaesthesiologists would choose VL as their first-line device for an anticipated difficult intubation.

**Conclusions:** Anaesthesiologists do not consistently use current guidelines to interpret and document a difficult intubation. The use of VL appears to be associated with this discrepancy.

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**Difficult intubation in severely obese patients in the era of video laryngoscope**

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**Background and Goal of Study:** Obesity is one of the major risk factors for difficult intubation. Prevalence of severe obesity, which is defined as body mass index (BMI) ≥ 35 kg/m², in Japan is reported to be 0.5%, and the rate is increasing. The rate of obesity is rising in recent years, and it is the coming concern for anaesthesiologists. Meanwhile, the use of video laryngoscopes has been popularized and spread, which facilitates intubation in obese patients. The purpose of this study is to clarify the incidence of difficult intubation in severely obese patients and to describe intubation time and laryngoscope type.

**Materials and Methods:** Following Institutional Review Board approval, all anesthesia records between April 2017 and October 2019 at Keio University Hospital were retrospectively studied. There were 25297 anesthesia cares provided by anaesthesiologists, and of these, 145 patients (0.57% of all cases) with severe obesity (BMI ≥ 35 kg/m²) who underwent general anesthesia with tracheal intubation were identified. Thirteen cases managed by supraglottic devices were excluded.

**Results and Discussion:** The patients were 71 men and 74 women, 50.6±14.8 years old, and the average BMI was 37.8 (maximum 68.4). Major performed procedures were orthopedic procedures in 44 cases and obstetric and gynecologic in 36 cases. Tracheal intubation was successful in all cases. Eight cases were classified as “difficult” intubation in the record, however, even in those cases, intubation was completed within 20 minutes after entering the operating room. The classifications of difficulty in intubation were recorded by the anaesthesiologist in charge, as selected from three categories of “easy,” “moderate,” and “difficult.” The time from the start of preoxygenation to completion of intubation was 10 minutes 26 seconds on average. McGrathTM were used in 78 cases and conventional laryngoscopes in 69 cases. The case was planned to use bronchial fibroscope. In our institution, McGrathTM and bronchial fibroscope are equipped in every room and can be used on a physician's preference. There was no case of difficult ventilation and extubation. Nasopharyngeal airways were used to support spontaneous ventilation after extubation in 4 cases.

**Conclusion:** With the widespread use of video laryngoscopes, the incidence of difficult intubation in severely obese patients is considered to be decreased.
Background and Goal of Study: Videolaryngoscope (VL) is known to improve glottic visualization, and becoming the first line device for difficult airway management. McGrath VL MAC is one of the popular VL used in Japan. As there is less lifting force required during glottic exposure, direct elevation of the epiglottis, named “straight blade technique” is allowed if the view is not great with standard technique that the blade tip inserted into the vallecula. This study aimed to compare two intubation technique, 1) standard technique and 2) straight blade technique using McGrath VL MAC in retrospective manner.

Materials and Methods: Patients without having difficult intubation profiles and intubated with McGrath MAC for elective surgery between October, 2017 - October, 2018 were searched from our anesthesia database. A total of 15 variables including patient characteristics, intubation profile, postoperative complication were collected. For statistical analysis, unpaired t test, chi-square test, fisher’s exact test, and other if necessary was used with R statistical software package, version 3.6.1 (R foundation for Statistical Computing, Vienna, Austria) A p value less than 0.05 was considered significant.

Results and Discussion: 70 data were collected, and 5 in each group was excluded because of missing data. Therefore, total of 60 (30 each) was used for analysis. The patient characteristics were not different between groups. For intubation profile, POPO was significantly improved by straight blade technique compared with standard technique (82±14% vs 67±14%, p=0.002). Time for intubation was shorter but not significantly different (23±9 sec vs. 28±13sec, p=0.067). Complication rate were not significantly different (6 (20%) vs. 4 (13%), p=0.729), sorethroat (9 (30%) vs. 6 (20%), p=0.551)), but one folding epiglottis was noted in straight blade technique group.

Conclusion: Straight blade technique provides improved glottic visualization when evaluated by POGO score, without causing prolonged intubation time or increased complication rate. This technique can be a useful method for McGrath MAC intubation, but practitioner should be cautious about chance for epiglottic displacement.

Background and Goal of Study: Videolaryngoscopy can improve the laryngeal (vocal cords) visualisation and is frequently implemented into the clinical practice in patients with predicted difficult airway or even during the unexpected difficult airway management. The aim of the study was to compare the clinical effectivity and safety of elective videolaryngoscopy use for airway management in paediatric patients compared to direct laryngoscopy.

Materials and Methods: Trial was approved by Ethics Committee (10/2018), registered on clinicaltrials.gov (NCT03747250) and designed as prospective randomized pragmatic trial. After obtaining informed consent, paediatric patients undergoing general anaesthesia with tracheal intubation were randomized in to elective videolaryngoscopy versus direct laryngoscopy. The first attempt success rate, time to first ETCO2 wave, type of videolaryngoscopy, type of tracheal tube, type of anaesthesia induction, complications were recorded.

Results and Discussion: Overall 338 patients (1/2019-10/2019) were included, and data was available for 330 patients (162 video/168 direct). There were no significant differences in demographics between the groups. Inhalation induction was preferred choice in both groups (78.4% video vs. 78.6% direct). Most patients were intubated with uncuffed tracheal tube (77.0% video vs. 73.8% direct). The first attempt success rate (86.4% vs. 93.5%), median time to first ETCO2 wave (30 vs. 18 seconds) and incidence of complications (5.5% vs. 3.6%) were all inferior for videolaryngoscopy.

Conclusion: The first attempt success rate was higher in the direct laryngoscopy group versus videolaryngoscopy. Videolaryngoscopy was associated with higher incidence of complications.

Acknowledgements: Supported by a Specific University Research provided by MŠMT (MUNI/A/1111/2018 and MUNI/A/0943/2019), supported by MH CZ – DRO (FNBr, 65269705) and supported by funds from the Faculty of Medicine MU to junior researcher (Jozef Klucka, Martina Kosinova).

Background and Goal of Study: Video laryngoscopes are widely available and become increasingly used as routine for tracheal intubation. We evaluated trainees’ experience using McGrath MAC® video laryngoscope for tracheal intubation in the operating theatres.

Materials and Methods: Anaesthetists’ trainees were asked to fill out a survey when they used a McGrath MAC® video laryngoscope. The survey included years of experience, previous training on its use, presence of predictors for difficult intubation, use of airway adjuncts, difficulties with railroading endotracheal tubes (ETT), complications during intubation and overall satisfaction score (on a scale of 100). This survey was registered with the Clinical Audit department.
Results and Discussion: 55 responses were collected from 23 trainees over a three week period. On 26 occasions (47%) trainees had less than two years of experience of anaesthesia compared with 53% who had three or more years of experience. Although McGrath MAC® video laryngoscope is used on a regular basis in our anaesthesia department, only one third of the trainees received formal training before starting its use. Airway adjuncts were used in 16 patients (29%); a bougie was used in 14 patients and a stilet in two patients. Seventeen patients (30%) were deemed to be a difficult intubation requiring an airway adjunct in 56% of these cases. There was difficultyrailroading the ETT tube in only 3 cases. There was a 5% complication rate associated with the McGrath laryngoscope, one oxygen desaturation to 88% and difficulty visualising the anatomy due to lubricating jelly obscuring the scope camera on two occasions. The average satisfaction score was 86% which reflects the ease of use of McGrath MAC® video laryngoscope. A common problem reported with video laryngoscopes is advancing the endotracheal tube inspite of having a good view of glottis which usually requires the use of airway adjuncts. Difficulty railroading the ETT was low in this survey which may have been due to the frequent use of airway adjuncts.

Conclusions: McGrath MAC® video laryngoscope is easy to use with high satisfaction among trainees. Airway adjuncts are commonly used to facilitate endotracheal tube advancement especially in patients with predictors for difficult intubation. We recommend that all anaesthetists should be trained on the proper technique for using McGrath MAC® video laryngoscope before starting its use.

5858
Determining a safe upper limit of oxygen supplementation for adult patients: a systematic review
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Background and Goal of Study: Supplemental oxygen is commonly used in critically ill patients and during anaesthesia to prevent desaturation. However supplementary oxygen may result in hyperoxaemia, with the risk of tissue hypoxia, and an increasing body of evidence has connected these conditions with increased mortality. Thus, hypoxia must be avoided, but patients should not be exposed to high concentrations of oxygen if not needed. This systematic review aimed to describe the connection between the inspired oxygen fraction Fio2 and pulmonary complications in adult patients, with the objective of determining a safe upper limit of oxygen supplementation.

Materials and Methods: MEDLINE and Embase was systematically searched in August 2018 for studies fulfilling the following criteria: Intubated adult patients (Population); high fractions of Fio2 (Intervention) versus low fractions of Fio2 (Comparison); atelectasis, ARDS, pneumonia and/or duration of mechanical ventilation (Outcome); original studies both observational and interventional (Studies). Screening, data extraction and risk of bias assessment was done by two independent reviewers.

Results and Discussion: 5891 records were assessed for eligibility, of which 12 were included. Seven studies were conducted in the emergency setting, and five studies included patients undergoing elective surgery. Eight studies reported data on atelectasis, three on ARDS, three on pneumonia and two on duration of mechanical ventilation. There was a significantly increased risk of atelectasis if an Fio2 of 0.8 or above was used, RR: 1.44 [1.05-1.97] (figure). One study showed an almost three-fold higher risk of pneumonia in the high Fio2 group, RR 2.83 [2.25-3.56]. The three studies reporting ARDS and the two studies with data on mechanical ventilation showed no association with Fio2. Half of the randomized controlled trials had high risk of bias.

Conclusion: In this systematic review we found that there was inadequate evidence to identify a safe upper dosage of oxygen, but the available studies suggest a benefit of keeping inspiratory oxygen fraction below 0.8 with regards to formation of atelectasis.

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A method for the prevention of atelectasis of the alveoli in patients during mechanical ventilation of the lungs
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Background and Goal of Study: Prevention of atelectasis of the alveoli during prolonged mechanical ventilation of the lungs in adults without severe ALI. Materials and Methods: 38 patients on MVL were divided into two groups. Patients of groups A (n = 19) and B (n = 19) were given MVL in BIPAP, PSIVM, PSV modes with protective parameters (PEEP 5-10 mbar, Vt 6-8 ml / kg, MV and FIO2 were selected for MVL in normocapnia mode and normoxemia). Groups differed significantly in terms of management of alveolar ventilation and atelectasis. In group A patients, with the appearance of atelectasis on a chest X-ray, a bronchoscopy was performed. Group B patients, on the background of MVL, changed the parameters of mechanical ventilation according to the following algorithm: after auscultation of the lungs and confirmation of the endotracheal tube patency and sputum aspiration, PEEP increased by 4 mbar from the original with simultaneous increase in peak inspiratory pressure to 30 mbar with a duration of 5 minutes and a repetition interval every 4 hours, and at each change of position of the patient. Exclusion factors: pneumothorax, COPD, spontaneous pneumothorax, severe ALI. The groups were compared by the number of patients who did not develop atelectasis during MVL or were resolved on a chest X-ray, the number of which had atelectatic changes, and according to the need to perform bronchoscopy.

Results and Discussion: In group A, atelectatic changes in the lungs were initially in 10 patients and developed in 9 patients. Bronchoscopy was performed in 12 patients with a positive result in 4 patients. In group B, atelectatic changes in the lungs were initially in 11 patients, in 6 patients they did not develop -- After the algorithm, atelectatic changes resolved 11 patients. Bronchoscopy in group B compared with group A was not performed in any patient (p <0.05). In comparison with group A in group B, when applying the proposed algorithm, MVL complications in the form of disateletic did not develop or were resolved during treatment without the use of bronchoscopy (p <0.05).

Conclusion: The use of MVL with protective parameters and the use of the proposed preventive algorithm makes it possible to reduce the likelihood of atelectasis of the alveoli, to obtain a positive result with the initial presence of disateletic changes in the lungs, and to reduce the frequency of bronchoscopy.

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The protective effect of closed suction systems on the incidence of ventilator-associated pneumonia
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Introduction: Ventilator-associated pneumonia (VAP) is one of the most common ICU-acquired infection resulting in significant attributive mortality, increased length of stay, personnel workload and ICU costs. Therefore, the barrier precautions to prevent VAP are of paramount importance. The goal of our pilot study was to assess the effect of closed suction systems (CSS) as a part of the barrier bundle on VAP incidence and pulmonary inflammation.

Methods: Forty ICU patients were prospectively randomised into either the CSS (n=20) or the control (n=20) groups. The VAP was diagnosed in patients with CPIS score ≥ 4 pts. beyond 48 hrs of invasive ventilation. Point-of-care lung ultrasound, gas exchange and ventilatory parameters were monitored. Soluble triggering receptor expressed on myeloid cells-1 (sTREM1) was assessed in sputum obtained by bronchoalveolar lavage at 48 and 96 hrs using immunofluorescence assay. The microbiological samples were taken from oropharyngeal and tracheal secretions as well as from the closest unanimated surfaces to explore the colonisation, infection, and contamination, respectively.

Results: In the SCC and the control groups, VAP (CPIS ≥ 4) was diagnosed in 3 (15%) and 9 (45%) patients, respectively, with a significance gained mainly by the cases of late VAP in the control group (after 96 hrs; 0 vs. 4 patients, respectively) (χ2 4.29, p = 0.038). Surprisingly, at 48 hrs sTREM1 tended to be higher in the CSS group (8.4 (6.5–14.0) vs. 5.2 (4.0–15.1) pg/mL, in the control group (p = 0.175)) and was lower in early VAP (48–96 hrs) compared with patients without VAP (p = 0.04). In contrast to the unprotected suction, the use of CSS resulted in the dissociation of colonising oropharyngeal and tracheal flora as well as containing flora of the unanimated surfaces.

Conclusion: Closed suction systems may reduce the risk of late VAP diagnosed with CPIS score. This barrier prevention measure may also be effective for detracting the oropharyngeal and tracheal flora compartments as well as for reduction of the contamination of the closest unanimated surfaces. Analysis of sTREM1 has shown implausible results, thus this marker should not be used for the diagnosis or risk estimation of VAP.
Risk factors for Postoperative Pulmonary Complications in an Afro-Caribbean Population: the CareCoI Score

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Background and Goal of Study: Postoperative Pulmonary Complications (PPC) are associated with an increase of morbimortality and longer hospital stays. The incidence of PPC after non-thoracic surgery varies between 2 and 19%. The most of the existing prediction scores for postoperative pulmonary complications were based on Caucasian populations. Only little is known about Caribbean populations and postoperative pulmonary complications, but differences in comorbidities between Caucasian en Caribbean populations are well known. Epidemiologic data shows that Caribbean populations are more at risk for asthma, diabetes and obesity. Objective of this study is to identify risk factors for postoperative pulmonary complications in an afro-Caribbean population

Materials and Methods: Observational, longitudinal, retrospective, descriptive study. Main judgement criteria: respiratory complications (defined as respiratory failure, pleural effusion, respiratory infection, atelectasis, pneumonia, hypoxemia, bronchospasm) within the 7 days after surgery with general anaesthesia. Univariate analysis for identifying risk factors for PPC followed by a logistic regression for identifying independent risk factors.

Results and Discussion: Preliminary results: 720 patients were operated and 235 includes in the study during the inclusion period. 56 patients developed a PPC. Incidence of PPC was 19.2%. Mean age 58 years (+/-18 years); mean BMI was 26 (+/-6); 48% female; 21% ASA1; 53% ASA2 and 26% ASA3. Analysis of the data included student’s t-test and multivariate logistic regression analysis.

Conclusion: The incidence of PPC is higher compared to the literature data. The identified independently associated risk factors for developing a PPC are different to the in the literature described factors. It may be useful to use a specific PPC prediction score for a Caribbean population

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A case of post-extubation airway obstruction and aspiration pneumonitis due to nasal pack aspiration

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Background: Nasal packs are routinely inserted post nasal surgery to assist with haemostasis. Nasal pack aspiration is a rare cause of acute airway obstruction in the post-operative period that can quickly become life threatening if not rapidly managed.

Case Report: We report a case of post-extubation airway obstruction due to aspiration of a Merocel® nasal pack into the trachea, resulting in hypoxia, hypercapnoea and tachycardia requiring re-intubation and bronchoscopic retrieval of the pack. Post-procedurally, the patient developed aspiration pneumonitis and required oxygen supplementation, antibiotics, and high dependency monitoring. He was subsequently discharged well and did not have any long term complications on follow up at 3 and 6 weeks post-event.

Discussion: Nasal pack aspiration has previously been reported in a similar patient (1). Factors such as patient profile and the type of nasal pack used (2) may contribute to aspiration. Young, healthy, male patients may be at increased risk of aspiration due to their ability to generate a greater negative inspiratory force. Self-expanding nasal packs may cause severe airway obstruction by expanding to occlude the lumen of the airway. By identifying risk factors for airway obstruction and aspiration, we can reduce the morbidity of these events by avoiding the use of nasal packs in at-risk patients and instituting closer monitoring if nasal packing is required.

References:

Learning points: Nasal pack aspiration is an uncommon cause of potentially life-threatening post-extubation airway obstruction. Indications for use of nasal packs should be weighed against the potential risk of complications, and care should be taken to secure packs well to prevent aspiration. Surgeons may also consider the use of non-expandable packs so as to reduce the severity of obstruction should aspiration occur.

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Slower gait speeds during operation room entrance is predictive of hypoxemia in supine position patients during one lung ventilation

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Background and Goal of Study: Gait speed is used for the diagnosis of frailty and assessment of postoperative morbidity risk. Slower gait speeds have been related to poor outcomes in patients undergoing surgery. Measuring gait speed when patients are entering the operation room (OR) is a noninvasive easy method. The gait speed on entering the OR provides information of the current physical status of patients and may possibly reflect the capacity of the patient to tolerate changes in the ventilation-perfusion ratio during one lung ventilation (OLV). In this study we explored the association of gait speed on entering the OR with the frequency of intraoperative hypoxemia during OLV in non-cardiac thoracic surgery.

Materials and Methods: After review board approval, we performed a retrospective review of hospital records of all patients undergoing non-cardiac thoracic surgery with OLV at our center from September 2018 to October 2019. Gait speed was calculated postoperatively by reviewing video recordings from monitoring cameras in our surgical department. Patients with walking disabilities or prior lobectomy were excluded. Other data included patient positioning during OLV, preoperative spirometry, and BMI. Our primary outcome was the association of gait speed with the event of hypoxemia (SpO2<91) unrelated to surgical procedures during OLV.

Statistical analysis of the data included student’s t-test and multivariate logistic regression analysis.

Results and Discussion: The final cohort consisted of 353 patients. Overall mean gait speed was 0.94±0.13 m/s and hypoxemia during OLV occurred in 13.0% (n=46). Patients experiencing hypoxemia during OLV (hypoxemia group) had significantly slower gait speeds than control group (0.91±0.15 vs 0.94±0.13 m/s, p=0.045). Our multivariable analysis showed slower gait speeds were predictive of hypoxemia only in patients in the supine position. Hypoxemia group patients in the supine position (n=13, 30.2%) had significantly slower gait speeds than control group (0.89±0.16 vs 1.00±0.12 m/s, p=0.018). An increase in gait speed reduced the odds for hypoxemia during OLV. (Odds ratio 0.993 for every 1/1000 m/s increase in gait speed, 95% confidence interval 0.987-0.996, p=0.004).

Conclusion: Our study suggests the gait speed on entering the OR is a predictor of hypoxemia during OLV in supine position undergoing non-cardiac thoracic surgery.
We took advantage of assessing the dynamic VC phasically moved in accordance with respiratory cannula and mechanical ventilation. In critical patients, Mallick recommended to leading to a partial obstruction of the airway. Finally, the insertion of a tracheal tube of the cannula exerted a lot of backward pressure onto the posterior tracheal wall, cannula number 8 was inserted, but the length of this cannula was too short: the tip of portex tracheostomy cannula couldn’t be introduced. A shyley tracheostomy was introduced into the airway, forcing the surgical extraction by bronchoscopy. During this procedure, a piece of the neck flange of the tracheostomy cannula was removed and the replacement for another one was not possible. Finally, a 6 number orotracheal tube was inserted at the level of the tracheostomy.

**Background and Goal of Study:** We often encounter laryngeal stridor during emergence from anaesthesia in children managed with supraglottic airway (SGA). However, we know little about the mechanisms of the stridor and behavior of the vocal cords (VC). VC patency is determined by the balance of forces between laryngeal adductor and abductor muscles. We hypothesized that this balance control is depressed during anaesthesia and recovers during anaesthesia emergence while no previous studies have explored the recovery processes.

**Materials and Methods:** We took an advantage of assessing the dynamic VC behavior during emergence with using the previously-reported data obtained in 27 anaesthetized children undergoing minor surgeries with SGA (19 to 53 months) (Ishibashi K, et al. Br J Anaesth 2019). Endoscopic VC images, respiratory variables and respiratory sound were used for this secondary analysis. We focused on changes of VC angle (VCA), an angle formed by lines connecting anterior and posterior commissures, in the first few spontaneous breaths (delta VCA = inspiratory VCA minus expiratory VCA). We explored independent factors explaining the delta VCA with using backwards stepwise analysis.

**Results and Discussion:** VC phasically moved in accordance with respiratory cycles, and inspiratory VC abduction was endoscopically observed in 11 out of 27 children while mean inspiratory VCA did not differ from mean expiratory VCA (P = 0.819). Delta VCA varied from -19.2 to 32.7 degree and one subject met the outlier exclusion criteria. Age, end tidal carbon dioxide concentration (ETC02), and effect site concentrations of remifentanil and propofol had P values smaller than 0.1 determined by univariate correlation analyses with delta VCA. Backwards stepwise analysis determined age (P<0.001) and ETC02 (P=0.017) as independent variables explaining delta VCA (delta VCA = 5.0 ± 0.25Age – 0.29ETC02). Stridor sound was identified by a microphone within the anaesthesia circuit in 6 children. VC narrowing was observed in 4 of them whereas airway narrowing at the level of arytenoids without VC narrowing was observed in 2 of them. The stridor disappeared during the course of anaesthesia emergence and stable spontaneous respiration was established in all children.

**Conclusions:** Recovery of abduction movements of the vocal cords during emergence of anaesthesia is delayed in smaller children, and hypercapnia appears to augment the vocal cord narrowing.

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**Mechanical ventilation through tracheostomy in critical patient: a consideration of the size of the tracheal cannulas**

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**Background:** The length of the two segments of the tracheostomy cannula (stomal and intratracheal segments), as well as the angle formed between both segments, should be selected for each patient according to their anatomy. However, an adequate selection of a tracheal cannula, not always guarantees a correct ventilation.

**Case Report:** A 78-year-old patient required double valve replacement. In the postoperative period, a percutaneous tracheostomy was performed due to an impossibility of progression in the weaning. On the 5th day of tracheostomy, a persistent air leak was seen through it. The B number of portex tracheostomy cannula was removed and the replacement for another one was not possible. Finally, a 6 number orotracheal tube was inserted at the level of the tracheostomy. During this procedure, a piece of the neck flange of the tracheostomy cannula was introduced into the airway, forcing the surgical extraction by bronchoscopy. After inserting the bronchoscope through the glotic opening, the tracheal tube was removed, and high frequency jet ventilation was performed. Once the foreign body was removed, and under direct vision by the rigid bronchoscope, an 8 number of portex tracheostomy cannula couldn’t be introduced. A shyley tracheostomy cannula number 8 was inserted, but the length of this cannula was too short: the tip of the cannula exerted a lot of backward pressure onto the laryngeal wall, leading to a partial obstruction of the airway. Finally, the introduction of a tracheal tube size 5 in tracheostomy guaranteed an optimal ventilation.

**Discussion:** The edema, inflammation and emphysema around the stoma tissue increase the deep of the tracheal stoma and can make difficult to change the tracheal cannula and mechanical ventilation. In critical patients, Mallick recommended to place tracheostomy cannulas with an increase the stomal and intratracheal lengths, by approximately 1 cm. Also, the relation between the angle of the stoma segment and of the tracheal segment, should be greater than 110-120 degrees to provide a correct orientation of the intratracheal section of the cannula. Due to greater flexibility and length of orotracheal tubes, its insertion at the level of tracheostomy, and ventilation provided through it, are usually successful.

**Conclusion:** The standard length of the tracheostomy cannulas has been designed for patients with normal neck; but, in critical patients, we should consider the placement of greater tracheostomy cannulas.
Obstructive Sleep Apnoea risk as predictor of difficult intubation among obese oral surgical patients

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Background and Goal of Study: Obese, defined as body mass index (BMI)≥30 kg/m² is a multisystem, chronic, proinflammatory disorder associated with a significant increase in perioperative complications. Obese patients undergoing oral surgery may provide a unique set of anesthetic challenges associated with airway management. The aim of the study was to evaluate obstructive sleep apnoea (OSA) risk as possible predictor of difficult intubation among obese patients scheduled for one day oral surgical procedures under general anesthesia.

Materials and Methods: This was an explorative single-center prospective observational study. 75 obese patients (≥65 year old and ASA II-III) undergoing oral surgery were enrolled. The risk for OSA determined by STOP-BANG questionnaire, body mass index (BMI) and waist-to-hip (W/H) ratio was assessed. Difficult intubation was a priori defined as any intubation with > 2 attempts and/or requiring alternative techniques: McCoy laryngoscope, Gum elastic Bougie, fiberoptic bronchoscope or Bronfils and assessed by two independent experienced investigators. Receiver operating curve (ROC) analyses were performed to identify predictors of difficult intubation and their cut-off values.

Results and Discussion: Difficult intubation was observed in 15 (20%) patients (10.7% males, 9.3% women, p=0.72). High OSA risk (STOP-Bang ≥ 4) was reported by 56% (n=42) of the population (22.66%, n=17 women; 33.3%, n=25 males). ROC analysis showed that STOP-BANG criteria of above 3 had 93,33% sensitivity and 25% specificity in prediction of difficult intubation (area under the curve [AUC] = 0.559). The average (SD) BMI was 35.6 (5.6) kg/m², with 42 males, and average (SD) W/H ratio was 1.1 (0.19) with no significant prediction of difficult intubation.

Conclusion: In our population of obese patients undergoing oral surgery we found that more than 3 STOP-BANG criteria had high sensitivity but low specificity in prediction of difficult intubation. We recommend routine assessment of OSA risk among obese patients during preoperative evaluation, especially in one-day oral surgery.

Discussion and learning points: CAO may not be managed with any conventional oxygenation technique. This patients should be managed only in tertiary care institutions. ECMO may be a valuable tool in such scenarios. Venousvenous ECMO may be a more suitable device for pre-emptive strategies. The degree of ECMO implementation varies among authors. Anticipation and planification are key to successful management of CAO, as emergent ECMO cannulation is associated with greater morbidity and mortality. In the future ECMO may be involved in DAG. Further studies should be conducted to identify the predictors of difficult intubation among obese patients undergoing oral surgery.

References:
whether there is indeed some correlation using a larger patient sample.

Conclusion: There was no statistically significant correlation between predictive factors for difficult airway and the C-L grade in adult patients who underwent elective maxillofacial reconstructive surgery in our Institution. Our intention is to keep collecting data in order to study a larger patient group for possible correlations.

Perioperative airway management of mucopolysaccharidosis: A retrospective study

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Background and Goal of Study: Mucopolysaccharidosis (MPS) is an inherited and progressive metabolic disorder associated with glycosaminoglycan aggregation in various tissues. Airway management is difficult in these patients due to facial deformities and mucopolysaccharide aggregation in nasopharynx. The aim of this study is to determine the problems in airway management of MPS patients undergoing surgery.

Materials and Methods: Following approval of the ethics committee, MPS patients who underwent surgery between 2015-2019 in our hospital were evaluated retrospectively.

Results and Discussion: The mean age of 23 patients undergoing 31 surgical procedures was 127.6±84.2 months, mean body weight was 24.9±17.6 kg. MPS VI (30%) and MPS IV (30%) were the most common MPS types. Orthopedic surgeries were the most common surgery type (29%). Difficult mask ventilation was not seen in any of the patients. Intubation was difficult in 10 patients (32%), eight of which were intubated with videolaryngoscopy (VL). One patient, scheduled for emergency tracheotomy, couldn’t be intubated and operated under mask ventilation. One patient with limited neck extension due to narrowness of foramen magnum was intubated via awake fiberoptic bronchoscopy. There was no need for laryngoscopy in 5 patients (16.6%) because 3 had a tracheotomy and 2 were already intubated orally during admission to the operating room. VL was the most common intubation method (64.5%) in overall patients. In the postoperative period, 53.3% of patients were followed up in the intensive care unit (ICU). One patient was reintubated due to acute respiratory dysfunction during postoperative ICU stay. There were no other perioperative complications. Patients with difficult intubation were older than those without difficult intubation. However, this difference was not statistically significant (p=0.362). We attribute this to the low number of patients.

Conclusion: Anesthetic management could be challenging in many aspects in MPS patients. The risk of difficult intubation must always be considered due to macroglossia, short neck, hypertrophic tonsils and adenoids, kyphoscoliosis, immobile jaw, narrowed nasal passages and atlantoaxial instability. VL seems to be a safe method in MPS patients, however an experienced anesthesiology team and alternative plans should always be ready during perioperative management of these patients regardless of the choice of the equipment.

HEAVEN criteria: prediction of difficult airway during in-hospital rapid sequence intubations

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Background and Goal of Study: Assessment of difficult airways in emergencies is an important competence and may prevent life-threatening complications. The HEAVEN criteria [1] were found valid to predict difficult airways during preclinical emergency intubations in a retrospective study. The acronym stands for Hypoxemia, Extremes of size, Anatomic abnormalities, Vomiti/blood/fluuid, Exsanguination/anaemia, and Neck mobility issues. This pilot study aims to assess the feasibility of using the HEAVEN tool to predict difficult in-hospital rapid sequence intubation (RSI).

Materials and Methods: With Cantonal Ethics Committee approval and written informed consent from each patient we prospectively recorded the HEAVEN criteria during in-hospital RSI facilitated by videolaryngoscopy. Difficult intubation was defined as more than one intubation attempt or desaturation <93% SpO2 during RSI. Sensitivity, specificity, positive predictive value, and negative predictive value (NPV) were determined for first-attempt success.

Results and Discussion: This pilot study included 54 patients who underwent general anaesthesia with indication for RSI due to emergency surgery. The patients’ median [IQR] age was 56.5 [38.5-70] years, BMI was 24 [22-28] kg/m2, and ASA physical status classification n (%) was: ASA 1: 7 (13), ASA 2: 21 (39), ASA 3: 15 (28), ASA 4: 10 (18), ASA 5: 1 (2). First attempt success rate was 94% without HEAVEN criteria and 90% with at least one criterion, overall success rate was 100%. NPV was higher than 92% for each of the HEAVEN criteria.

Conclusion: The high NPV of all HEAVEN criteria suggests that its absence rules out difficult intubation to a high degree. After this feasibility study, we plan a proper sized prospective study to validate the HEAVEN criteria as prediction tool for difficult RSI in in-hospital surgical emergencies.

References:
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Predictive value of combined Mallampati and Sternomental distance for difficult laryngoscopy: a prospective study

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Background and Goal of Study: Difficult airway prediction remains a challenging task as none of the predictors reported so far has featured satisfactory accuracy. Much of this poor accuracy may be due to the inability of predictors to assess the diverse anatomic structures involved in difficult airway management. This led us to investigate whether the Mallampati test, a parameter which assesses the upper region of the airway, along with the sternomental distance, a parameter which evaluates the lower region of the airway, would improve the preoperative airway assessment when bound together.

Materials and Methods: A prospective study with 453 patients scheduled for elective surgery under general anesthesia was performed. At transitional waiting hall before transport to the operating room, we collected data on sex, age, weight, height, ASA physical status, Body Mass Index, modified Mallampati test, and acoustic parameters from three phonemes (/a/, /i/, /u/). Uni and multivariable analyses were conducted. Two logistic regression models and their predictive performances were determined.

Results and Discussion: The main result was the association found between formant #5 (p=0.00) and modified Mallampati test. The AUC for the regression model containing only three formants together was 65.0%, whereas the AUC for the model containing only three formants (af2, af4, and if5) after a stepwise was 60.2%.

Conclusion: Voice formants are objective measurements associated with both upper airway anatomy and Mallampati classification. Such as, voice analysis may improve the upper airway assessment performed by the conventional modified Mallampati test.

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Known difficult airway with proposed laryngeal microsurgery: when normal-caliber fiberscope is not an option

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Background: The management of the known or suspected difficult airway (DA) often requires an awake intubation for greater safety. Awake fibroptic intubation (AFOI) is considered the “gold standard” tool for managing the known DA, with recognized effectiveness and safety1. However, AFOI has some drawbacks such as its unfeasibility in some situations and limited availability2. In these cases, other strategies must be adopted to manage the known DA safely. We present a case of a known DA in which the AFOI was not possible and awake intubation with videolaryngoscopy (VL) was successfully used.

Case Report: A 45-year-old female, ASA II, with previous history of failed intubation was proposed for laryngeal microsurgery due to symptomatic Reinke’s edema. Due to the unavailability of a small-caliber fiberscope at our hospital that fit the narrow lumen of microlaryngeal endotracheal tube, AFOI was not an option and the primary strategy was awake intubation with VL.
With the patient monitored, sedoanalgesia and topical anaesthesia of the upper airway were administered. Pre-oxygenation, laryngoscopy was performed with the C-MAC videolaryngoscope. The intubation was successful and intravenous anaesthesia was induced. After surgery, extubation occurred without incidents. In the postoperative period, the patient did not consider intubation a painful or traumatic event.

Discussion: Although AFOI is the first-line technique when managing known DA, awake intubation with VL is emerging as an alternative approach.1 Actually, it has been proposed as a more accessible, easier and faster technique to perform than AFOI as VL is a more familiar tool.In this patient, an awake intubation was mandatory. The absence of a small-caliber fibrescope made AFOI impossible to perform and forced us to adopt a different strategy. Awake intubation with VL was used with success, which highlights the importance of mastering different techniques to manage most cases of known difficult airway in a safe and effective manner. In sum, AFOI and awake intubation VL are not mutually exclusive techniques but are instead complementary strategies in the management of DA2.


A retrospective review assessing the level of difficulty of airway management in Klippel-Feil syndrome: 6 years experience

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Background: The anatomical characteristics of Klippel-Feil syndrome (KFS) have significant implications for airway management because of the potential for difficult intubation. The purpose of this study was to assess the difficulty of airway management in KFS patients.

Methods: After IRB approval, we performed a retrospective electronic chart review from 06/2012-06/2018. Intubation was categorized as “difficult” by the following criteria (1) more than 1 intubation attempt required by attending staff to secure the airway (2) management described by the anesthesia team as “difficult” (3) escalation to advanced intubation device after failed first DL attempt (4) advanced airway device such as video laryngoscopy (VL) or flexible fiberoptic scope (FF) as first intubation device. We compared the level of difficulty of airway management for each KFS who underwent multiple procedures and had more than 1 intubation at least 12 months apart during our study period. The “Change of airway difficulty level” was categorized as “easier” if their first airway management was easy and remained easy for every subsequence airway management; as “difficult” if their first airway management became difficult as the airway (2) management described by the anesthesia team as “difficult” (3) escalation to advanced intubation device after failed first DL attempt (4) advanced airway device such as video laryngoscopy (VL) or flexible fiberoptic scope (FF) as first intubation device. We compared the level of difficulty of airway management for each KFS who underwent multiple procedures and had more than 1 intubation at least 12 months apart during our study period. The “Change of airway difficulty level” was categorized as “easier” if their first airway management was easy and remained easy for every subsequence airway management; as “difficult” if their first airway management became difficult.

Results and Discussion: The demographic information and choice of airway management are shown in table 1. For those who underwent multiple procedures, the total operative numbers ranged from 2 to 7 procedures and the median was 4. We analyzed the change in the difficulty of intubation over the time of subsequent procedures in 25 patients. The “change of airway difficulty level” with time data from 21 patient is presented in table 2. Additional 4 patients had inconsistent trend.

Table 1: Patients’ demographic data and choice of airway management

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Single procedure (41 procedures)</th>
<th>Multiple procedure (50 procedures)</th>
</tr>
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<tbody>
<tr>
<td>Gender (%)</td>
<td>Male (51, 60%)</td>
<td>Female (34, 40%)</td>
</tr>
<tr>
<td>Age group (%)</td>
<td>Toddler (&lt;5 years) (57, 22.7%)</td>
<td>Pre-school (5-10 years) (70, 27.9%)</td>
</tr>
<tr>
<td>School aged (6-12 years) (72, 28.7%)</td>
<td>Teenager (13-17 years) (34, 13.5%)</td>
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</tr>
<tr>
<td>Adult (&gt; 18 years) (16, 7.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choice of airway (%)</td>
<td>Mask (27, 10.6%)</td>
<td>LMA (32, 12.7%)</td>
</tr>
<tr>
<td>Direct laryngoscopy (128, 51.3%)</td>
<td>Video-assisted laryngoscopy (48, 19.1%)</td>
<td></td>
</tr>
<tr>
<td>Flexible fiberoptic (9, 3.6%)</td>
<td>FF through LMA (7, 2.8%)</td>
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</table>

Discussion: The contrast between these two cases highlights the importance of adopting a strategy concordant with the patient needs, the anaesthesiologist experience and the resources available. Literature have been consistently including video-assisted laryngoscopy in the approach of an expected difficult airway, although strong evidence is still lacking in pediatric anesthesia practice.1,2


Learning points: The good outcome and absence of complications in both cases is a strong reminder that what constitutes a high standard practice is not a standard approach but an adaptive one.

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Expected Difficult Airway: The High Standard of Not Being Standard

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Background: Difficult Airway management is a challenge to the anesthesiologist and incorrect measures can have catastrophic consequences. Hence, although a thorough history, physical examination and preoperative planning are universal, recognition of patient anatomical and physiological variations as well as anesthesiologist expertise with different techniques make the assembly of the plan of action a unique affair. We report two cases of anticipated difficult airway.

Case Report: A 45-years-old female with an extensive Arterio-venous malformation (AVM) that spread through the nasopharynx, palate, tongue, mandible and neck, proposed for a total thyroidectomy with cervical ganglion dissection and a 5-years-old child with a macroglossia associated with a Beckwith Wiedemann Syndrome and Obstructive Sleep Apnea proposed for a partial glossectomy. In both cases was conducted a thorough preoperative assessment with a detailed history, physical examination and risk stratification. With all the information, an individual plan was established. In the day of surgery, the airway was managed with two different techniques, awake flexible fiberoptic-guided intubation in the first, and video-assisted laryngoscopy in the second. In both, intubation was successful at the first attempt. Both remained haemodynamically stable, without periods of oxygen desaturation during the entire surgical procedure. Emergence from anesthesia occurred without complications. Postoperative period occurred in an intensive care unit without complications.

Discussion: The contrast between these two cases highlights the importance of adopting a strategy concordant with the patient needs, the anaesthesiologist experience and the resources available. Literature have been consistently including video-assisted laryngoscopy in the approach of an expected difficult airway, although strong evidence is still lacking in pediatric anesthesia practice.1,2


Learning points: The good outcome and absence of complications in both approaches is a strong reminder that what constitutes a high standard practice is not a standard approach but an adaptive one.

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What language are we speaking in emergency airway management?

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Background and Goal of Study: A unified and multidisciplinary approach is advocated in emergency airway management. We aimed to explore the language that would be preferentially used by anaesthetists, anaesthetic nurses and operating department practitioners (ODPs) and surgeons in our UK-based hospital.

Materials and Methods: Between May and Oct 2019, an online survey was distributed to surgical and anaesthetic trainees and consultants, and to anaesthetic nurses/ODPs. Specific questions related to the terminology for performing or asking for help with an emergency Front of Neck Airway, as well as perceived availability and preference of emergency airway equipment.

Results and Discussion: The survey generated 64 responses from anaesthetic team members, comprising of 36 anaesthetists and 27 anaesthetic nurses/ODPs. Of the anaesthetists, 16 were consultants There were 49 responses from surgeons. The most represented surgical specialties orthopaedics (n=14) and general surgery (n=13). Amongst the anaesthetic team (anaesthetists and anaesthetic nurses/ODPs) the most familiar terms associated with a colleague asking for help with emergency airway access were “can’t intubate, can’t oxygenate”, “front of neck” and “emergency front of neck access”. Within the surgical cohort the three most familiar terms were “cricothyroidotomy”, “tracheostomy” and “emergency surgical airway”. Amongst anaesthetic team members, 90.1% (58) had received training in performing eFOANA. Of the 58, 90.1% (53) had received training in performing eFOANA in the past year. By contrast, only 42% of surgeons stated they had received training in performing eFOANA. Only 38% of surgeons were familiar with the “blade/bougie/ tube” technique compared with 96% of anaesthetists. Only 53% of anaesthetic team members and 12% of surgeons knew we had an eFOANA kit (scalpel/bougie/tube) in the anaesthetic room of every theatre in our trust.

Conclusion: We are clearly not speaking the same language. There was a discrepancy between Anaesthetists, Anaesthetic nurses/ODPs and surgeons – any
of whom could be called to assist in an emergency. A unified and multidisciplinary approach is not a new aspiration and should be within our grasp. We are developing local anaesthetic team teaching, in addition to undertaking a training programme targeting consultant surgeons in our DGH as well as the surgical trainees rotating within our region.

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Tracheal intubation in the ICU: Is it more difficult the first intubation or the reintubation? A prospective, observational study

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Background and Goal of Study: Tracheal intubation (TI) is a procedure frequently performed in the intensive care unit (ICU). The TI in ICU is associated with higher incidence of complications, difficult intubation and likely have second or more intubations during the stay. The main objective of this study was to compare the incidence of complications and physiologic changes during the TI on the first and the last intubation. Secondary objective was to compare the rate of difficult intubation.

Results and Discussion: Of 82 patients intubated more than once in our ICU between January 2015 and September 2019. After each TI, the intubating provider completed a data collection form, including patient details, pre-induction physiology and organ support, details of the intubation procedure, and immediate complications associated.

Discussion: There was no difference in number of complication presented in the first and the last intubation (Table 1). Complications recorded were: hypotension, Hypoxia, Esophageal intubation and bronchoaspiration. The difficulty of intubation also presented with no difference, classified using Cormack-Lehane score. They considered that the increase in number of complication was due to worsening of patient’s clinical state with time. In our study, we found no changes in physiologic conditions which could explain the discrepancy in the result.

Conclusion: In our ICU patients needing repeated tracheal intubations, the incidence of complications and technical difficulty of intubation were similar during the first intubation compared to reintubation.

References:

6118

Anesthetic consideration for stent management of central airway obstruction

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Background: Stent management is the first choice for central airway obstruction in a patient with advanced cancer who is not a candidate for surgery (1). However, the appropriate approach of upper airway obstruction secondary to thyroid cancer and anesthetic management are controversial. The tracheal compression and deviation are not uncommon, so stent placement can be a challenge to the anesthesiologist, who shares airway with neurologist, must keep airway control, normoxia, normocapnia and avoid central airway obstruction or stent migration.

Case report: 92-years male without pathological history with anaplastic T4N0M1 thyroid carcinoma, stage IVB, with mediastinal and pulmonary involvement, with secondary central airway obstruction programmed for self-expanding metallic stent placement in trachea. The procedure was done with spontaneous ventilation with FiO2 50%, sedoanalgesia with titrated infusion of dexmedetomidine. At the passage of flexible fibrobronchoscope was observed an extrinsic compression in middle third of trachea with 50% obstruction of lumen, was placed the guide and the coated self-expanding stent were passed and after dilatation was observed expanded stent in the right position.

Discussion: For tracheal stent placement in the predicted difficult airway, it is preferred to maintain spontaneous ventilation, avoiding muscle relaxation and positive pressure ventilation, to keep airway control and decrease the risk of bronchoaspiration, for what is used flexible fibrobronchoscope (1). Inhaled anesthetics should not be used to prevent operating room contamination and ensure constant anesthetic administration. Dexmedetomidine, as a sedative, with respiratory pattern and EEG similar to those of natural sleep, with analgesics properties (2) is the ideal agent to achieve suitable conditions for stent placement, maintaining spontaneous breathing. The oxygen should be adjusted to the minimum tolerable while maintaining adequate fresh air flow, always having on hand auxiliary devices in case of difficult oxygenation and ventilation.

Conclusion: The anesthesiologist should avoid muscle relaxation, positive pressure ventilation and inhaled agents; dexmedetomidine is a safe and effective anesthetic strategy when airway management is difficult due to severe tracheal stenosis.

References:
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5665

Application of the Vortex tool for emergency doctors, is it an option in guiding difficult airway management?

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Background and Goal of Study: The emergency doctor is the professional who has contact with acutely ill patients, eventually in imminent risk of death. The decisive, effective, and timely airway management in an emergency can reduce morbidity and mortality. The difficult airway (DA) is estimated in 20%. The Vortex approach is predominantly graphical and simple, ideal to be used in high risk and time critical situations of an airway emergency. This research will provide data for the academic-scientific environment, which may act to mitigate airway morbidity and mortality. Its main objective is to verify if the application of the Vortex tool to emergency doctors.

Materials and Methods: A quantitative and qualitative research, classified as an actional, descriptive and cross-sectional research applied in the auditorium of the São Camilo and São Luiz Hospitals in Macapa - AP, submitted and approved by the Research Ethics Committee of the Federal University of Amapa. Each participant has received and signed the Consent Form. Target audience: Doctors of the emergency department on call in Macapá-AP, in January of 2018 who voluntarily participated in the research and attended a lecture about DA and the Vortex tool. A pre-test was applied, followed by the presentation of the Vortex tool and its application in a DA facing situation, and a post-test. The scenario 1 corresponded to the situation of “I do not intubate, do not ventilate”, the second corresponded to the situation of “I do not intubate and do not ventilate with a mask valve device” and the third one to “I do not intubate but I ventilate with a mask valve device”. Descriptive and inferential
statistical methods were applied. The comparison between the pre-test and post-test evaluations were performed by a chi-square test, with alpha significance level = 0.05 for rejecting the null hypothesis. The statistical processing was performed using the following softwares: Statistical Analysis Model and BioEstat 5.3 version. Results and Discussion: The presentation of the Vortex tool demonstrated to be a key element in the process of taking right decisions for the scenarios questioned, as there was a highly significant statistical change (p < 0.0001 *) in the answers for the 3 scenarios.

Conclusion: This study found that the instruction of emergency doctors about the vortex tool showed to be effective in guiding the management of VAD.

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Two types of emergency airway after oral maxillofacial surgery

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Background: In clinical practice, we may encounter postoperative emergency airway after oral maxillofacial surgery. These cases may include not only narrowing of the airway due to severe swelling, but also much bleeding into the pharynx. Immediate intubation should be required in such cases, but there were no structured methods for it. In addition, some anesthetics and/or analgesics may be necessary to reduce stress, which may cause panic reaction and/or serious problems in cardiovascular condition. Children may be impatient of full awake intubation.

Case report: We experienced 15 unexpected emergency airways for these 5 years after oral maxillofacial surgery. Three patients of oral cancer resection were intubated again after surgery because of hemorrhage. One of them (67-yrs, male) complained of dyspnea after oral cancer resection. SpO2 drastically dropped and cyanosis was observed. Orotracheal intubation using fiberscope was tried first. The glottis, however, could not be found due to much bleeding. Orotracheal intubation was succeeded by Pentax Airway Scope (Pentax-AWS) which equips useful suction port. Another 2 cases of oral cancer resection were also reintubated orostracheally after surgery by using Pentax-AWS also because of postoperative bleeding. Remaining 12 cases were reintubated after surgery because of serious swelling of the airway due to infectious condition. Pentax-AWS was used in one case, and McGrath was used in 2 cases. Other 9 cases of serious swelling were intubated using fiberscope. Fourteen patients received some anesthetics or analgesics. In addition, 5 of them received rocuronium, but other 10 patients were reintubated using CPAP devices and availability of intensive care postoperatively.

Discussion: Emergency airway after oral maxillofacial surgery is divided into two types; one is caused by poor view field in the pharynx due to much bleeding, and caused by narrowing of the airway due to tissue swelling. Fiberscope is useful device for narrow airway, but not suitable for bleeding cases. In addition, we have to consider to use anesthetics or analgesics to reduce patient’s stress.

References:

5200

The airway management in accidental tracheal extubation in the prone position: A simulation study

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Background and Goal of Study: Accidental tracheal extubation in the prone position is a rare but life-threatening event. Many case reports have described successful airway management in this situation, but comparison of airway devices has seldom been performed. This study is aimed to reveal the best airway management device in prone patients.

Materials and Methods: Based on sample size calculation, 24 anesthesiologists were enrolled (12 board certified (BC) anesthesiologists and 12 residents). An intubation simulation manikin (HeartSim, Laerdal, Norway) was placed in the prone position and its head was fixed to an operation table with 3-point skull pins and head holder devices (MAYFIELD, Integra Life Sciences Corporation, USA). Each participant tried airway management with 4 devices (laryngeal mask (LMA): Proseal (Teleflex, USA), Macintosh direct laryngoscope and a stylet (MAC), Airway Scope (AWS) (Nihon-koden, Japan), fiberscope (FB) LF type V (Olympus, Japan) in the randomly assigned order from 24 different orders. The time from the start of airway management to the first successful ventilation through the inserted device was measured for each airway device and was defined as the success time. The success times for the four different airway devices were compared by survival analysis (Wilcoxon’s test) at the significance level of p< 0.0083. The comparison between BC anesthesiologists and residents was also performed by Cox proportional hazard model. Data were shown as median (95% confidence interval)

Results and Discussion: The median success times (95% confidence intervals) of the LMA, AWS, MAC and FB were 25.9 (24.0-60.0), 96.0 (75.0-163.0), 146.0 (106.0-250.0) and 166.5 (123.0-213.0) seconds, respectively. The LMA was significantly faster than other three devices (p < 0.001). There were no significant differences among other three devices. Although BC anesthesiologists had significantly more experience of clinical use of AWS and FB than residents, board certification was not a significant factor of the success time.

Conclusion: Our results suggest that LMA should be considered the first-line airway device in accidental tracheal extubation in the prone position, regardless of whether board certified anesthesiologists or residents perform airway management.

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Tracheomalacia risk and perioperative care safety case report

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Background: Patients with large goiters are at risk of developing post-thyroidectomy tracheomalacia (PTTM) secondary to long-standing extrinsic tracheal compression with loss of tracheal cartilage rigidity1. Case Report: A 76-yr-old man scheduled for thyroidectomy due to a huge goiter. Clinical findings were dysphagia, hoarseness and increased mass growth in the previous 6 months. Physical examination revealed a cervical mass with tracheal displacement. Cervical sonography showed a 64x78x130 mm mass on the left thyroid lobe. Preoperative care included airway evaluation (AE) with cricoidthyroid membrane (CTM) identification, explanation of fiber optic intubation (FOI), use of postoperative CPAP device and availability of intensive care postoperatively. A multimodal general anesthesia under ASA standard, BISTM and neuromuscular blockade monitoring was conducted. After identification of CTM, remifentanil infusion was started and topical lidocaine was applied. Patient was intubated under FBO with a reinforced 6.5 cm tracheal tube. Intubation was hampered by edema of the supraglottic structures. The thyroidectomy procedure was uneventful. After surgery a cervical and thoracic X-ray were performed to assess the alignment of glottis. Fiberscope was reintroduced to identify tracheal wall collapse and extubation was performed with the patient awake. No further complications were noted.

Discussion: Studies indicate as predictive factors for PTTM: longstanding goiter, retrosternal extension, tracheal deviation, difficult endotracheal intubation, preoperative recurrent laryngeal nerve palsy and thyroid cancer1. Most of the described predictors are positive in this case and loss of airway patency was considered when determining the tracheal extubation. The assessment of the trachea and its alignment prior to extubation may help in predicting the risk of postoperative airway obstruction and guiding a safe strategy.

References:

Learning points: Importance of airway intubation in order to predict and eventually manage post-operative complications such as PTTM. The described clinical report supports that the risk of PTTM exists and a safe perioperative care includes AE with CTM identification, FBO, use of postoperative X-ray image, use of CPAP devices and availability of intensive care postoperatively.
6055

Induction of anesthesia in patients with cleft lip and palate, our experience

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Background and Goal of Study: Cleft lip and palate are the most common developmental abnormalities of the face. This type of malformation can represent a challenge for airway management due to possible difficult mask ventilation and intubation. The goal of our study is to show our experience in induction of anesthesia depending of the cleft, palate and lip abnormalities.

Materials and Methods: The study, which took place in period of three years, included 40 patients aged from 3 to 12 months old. They were divided in four groups according to the malformation they had: group 1 – isolated cleft lip deformity, group 2 – cleft lip and palate unilaterial right deformity, group 3 – cleft lip and palate unilaterial left deformity, group 4 – bilateral cleft lip deformity. The induction of anesthesia in the first group of patients who had only isolated cleft lip deformity was performed by inhalational induction of anesthesia with sevofofrane in oxygen 100%, in the other three groups the induction was performed with awake intubation and the cleft palates were packed with small gauze roll to avoid the tendency of the laryngoscope to fall into a wide gap. After securing the airway the anesthesia was maintained with volatile anesthetic agent, and intraoperative analgesia was provided with fentanyl.

Results and Discussion: Airway management problems in infants with cleft lip and palate were first recognized by Magill many years ago. In our study, taking in consideration the abnormality of the face and airway malformation, every patient was regarded as a possible difficult intubation. In patients with isolated cleft lip malformation we did not had problems with mask ventilation, so we performed inhalational induction of anesthesia. Mask ventilation in patients with combined cleft lip and palate can be difficult because it interferes with the normal upper airway anatomy, therefore during ventilation we have turbulent flow which causes inefficient ventilation which in turn leads to desaturation and hypoxia, therefore awake intubation was performed. There was no failed intubation recorded during the study.

Conclusion: The methods we used of induction in anesthesia were the safest way of securing airway in patients with cleft lip and palate.

5840

Effectiveness and safety of nasotracheal intubation with gum elastic bougie in two patients undergoing mandibular orthognathic surgery

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Background: Nasal intubation is the most common method for giving anesthesia in intraoral, orthopharyngeal and maxillofacial surgeries. (1) Knowledge of the relevant anatomy is essential as it gives an idea about the pathway of the endotracheal tube and the complications encountered during its insertion.(2)

Case Report: We describe a technique of nasotracheal intubation using gum elastic bougie in two patients with Cormack –Lehane IIIB scheduled to undergo elective maxillofacial operation under general anesthesia and neuromuscular blockade, without predicted difficult airway. We used regular endotracheal tube, gum elastic bougie, Magill forceps and laryngoscope with Macintosh or McCoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of bougie, Magill forceps and laryngoscope with Macintosh or Mccoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of bougie, Magill forceps and laryngoscope with Macintosh or Mccoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of bougie, Magill forceps and laryngoscope with Macintosh or Mccoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of bougie, Magill forceps and laryngoscope with Macintosh or Mccoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of bougie, Magill forceps and laryngoscope with Macintosh or Mccoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of bougie, Magill forceps and laryngoscope with Macintosh or Mccoy blade.

Discussion: A thorough knowledge of the anatomy and the advent of newer techniques in endotracheal intubation can be of great help to the practicing anesthesiologist. The purpose of this report is to share our experience with this technique and to highlight the potential benefits of this method.

References:

4658

Let there be light: Tracheostomy assisted by fiberoptic light through endotracheal tube

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Background: Surgical tracheostomy is based on the tissue dissection of neck structures in order to perform an ostomy on the trachea to establish a definitive permeable airway. Sometimes this procedure may become difficult for many reasons: anatomical distortion due to tumor invasion or fibrosis caused by radiotherapy.

Case report: We present a 72 year-old male diagnosed with vocal cord tumor, receiving multiple surgical neck, currently undergoing local radiotherapy. The patient was admitted to the Emergency department with shortness of breath and stridor. Flexible endoscopy was performed by the Otorrinolaringologist on duty observing local progression with partial obstruction of the upper-airway. Emergent surgical tracheostomy was indicated. Light remifentanil sedation and topical xylocaine was implemented to perform awake fiberoptic intubation under spontaneous breathing (spray-as-you-go technique with lidocaine 2%) with a 6.0mm ringed endotracheal tube. Surgery was extremely difficult to perform due to high fibrosis and de-structuring of local anatomy. Without any progress, trachea couldn’t be located by surgeons, increasing iatrogenic risk. Being the fiberotic bronchoscope at the operating room, we proposed to turn off the surgical lights and illuminate through the endotracheal tube, allowing the visualization of the tracheal rings by transillumination at 4 centimeters from midline. Surgery was conducted from then on without incidents. Posterior bibliographic research on Pubmed was fulfilled, finding the references below about similar cases.

Discussion: Oropharyngeal cancer may obstruct airway by: external tracheal compression, intra lumen extension or bilateral vocal cord paralysis. Patients with rapidly progressive masses or with stridor clinic may be candidates for urgent surgical tracheostomy that could be difficult due to distortion of adjacent tissues. Fiberotic bronchoscope is an important part of the difficult intubation equipment. Its use as a location guide of trachea by trans-illumination is a novel and poorly described function in the literature that may help during surgery.

References:

Learning points: In case of unexpected difficult intubation, nasotracheal intubation can be carried out successfully with the use of gum elastic bougie.

4513

CANCROM ORIS (NOMA) and the Airway challenges in Children, A Humanitarian experience

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Background: NOMA (cancrum oris) is an exclusive disease of childhood characterized by ulcerative necrosis of the maxillo-facial structures, affecting up to 1,40,000 children annually. It is fatal in 80-90% of cases in the acute setting. Survivors are left with disfiguring maxillo-facial deformations that make airway manipulation for reconstructive surgery very challenging.

Methodology: Over two interventions of Medicines Sans Frontiers(OCA) mission at the NOMA hospital for children, Sokoto, Nigeria, 16 patients, with chronic sequelae of NOMA, underwent maxilla-facial reconstructive surgery. Each patient posed significant airway challenges due to anatomic malformations, trismus, and restricted neck movements. Lack of preoperative imaging and limited resources added to the challenge. We were able to surmount these with the use of a three tier hierarchical plan – plan A (intended airway management strategy), plan B (secondary management strategy), and plan C (surgical access to the trachea).

Results: Preoperative work up included measuring thyromental, sternomental, and inter incisor distances, neck movements, and mouth opening. Of the 16 patients in this series, 14 were intubated using plan A. Two required deployment of plan B and none required plan C. We predominantly used fibre-optic and nasal intubation for these patients.

Conclusions: Maxilla-facial reconstructive surgery for NOMA poses a huge challenge to the anesthesiologists, especially in children. Adequate planning, screening, and assessment of the airway with primary, secondary, and back up plans are crucial. With this strategy in place “cannot intubate, cannot ventilate” situations can be handled during an emergency. Psychological and nutritional rehabilitation is essential prior to surgery.

References:
1 Diakomi M., Trantzas P., Sofianou A. General Hospital of Attica KAT - Kifissia, Athens (Greece), General Hospital of Attica “KAT” - Kifissia, Athens (Greece), General Hospital of Attica KAT - Kifissia, Athens (Greece).
The median effective dose (ED50) of intravenous oxycodone depending on sex and age for attenuation of intubation-related hemodynamic responses

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Background and Goal of Study: The various opioid interventions have been used to attenuate intubation-related hemodynamic responses (IRHRs). The preoperative oxycodone administration may be expected the preemptive effect on prevention or attenuation of IRHRs. However, the pharmacokinetics of oxycodone have a somewhat different effect depending on age and sex. Therefore, we calculated the 50% and 95% effective doses (ED50 and ED95) of oxycodone, depending on age and sex, which could attenuate all IRHRs.

Materials and Methods: Patients were allocated to one of 6 groups; 1) male between 20 to 40 year old (group YM), 2) male between 41 to 65 year old (group OM), 3) male between 66 to 80 year old (group EM), 4) female between 20 to 40 year old (group YF), 5) female between 41 to 65 year old (group OF), 6) female between 66 to 80 year old (group EF). First patient in each group injected oxycodone 0.1 mg kg⁻¹ slowly (over 2 min) 20 min before intubation. One min after intubation, we investigated whether all changes of IRHRs were ≤ 20%, which was defined as the “success”, or not as the “failure”. The subsequent patient received the next oxycodone dose, which was decreased or increased with an interval of 0.01 mg kg⁻¹, depending on the “success” or “failure” of the previous patient, respectively. We performed the Dixon’s up-and-down method until we obtained eight crossover points as crossover from “failure” to “success”.

Results and Discussion: The calculated ED50 [mean (95% CI) mg kg⁻¹] was 0.089 (0.078-0.100), 0.156 (0.147-0.168), 0.134 (0.109-0.158), 0.109 (0.101-0.118), 0.101 (0.097-0.106), and 0.091 (0.081-0.101), in groups YM, OM, EM, YF, OF, and EF, respectively. The calculated ED95 in group YM was significantly lower than that in groups OM, EM, and YF (P<0.001, P=0.026, P=0.034, respectively). The calculated ED50 in group OM was significantly higher than that in groups YF, OF, and EF (P<0.001). The calculated ED50 in group EM was significantly higher than that in group EF (P=0.035). The predictive oxycodone ED50 and ED95 (mg kg⁻¹) were 0.089 and 0.156, 0.134 and 0.183, 0.109 and 0.128, 0.091 and 0.108, and 0.080 and 0.147 in groups YM, OM, EM, YF, and EF, respectively.

Conclusion: Higher ED50 and ED95 of oxycodone is required in male with increasing age, but it is not clear in female. In addition, ED50 and ED95 of oxycodone is higher in male under 65 year old, but in female over 66 year old.

Ideal Length of the Nasotracheal Tube Considering Nasotracheal Tube Size

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Background and Goal of Study: Most of the clinically available nasotracheal tubes (NTs) are pre-bent and have markings around the vertex of tube (proximal marking), resulting in pre-determined depth of tube insertion. Since the tip-to-proximal marking length of the NT is fixed and increases with the increment of its internal diameter, there is a problem of whether the selected NT in accordance with individual nasal cavity size guarantees the proper length. The purpose of this study was to investigate 1) ideal NT length and 2) evaluating the adequacy of the NT depth in accordance with nasal cavity size in Korean men and women.

Materials and Methods: This prospective observational study was performed in 137 patients aged 20 to 70 years scheduled for elective surgery under general anesthesia requiring nasotracheal intubation from September 2017 to December 2018. After anesthetic induction, the largest size of nasopharyngeal airway that enters nasal passages with mild resistance was recorded as nostril size. Using flexible bronchoscopy, nostril-to-carina and nostril-to-vocal cord lengths were measured. We defined the ideal nostril-to-UCB (upper cuff border) tip length as [(nostril-to-vocal cord + 2 cm) and (nostril-to-carina length – 3 cm)], reflecting borderline for ensuring minimum distance between NT (UCB, tip) and vocal cord and carina, respectively. We examined whether nostril size (i.e. maximal airway size) can be predicted by patients’ characteristics (age, gender, height, weight, etc.) and whether the NT (Mallinckrodt TaperGuard/Medtronic, and PORTEX/Smith Medical) chosen according to nostril size would satisfy both ideal NT length.

Results and Discussion: Overall, 137 patients completed the study. Only ‘gender’ was independently associated with ‘nostril size’ in the multivariate analysis. 6.5 in males and 6.0 in females are the maximum size of nasopharyngeal airway that enters in 100% of cases with mild resistance or less. NT size selection by gender (6.5 for men, 6.0 for women) ensures proper NT location of 86% and 62% in men, women respectively when using PORTEX. In the case of the Mallinckrodt TaperGuard, the fraction located at the ideal location is considerably smaller than that of the PORTEX.

Conclusion: Nostril size is largely determined by gender. PORTEX has an advantage over an ideal location over Mallinckrodt TaperGuard, and it is necessary to produce NT with shorter UCB-tip and longer ‘proximal marking-to-UCB’ lengths.
An unusual management to a premature newborn difficult airway

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Introduction: Neonatal endotracheal intubation can be very difficult, because neonatal airways are smaller and more anterior than the airways of older children and adults.1

Case report: 26-year-old woman with monochorionic and biamniotic twin pregnancy (ASA II,2011A) turned to the emergency department in preterm labor(23 weeks and 0 days). Cesarean operation occurred and both fetuses were female, Aggar 2/4,8, the first one weighed 650g and the second one 700g. The first one had a difficult airway with grade 4 Cormack-Lehane. Myocutaneous attempts were performed by three different persons (one neonatologist and two anesthesiologists), with direct laryngoscopy and an endotracheal tube size 2.0 mm. It was suggested by a nurse in the room to use a Kirschner wire, an orthopedic surgery material, as endotracheal tube stylet (figure 1). The endotracheal tube was inserted with caution to avoid laryngeal injury and after the passage through the epiglottis, the Kirschner wire was extracted. It was confirmed the position of the tube with auscultation and symmetric thoracic expansion. The second fetus presented with grade 1 Cormack-Lehane and was intubated with one attempt.

Discussion: A stylet may be helpful increasing the rigidity and curvature of a very flexible endotracheal tube, however, is there an associated risk of airway damage. Available stylets are suitable for use with tubes of 2.5 mm internal diameter or greater.1 At this case, the use of a Kirschner wire as endotracheal tube stylet allowed a successful intubation in a difficult neonatal airway. Despite this risk of laryngeal injury, the emergency of this situation justified the use of a stylet. This is an example of effective team communication and resource utilization, by anesthesiologists, neonatologists, nurses and surgeons.

Learning points: Sometimes, the lack of available material becomes a problem, mainly in emergency situations. We can verify that Kirschner wire can be used as an endotracheal tube stylet for endotracheal tubes size 2.0mm. The team work and other non-technical skills assume a vital part in clinical competency.

Bilateral Myositis Ossificans of masticatory muscles: Fiberoptic intubation saves the day

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Background: Myositis Ossificans is characterized by nonneoplastic, heterotopic bone formation within a muscle. Myositis Ossificans is rare. The most common clinical finding is progressive limitation of motion in the mandible leading to trismus. Airway management can be challenging, requiring an extensive knowledge and training.

Case Report: A 37-year-old female patient, ASA I, with clinical diagnosis of trismus due to Bilateral Myositis Ossificans of masticatory muscles secondary to orthodontic infection, was scheduled for bilateral temporomandibular articulation bone tissue excision. Physical examination showed total incapacity for mouth opening with permanent inter-incisive occlusion. No other difficult airway predictive signs were observed. Routine preoperative tests were normal. Airway management was carefully discussed and awake fiberoptic nasotracheal intubation was planned. In preparation for the procedure, the patient was made aware of the steps involved and reassured that safety and comfort would be optimized.

Topical airway anesthesia was achieved by spraying 2% lidocaine in the nasal and oropharyngeal mucosa. Phenylephrine was applied to limit bleeding of the nasal mucosa. Fiberoptic intubation was successfully accomplished followed by induction of general airway anesthesia. Total intravenous airway anaesthesia (TIVA) was used with adequate hemodynamic stability and surgery proceeded uneventfully. At the end of surgery a 2.5 cm inter-incisive distance was achieved. After neuromuscular blockade was reversed with sugammadex, the patient was extubated and moved to the postanaesthesia care unit, where she remained stable.

Discussion: Fiberoptic intubation is an effective technique for establishing airway access in patients with anticipated difficult airway, particularly due to trismus. Patient preparation and education is a safe and comfortable management option. In this case report awake fiberoptic intubation was the obvious first choice for airway management and shows how vital is adequate training in this field. A thorough knowledge of a difficult airway algorithm is essential for a successful outcome.

References:

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Oral awake tracheal intubation in a patient with severe trismus with a homemade cannula. A case report

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Background: Awake tracheal intubation (ATI) is gold standard in airway management for predicted difficult airway. (1) We have many options of ATI (bronchoscopy, videolaryngoscopy, tracheostomy) but in cases of limited mouth opening, insertion of oropharyngeal cannulas, laryngeal masks and laryngoscopes may be impossible and nasal bronchoscopy approach may be more appropriate. There are situations that nasal route for intubation is not advised and must consider other option.

Case Report: 76 year old male, presented for mitral valve replacement. The patient had personal history of mandibular fracture in childhood with severe trismus (~15 mm), Sleep Apnea Syndrome, arthritis with limited cervical mobility, so he gave consentment for awake intubation. We used nasal oxygen and performed airway topicalisation with nebulised lidocaine, mucosal atomiser and patient gargling.
Failed tracheal intubation in a patient with mucopolysaccharidosis type II

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Background: Mucopolysaccharidosis are rare lysosomal storage diseases resulting from defects in lysosomal enzymes involved in degradation of glycosaminoglycans. Different mucopolysaccharidosis are caused by different enzyme deficiencies. The anesthetic complications are related to the organs involved. Patients with mucopolysaccharidosis are rare, and few anesthesiologists encounter such patients.

Case Report: A 13 years old boy diagnosed mucopolysaccharidosis II was scheduled for extraction of deciduous tooth. He had mental retardation. The pre-operative examination revealed he had a short neck, macroglossia, and limited neck movement. Difficult airway was anticipated, we prepared various intubation devices. Anesthesia induced with thiopental 150 mg, and succinylcholine 10 mg was injected. Anesthesia was maintained with 2.5 vol% Sevoflurane in 100% Oxygen. First endotracheal intubation attempt was conducted with 5mm tracheal tube by direct laryngoscope, but failed. Second endotracheal intubation attempt was conducted with 4.5mm tracheal tube by video laryngoscope, then I-gel LMA was inserted. However, respiratory obstruction was observed immediately. Next endotracheal intubation attempt was conducted with 4.5 mm tracheal tube by flexible fiberoptic scope, but failed. Patient's spontaneous ventilation was recovered, and we decided to start surgery under spontaneous ventilation. A total surgery time was 4 minutes.

Discussion: Airway management is the major problem for patients with mucopolysaccharidosis. If patient’s cooperation is possible, awake intubation using flexible fiberoptic scope is safe choice. In the case of short-term surgery, anesthesia with mask ventilation and if regional anesthesia is indicated, consider actively. Along with standardization of new mucopolysaccharidosis therapy options, the need for anesthesia in high-risk cases will increase in the near future, for which anesthesiologists must be prepared.

References:

Learning Points: Patients with mucopolysaccharidosis are rare, and few anesthesiologists encounter such patients. Communication with surgeon is an important key for safe anesthesia in such patients.

6020
Endotracheal tube displacement in patient with maxillofacial trauma: a case report

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Background: According to the Advanced Trauma Life Support (ATLS) recommendations, an effective airway management is imperative. Severe injuries in maxillofacial region can complicate early airway management of trauma patients. Establishing a definitive airway as well as the frequent reevaluation of airway patency is necessary.

Case Report: A 20-year-old man was transferred to Gregorio Marañón Hospital after being found in the street under suspicion of having been run over. The patient was hemodynamically stable, intubated. Pulse-oximetry and end-tidal carbon dioxide were measured. Normal peak inspiratory pressure was found in mechanical ventilation. Physical examination revealed a scalp injury, normoreactive right pupil and unexplorable left pupil by a large orbital hematoma. Cranial and thoraco-abdominal CT were performed (Figure 1):
Anesthetic concerns for an Ivor-Lewis esophagectomy in a patient with tracheostomy: A Case Report

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Background: A tracheostomy is a specific condition in which one-lung ventilation (OLV) may be uniquely challenging.

Case report: A 66-kg male, ASA-PS III patient (BMI=41 kg/m²) presented for an elective Ivor-Lewis esophagectomy for esophageal adenocarcinoma. Medical history included hypertension, obesity, diabetes mellitus, hypothyroidism, COPD and a total laryngectomy, with permanent tracheostomy. Anesthetic plan included general anesthesia combined with thoracic epidural analgesia. The first intubation attempt was unsuccessful, using a left 4.5 mm double-lumen tube (D LT) for tracheostomized patients. The second unsuccessful attempt was made with a smaller (8.5 mm) DLT. Ultimately, a tracheostomy tube (Rusch N9, Teleflex) and a bronchial blocker (EZ-blocker) were successfully used. During airway manipulations, manual ventilation with 100% oxygen was achieved with an infant mask securing the stoma. Total duration of anesthesia was 8 hours (3 hours of OLV). After restoration of spontaneous respiration, the tracheostomy tube was removed. The patient experienced no postoperative complications and was discharged home on POD10.

Discussion: Correct placement of the bronchial cuff of the Tracheo part tube was attempted using a left 4.5 mm double-lumen tube (D LT) for tracheostomized patients. The only plausible explanation for the discrepancy in fit of D LT in our case could be that the correct size for our patient’s height (175 cm) was between 85 mm and 95 mm. Learning points: It is imperative that alternate airway plans are carefully considered when dealing and planning OLV in tracheostomized patients. The primary goal should be patient’s safety. Careful selection of devices/equipment based on patient’s airway anatomy and the experience of the anesthesiologist involved are essential for successful OLV in such cases.


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A case of difficult intubation in a patient with vallecular cyst: a case report

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Background: Vallecular cyst is usually coincidentally encountered during general anesthesia and often cause difficulty in intubation. This case reports a patient with no prior history of intubation, diagnosed with a vallecular cyst.

Case report: A 71-year-old male patient underwent hospital with difficult breathing. During preoperative examination, the patient’s mouth opening and mucosa were normal. Mallampathy score was 3 with normal neck range of motion. The patient had a diffused irregular hypertrophic lesion that extends across the wings of the nose. Laryngeal examination using a flexible laryngoscope reveal a vallecular cyst expanding and rendering the vocal cord non-visible. In the operation room, the patient was routinely monitored for vitals. After 2 mg of midazolam, 40 mg and 100 mg iv titres of ketamine and propofol respectively was used for induction. Spontaneous breathing was maintained. Attempts to intubate the patient using a video laryngoscope (VL) was unsuccessful as we could not gain access to the vocal cord due to the size of the vallecular cyst. Nasal fiberoptic intubation was also unsuccessful as the vallecular cyst span as far as the posterior aspect of the vocal cord. Using VL blade for visualization as well as a retractor, the cyst was retracted, the larynx was visualized and successfully intubated with nasal fiberoptic endoscope. At the end of the operation the patient was successfully extubated.

Discusison: VL and fiberoptic intubation are commonly used for cases including pediatric cases marked as difficult intubation. In some cases, a combination of different visualization techniques may be required, especially in patients with large supraglottic masses that may impede intubation. In this case we used a combination of VL and nasal fiberoptic endoscopy to simultaneously manage the airway as well as endotracheally intubate the patient.


Learning points: In some cases alternative techniques, like combination of two devices, may be useful for successful intubation.

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Challenges in airway management of a child with maxillofacial trauma: a case report

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Background: Playground related injuries in children account for 56% of all trauma cases in this population, while 10% of these are severe fractures of cranial bones, dislocations of brain damage that requires medical assistance. Single facial fractures in children account for 72% while multilfacial fractures for 28%.

Case report: A 12 year old patient was admitted in hospital with a swollen face expanding and rendering the vocal cord non-visible. He was immediately transferred to the operating room with TA=115/45, HR=95, SaO2=95%. Patient in a chair sitting position was induced in anesthesia and often cause difficulty in intubation. This case reports a patient with no prior history of intubation, diagnosed with a vallecular cyst.

Case report: A 71-year-old male patient applied to hospital with difficult breathing. During preoperative examination, the patient’s mouth opening and mucosa were normal. Mallampathy score was 3 with normal neck range of motion. The patient had a diffused irregular hypertrophic lesion that extends across the wings of the nose. Laryngeal examination using a flexible laryngoscope reveal a vallecular cyst expanding and rendering the vocal cord non-visible. In the operation room, the patient was routinely monitored for vitals. After 2 mg of midazolam, 40 mg and 100 mg iv titres of ketamine and propofol respectively was used for induction. Spontaneous breathing was maintained. Attempts to intubate the patient using a video laryngoscope (VL) was unsuccessful as we could not gain access to the vocal cord due to the size of the vallecular cyst. Nasal fiberoptic intubation was also unsuccessful as the vallecular cyst span as far as the posterior aspect of the vocal cord. Using VL blade for visualization as well as a retractor, the cyst was retracted, the larynx was visualized and successfully intubated with nasal fiberoptic endoscope. At the end of the operation the patient was successfully extubated.

Discussion: VL and fiberoptic intubation are commonly used for cases including pediatric cases marked as difficult intubation. In some cases, a combination of different visualization techniques may be required, especially in patients with large supraglottic masses that may impede intubation. In this case we used a combination of VL and nasal fiberoptic endoscopy to simultaneously manage the airway as well as endotracheally intubate the patient.


Learning points: In some cases alternative techniques, like combination of two devices, may be useful for successful intubation.

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Tapia’s syndrome after orotracheal intubation: A case report

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Background: Tapia’s syndrome is a rare condition defined by signs and symptoms associated with unilateral lingual as well as vocal cord paralysis caused by extracranial compression of the hypoglossal nerve (XII) and the recurrent laryngeal branch of the vagus nerve (X). Most cases appear as a complication of airway manipulation after any type of surgery, most commonly after tracheal extubation. The inflated cuff or different head positions during the procedure can lead to a compression of the larynx or pharynx that can damage nerves in this area. Most cases recover in 4-6 months spontaneously suggesting neuroapraxia, nerve damage secondary to compression injuries.

Case Report: We present a case of a 34 year-old female patient with no relevant medical history, scheduled for mammoplasty surgery. The operation was performed under general anaesthesia and orotracheal intubation. During the procedure, after changing the position of the patient’s head, an episode of desaturation and elevation of arterial oxygen saturation. The perioperative course was otherwise uneventful. On the first postoperative day, the patient reported dysphonia, dysphagia and lingual paralysis. A complete neurological examination revealed unilateral lingual and left vocal cord paralysis. Diagnosis of Tapia’s syndrome was performed.

Discussion: We postulate that either an unnoticed compression of the endotracheal tube or the inflated cuff or the change in the position of the patient’s head might have been the source of the unilateral nerve compression that was observed. Both anesthesiologists and surgeons should be aware of this postoperative complication in patients reporting dysphagia and dysphonia after tracheal extubation. The diagnosis was based on a complete head and neck neurological examination and imaging test, both essential to exclude central causes.
Background and Goal of Study: Dielectric blood coagulometer (DBCM) is a coagulation test, based on measurement of dielectric permittivity change, which reflects aggregation and deformation of blood cells and fibrin polymerization during coagulation process. In this system, dielectric clot strength (DCS) are measured as variables reflecting clot strength respectively. This study was designed to evaluate a performance of a prototype DBCM (SONY IP&S, Inc., Tokyo, Japan).

Materials and Methods: Patients undergoing cardiovascular surgical care are studied. Blood samples are collected (1) after induction of anesthesia, (2) after the termination of CPB and protamine administration, and (3) after the sternal closure. We evaluated 2 assays: (A) CA as a test initiated by calcium supplementation, (B) IN as a test initiated by ellagic acid and calcium. We studied correlation between the variables from DBCM and those from laboratory test. Spearman’s correlation coefficient (Rs) was assessed in the correlation analyses, and receiver operating curve (ROC) analyses were performed as evaluations of test performance. Statistical significance was defined as P < 0.05.

Results and Discussion: One hundred patients were included, IN DCS showed strong correlation with fibrinogen by Claus method (Rs=0.83, P<0.001, Fig A), and CA DCS showed strong correlation with platelet counts (Rs=0.66 P<0.001, Fig B)). Area under the curves of ROC analyses were 0.92 to detect plasma fibrinogen levels >200mg/dL, from IN DCS Fig C, and 0.88 to detect platelet counts >60,000/mm3 from CA DCS Fig D.

Conclusion: DBCM showed acceptable performance for the evaluation of fibrinogen concentration, and platelet count in patients undergoing cardiac surgery. Further large sized clinical trials are needed to establish clinical usefulness of DBCM.

Acknowledgements: This work was supported by the Cooperation Program by TMDU and Sony IP&S, Inc.

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The use of viscoelastic techniques in the management of cirrhotic or septic patients undergoing invasive procedures allows to save blood-components transfusion without observing hemorrhagic complications

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Background and Goal of Study: Septic and cirrhotic patients often present prolonged coagulation tests. Fresh frozen plasma and/or platelet transfusions may be administered to these patients undergoing invasive procedures in order to minimize the risk of bleeding, despite routine coagulation tests do not predict an obligated bleeding risk. Blood-components transfusion is associated with an increased risk of morbidity and mortality, especially when not indicated. Rotational thromboelastography (ROTEM®) provides a more comprehensive global coagulation assessment, measuring clot formation, strength and stability. Its use may avoid unnecessary blood product transfusion for this type of patients.

Materials and Methods: A retrospective study including 290 septic and 230 cirrhotic patients admitted to the emergency room or hospitalization area at Parc Taulí Hospital (Sabadell, Barcelona) since 2011 to beginning 2019, having PT alteration to minimize the risk of bleeding, despite routine coagulation tests do not predict an obligated bleeding risk. Blood-components transfusion is associated with an increased risk of morbidity and mortality, especially when not indicated. Rotational thromboelastography (ROTEM®) provides a more comprehensive global coagulation assessment, measuring clot formation, strength and stability. Its use may avoid unnecessary blood product transfusion for this type of patients.

Results: We evaluated 2 assays: (A) CA as a test initiated by calcium supplementation, (B) IN as a test initiated by ellagic acid and calcium. We studied correlation between the variables from DBCM and those from laboratory test. Spearman’s correlation coefficient (Rs) was assessed in the correlation analyses, and receiver operating curve (ROC) analyses were performed as evaluations of test performance. Statistical significance was defined as P < 0.05.

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Conclusion: DBCM showed acceptable performance for the evaluation of fibrinogen concentration, and platelet count in patients undergoing cardiac surgery. Further large sized clinical trials are needed to establish clinical usefulness of DBCM.

Acknowledgements: This work was supported by the Cooperation Program by TMDU and Sony IP&S, Inc.

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Evaluation of dielectric blood coagulometer as a point of care test for measurement of anticoagulation potential caused by direct oral anticoagulants

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Background and Goal of Study: Dielectric blood coagulometry (DBCM) is a coagulation test based on the measurement of dielectric permittivity change, which reflects aggregation/deformation of blood cells and fibrin polymerization in coagulation process. The purpose of this study is to evaluate correlation between...
clotting time measured by DBCM (DBCM CT) and the thrombin generation of the blood supplemented with direct oral anticoagulants (DOACs) using a prototype machine of DBCM (SONY IP&S, Inc., Tokyo, Japan). We also evaluated a correlation between DBCM CT and DOAC concentration.

Materials and Methods: Whole blood samples are collected in sodium citrate tubes from 10 volunteers. Edoxaban and rivaroxaban was added to make blood samples with concentration of 25, 50, 100, 200 and 400 ng/mL. Low dose tissue factor and calcium were added to measure DBCM CT. Plasma was isolated from same samples, and they are used in evaluation of thrombin generation using calibrated automated thrombogram (CAT). Kruskal-Wallis tests were performed for multiple comparison, and the difference between the samples with or without DOACs were analyzed by Steel tests as post-hoc analyses. Spearman’s correlation test was performed to analyze correlation between DBCM CT and the variables measured by CAT analyses. Statistical significance was defined as P < 0.05.

Results and Discussion: DBCM CT was prolonged by supplementation of edoxaban and rivaroxaban (Fig 1A, B). The samples supplemented with DOACs showed significantly longer DBCM CTA than those from samples without DOACs. Both lag time and peak measured in CAT analyses showed significant correlation with DBCM CT (Fig 1C, D; R = 0.82, P < 0.001 for edoxaban; R = 0.91, P < 0.001 for rivaroxaban).

Conclusion: DBCM CT showed significant correlation with variables reflecting thrombin generation under FXa inhibition caused by DOACs. These results suggest potential for clinical usefulness of DBCM as a point of care test to evaluate anticoagulation by DOACs.

Acknowledgements: This work was supported by the Cooperation Program by TMDU and Sony IP&S, Inc.

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Hemostasis system evaluation by the rotary thrombelastometry method with the module of impedance aggreometry in newborn children with congenital heart disease.

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Background and Goal of Study: “Open heart” surgery in newborn children is carried out using a cardiopulmonary bypass and accompany the severe hemodilution condition. It aggravates by prolonged contact with a foreign surface in various temperature conditions - hypothermia. The aim of our study was to identify functional changes in platelets after cardiopulmonary bypass in newborn children. We applied the ROTEMplatelet module to assess platelet aggregation ability in infants with congenital heart disease to evaluate the effect of hemostatic therapy with platelet concentrate and identify patients with high thrombogenic risk who require specific antithrombotic therapy, such as heparin-induced thrombocytopenia.

Materials and Methods: The hemostasis system was examined by integrated test for evaluating the blood coagulation system ROTEMDelta and ROTEMplatelet (impedance aggregometry module) - determination of platelet aggregation activity in a native blood sample. Between July and November 2019 40 newborn children and infants undergone “open heart” surgery in A.N. Bakulev National Medical Research Center of Cardiovascular Surgery were examined for basic ROTEMdelta and ROTEMplatelet.

Results: The ROTEMplatelet module showed a significant correlation with the ROTEMdelta module (Rs=0.87, P<0.001 for edoxaban; Rs=0.91, P<0.001 for rivaroxaban).

Conclusion: This work was supported by the Cooperation Program by TMDU and Sony IP&S, Inc.

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Fibrinolysis detection by the next generation cartridge-based viscoelastic analysers TEG® 6s and ROTEM® Sigma: An in vitro comparison

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Background and Goal of Study: Hyperfibrinolysis is a critical component of DIC that is associated with poor outcomes if not diagnosed and treated early. Successful hemostasis management requires close monitoring of fibrinolysis and its treatment with anti-fibrinolytics. The study objective was to explore and compare the fibrinolysis detection capabilities of the new cartridge-based viscoelastic hemostatic analysers (VHA) under controlled conditions.

Materials and Methods: TEG60s and ROTEM® Sigma analyses were performed in duplicate on whole blood samples from 10 healthy volunteers spiked with 8 different concentrations of tPA (0-140ng/ml). Fibrinolysis was measured with the TEG60s at 30 minutes after maximum amplitude (LY30) for RapidTEG® (CRT) and Kaolin (CK) assays and with the ROTEM® Sigma at 30 minutes after clotting time (L30) for INTEM and EXTEM assays. Device thresholds to IPA were studied in linear or nonlinear models and measurement variances were studied with Bland-Altman analyses.

Results and Discussion: Both analyzers showed a monotonous relationship with increased tPA concentrations in log-logistic four parametric models. The IPA concentrations with >90% expected probability for detection of IPA induced lysis versus no-IPA control or reference range were respectively: 62.4ng/ml or 7.17ng/ml for CK.LY30, 84ng/ml or 89.2ng/ml for CRT.LY30, 100.7ng/ml or 100ng/ml for EXTEM.L30, and 110.9ng/ml or 114.9ng/ml for INTEM.L30. For the lower IPA concentrations of 20, 40 and 60ng/ml the lysis prediction sensitivity versus reference range were 61.4%, 69.2% and 78% for CK.LY30, 54.3%, 63.3% and 72% for CRT.LY30, 47.9%, 55.8% and 67% for EXTEM.L30 and 33.6%, 39.2% and 47% for INTEM.L30, respectively. In comparison, current commonly used VHA-guided thresholds for fibrinolysis treatment correspond to ~80ng/ml or higher. Both devices had specificity levels >85% at most studied concentrations. Finally, the variance of measurements ranged from 1.6% (CRT.LY30) and 3.7% (CK.LY30) for the TEG60s to 11.9% (EXTEM.L30) and 15.8% (INTEM.L30) for the ROTEM® Sigma.

Conclusion: Important differences were found between the fibrinolysis detection capabilities of the new VHA analysers. The clinical importance of these findings needs to be further investigated.

VHA-guided fibrinolysis treatment algorithms could potentially be improved to reflect the sensitivity of the new VHA analyzers.

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Comparison of low-frequency piezoelectric thromboelastography (LPTEG) data of patients with benign prostate hyperplasia between fasting and non-fasting groups in the preoperative period

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Background: Benign prostatic hyperplasia (BPH) is a common problem for elderly men that negatively affect quality of life and results in medical intervention. Despite the latest European recommendations about perioperative fasting, the majority of anaesthesiologists in Ukraine prefer nil per os (NPO) tactic for at least 12 hours before surgery. NPO for prolonged period may cause the hypercoagulability. The target of this study was to demonstrate the effects of water deprivation on hemostasis system in the cohort of elderly patients with BPH by LPTEG readings.

Materials and Methods: Participants were >70 y.o., underwent transrectal ultrasound-guided prostate biopsy from September 2018 till September 2019 to confirm the diagnosis of BPH. LPTEG data were collected twice before the procedures from the patients, who did not receive any antithrombotic or anticoagulant treatment on the admission and 1±0.43 hours previous to the surgical procedure. The patients (n=64) were blindly divided into two groups: group A (n=31) was represented by the patients, who were allowed to drink clear fluids in volume 100-300 ml until 2 hours previous to the operation; group B (n=33) was represented by patients, who underwent NPO tactic 12±2.3 hours previous to the operation.

Results: Blood coagulation constants checked by LPTEG were: Intensity of coagulation drive (ICC), Intensity of coagulation arrest (ICR), clot maximum density (MA), clot retraction activity - Index of retraction and clot lysis (IRCL). We received a slight increase of all measurements in both of the groups on the admission: ICC by 13.13 ± 8.56%, ICR by 22.43 ± 19.35%, MA by 44.11 ± 19.31%, ICR by 61.18 ± 31.18% above the norm. Before the surgical procedure LPTEG has shown such results: in group A – changes in ICC by 12.13 ± 6.11%, ICR by 16.87 ± 5.04%, MA by 43.51 ± 18.81%, ICR by 64.02 ± 26.22% above the norm similar to those at the admission; in group B we found a moderate increase in all the measurements - ICC...
Coagulation parameters associated with fibrinogen concentrate and cryoprecipitate for treating bleeding patients in Pseudomyxoma Peritonei surgery: results from the prospective, randomised, controlled Phase 2 FORMA-05 study

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Background and Goal of Study: Cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy for pseudomyxoma peritonei (PMP) can be associated with excessive bleeding and acquired fibrinogen deficiency. Maintaining adequate levels of coagulation proteins, including plasma fibrinogen concentrations during CRS helps control haemostasis. FORMA-05 compared efficacy and safety of human fibrinogen concentrate (HFC) vs cryoprecipitate for bleeding patients with acquired fibrinogen deficiency undergoing CRS for PMP. This sub-analysis explores the patient coagulation profiles intraoperatively and postoperatively.

Materials and Methods: FORMA-05 was a single-centre, prospective, randomised, controlled Phase 2 study. Patients undergoing PMP surgery with predicted intraoperative blood loss ≥ 2 L received either HFC (4 g) or cryoprecipitate (2 pools of 5 units, approximately 4.0–4.6g fibrinogen), repeated as needed. Plasma fibrinogen concentration (measured using Cluss assay) and FITBTEM A20 were measured hourly intraoperatively, while Factor (F) XIII, FVIII, von Willebrand Factor (VWF) levels and endogenous thrombin potential (ETP) were measured every two hours. Post-surgery, all parameters were measured at 6, 12, 24, and 28 hours, and 10 days.

Results and Discussion: The full analysis included 45 patients on either HFC (n=22) or cryoprecipitate (n=23). The intraoperative and postoperative changes in ETP, FXIII, FVIII and VWF are shown in Table 1. For FIBTEM A20 (intraoperatively) and thromboelastography (TEG) for the management of hemostasis in a septic patient: a case report

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Background: Thromboelastography (TEG) is a viscoelastic hemostatic assay that measures the global viscoelastic properties of whole blood clot formation, showing a functional perspective on the entire coagulation process. The use of TEG has been evaluated for cardiac surgery and the emergency control of bleeding after trauma and during postpartum haemorrhage (1). We report a case of a patient with sepsis who presents alterations of INR with TEG within normalization.

Case Report: A 34-year-old patient was diagnosed with xanthogranulomatous pyelonephritis that conditioned a chronic sepsis and was scheduled for nephrectomy surgery. In the preoperative evaluation, anemia of chronic disorders (non-iron deficiency) was observed with baseline hemoglobin 9 g/dL and an INR of 1.57 that did not improve with vitamin K, so fresh frozen plasma (FFP) was prescribed 10 ml/kg before the start of the intervention. After transfusion of FFP, an INR of 1.5 was maintained, so a TEG (ROTEM® delta, Werfen) was performed in which we did not find alterations in the INTEM, EXTEM, FIBTEM and APTEM that suggested a prohemorrhagic state. The intervention was carried out with an intraoperative bleeding of 400ml approximately, hemodynamic stability and transfusion of two red blood cell concentrates with hemoglobin of 8.6 g/dL at the end. In the immediate postoperative period, the alteration of the INR was maintained without alteration of the TEG or bleeding complications.

Discussion: The agreement between conventional laboratory tests, such as INR, and TEG is poor and it remains uncertain what type of coagulation test best reflects the risk of intraoperative bleeding (2). Apart from the use of TEG for cardiac surgery, bleeding after trauma and postpartum hemorrhage, it can be used in situations where we need additional information on the coagulation status of our patients.

References:
Massive hemorrhage protocol survey in five spanish hospitals: what knowledge is there?

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Background and Goal of Study: Massive hemorrhage protocols (MHP) have been designed to deliver predetermined blood product component ratios in an early and coordinated manner to control massive hemorrhage (MH). The implementation of MHP improves the prognosis but its non-compliance increases mortality. The protocol allows the professionals involved to optimize resources and follow an algorithm with specific circuits or procedures that adapt to the local conditions of each center. The objective of this survey was to evaluate the degree of knowledge in 5 different Spanish hospitals, identify the aspects with more unknowledge and propose corrective actions to improve MHP compliance.

Materials and Methods: An anonymous online survey was carried out by doctors and nurses staff, where high complexity surgeries and trauma patients are managed. All have MHP since 2011. The survey had 6 sections with 26 questions. 20 of them with multiple choices/singular answer and the other 6 asked about the personal experience. 1. Logistics and organization. 7 questions. 2. Criteria of activation and deactivation. 4 questions. 3. Content / preservation of blood components. 4 questions. 4. Prescription and administration of blood components. 3 questions. 5. Lab tests. 2 questions. 6. Personal experience. 6 questions.

Results and Discussion: A total of 281 surveys were answered. The area that had the highest participation was the surgical area (49%) followed by intensive care areas (37%). In the personal experience section, it’s noteworthy some services involved in the treatment of MH are unaware of key points of the care protocol and blood banks demand more leadership and communication during MTP activation while clinicians think that the activation of MHP is orderly and well led.

Conclusion: There is an acceptable but not sufficient or uniform knowledge of the MHP and it is necessary to improve coordination between teams involved in MH. After the results we have made an update of the MHP, an informative session in our hospital, we have made a check-list to remember all action recommended after MTP activation and we designed a compliance study of the MHP.
5276

Rehabilitation and patient blood management during colorectal cancer surgery

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Background and Goal of Study: The worldwide trend towards the use of blood replacement in surgery with significant blood loss. There are many complications of blood transfusion and without the use of alternatives risks cannot be prevented. We used new blood management strategies with erythropoiesis stimulants for the rehabilitation of patients in colorectal surgery. The goal of the study was to improve the outcome anaesthesia, reducing risks and complications in patients with two different perioperative blood management strategies.

Materials and Methods: 50 patients were divided into 2 groups due to blood management strategy: in 1 group (n = 25) we used 10,000 IU the epoetin-alpha (erythropoietin) with Iron (III) oxide 1mg/kg 5,3 days prior to the surgery and intraoperatively. Haemotransfusions were not planned in this group. In the 2 group (n = 25) were scheduled to blood transfusion based on intraoperatively blood loss (RBC:FFP to 1:1). The baseline hemoglobin and hematocrit level was not different in both group (118±3 g/l, erythrocytes 4,7±0,5 G/l, Ht - 37±3%). Monitoring of red blood carried out 6, 12, 24 and 72 hours after surgery. Restrictive infusio tactics were chosen for all patients. A sternal puncture and ultrastructural examination was performed intraoperatively.

Results and Discussion: All patients of 1 group showed an increase in hemoglobin by 17-19% from baseline. 24 patients (96%, p <0.05) tended to decrease hemoglobin 6, 12, 24 hours after surgery by an average of 13-15%. Further restoration to the initial level after 48 hours, and even increase above by 10-12%. At the same time, the hematocrit remained constant nearly of 2-3% from the initial. In patients in group 2, no significant decrease of red blood was observed, due to intraoperatively transfusion of erythrocytes. Anemia was observed in 17 cases (88%) to 48 hours after surgery, requiring additional blood transfusion. After 72 hours hemotransfusion were not necessary. In sternal bone marrow punctate in cases (68%) to 48 hours after surgery, requiring additional blood transfusion. After due to intraoperatively transfusion of erythrocytes. Anemia was observed in 17

5589

Transfusion ratio and hemoglobin levels in a perioperative blood management program for hip and knee arthroplasty

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Background and Goal of Study: Rates of blood transfusion after primary arthroplasty have fallen precipitously since blood management strategies have been implemented. A perioperative blood management program (BMP) for knee and hip arthroplasty has been progressively implemented in our hospital since 2015. At that time, the transfusion rate was 14.5%, while on 2018 it was reduced to 4.4%. As our goal of study both the preoperative hemoglobin levels and transfusion rates obtained with different treatments (iron vs. erythropoietin) were analyzed. We also analyzed whether patients with preoperative anemia using the World Health Organization’s (WHO) criteria, had a poorer response to the treatment.

Materials and Methods: We analyzed retrospectively our data from 2018, and 358 patients underwent knee and hip arthroplasty. One of the preoperative goals in our BMP was to improve the level of hemoglobin up to 13g/dl. Forty seven patients (13%) were treated: sixteen patients (34%) received endovenous iron, and thirty-one (66%) additional erythropoietin (EPO). Cyanocobalamin and folate were also administered in both of the groups when its deficiency was detected. We used Chi-square, Fisher’s exact test, to find if transfusion rates and the level of preoperative hemoglobin achieved, differed between different treatments. We also analyzed if hemoglobin levels achieved were lower in anemic patients.

Results and Discussion: Sixteen patients in the EPO group (50%) and five in the iron group (31%) achieved a preoperative hemoglobin level of 13g/dl. Differences
were not statistically significant (NS). In the EPO group, 11% of patients required transfusion vs. 33% in the group of patients treated with just iron (NS). Only 29% of patients who met the WHO anemia criteria reached hemoglobin levels ≥ 13g/dl. In contrast, 58% of patients without anemia, achieved the hemoglobin levels proposed in our program (p=0.05).

Conclusion: We conclude that whichever treatment we use in our BPM, patients reach a similar preoperative hemoglobin level, and are at a comparable risk of perioperative transfusion. Our data also indicate that patients who meet WHO’s anemia criteria, respond more poorly to stimulating hematopoietic strategies, and are more prone to continue with low hemoglobin levels despite proper treatment when compared with patients who do not meet these criteria.

5620
Anemia profile study of patients undergoing urological surgery with potential bleeding risk and the benefits of applying a PBM program
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Background and Goal of Study: Patients undergoing urological surgery with potential bleeding risks are usually subject to hematuria and secondarily to iron deficiency and anemia. Anemia and blood transfusions during the perioperative period have also been proved to worsen morbidity outcomes and mortality rates. Today, Patient Blood Management (PBM) programs are highly recommended in perioperative environments, which consist of a multimodal approach strategy based on the patient in order to diminish anemia and blood transfusion ratios. Due to the proven benefits of PBM programs, Hospital Parc Taulí started administering this program in 2018 to urology patients undergoing surgery. A preoperative anemia study was conducted, and those patients with anemia were treated. The purpose of this study was to evaluate the result of implementing a PBM program by analyzing the anemia characteristics and the transfusion rate.

Materials and Methods: A retrospective, observational analysis of all patients undergoing urological surgery during 2017 and 2018 was completed. Blood transfusion requirements and hemoglobin levels were recorded in both groups and iron metabolism was only recorded in 2018. All this data was compared in different patient diagnoses and surgeries.

Results and Discussion: During 2017 a total of 398 patients were analyzed. In this sample, 32.7% of patients had anemia before surgery, however no data about iron metabolism was collected. During 2018 a total of 315 patients were analyzed. In this year, 23.8% of patients had anemia before surgery, 34.1% of that 24% was related to iron deficiency, 32.9% was related to anemia of chronic disease and 20% was related to mix anemia. Larger discrepancies were observed in specific diagnoses, where 58% of patients undergoing cystectomy had anemia before surgery. Comparing both groups before (2017) and after (2018) the implementation of PBM program, a tendency of the reduction of the requirement of blood transfusions was observed, although due to the small sample the differences were not statistically significant.

Conclusion: The study reveals that patients undergoing urological surgery with potential bleeding risk show a high incidence of anemia. Therefore, the implementation of a PBM program would be justified, having a great importance the preoperative treatment of iron deficiency.

5839
Transfusion of stored red blood cells exacerbates renal ischemia reperfusion-induced hepatic injury
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Background and Goal of Study: Renal ischemia reperfusion (IRI) causes injuries not only in the kidneys themselves, but also in distant organs, including the liver. Transfusion of stored red blood cells (SRBCs) has been shown to prime neutrophils and monocyte-macrophage system. In this study, we investigated whether RIR-induced hepatic injury is exacerbated by transfusion of SRBCs.

Materials and Methods: After Institutional Animal Care and Use Committee approval, male Sprague-Dawley rats weighing between 275 and 325 g were included in this study. Rats were randomly divided into three groups (n=18): sham operation (Sham); RIR only (Control); transfusion of SRBCs (15% of estimated blood volume, via tail vein) started at 1 hour after the end of renal ischemia (TF). Ischemia reperfusion injury was evaluated in the right kidney by perfusing red blood cells collected from 3 rats and stored for 2 weeks, used for transfusion. Ischemia of both kidneys was induced for 1 hour and reperfusion was allowed for 24 hours. Then, blood (for BUN, creatinine, AST, ALT) and liver tissue (for mRNA expression of HO-1, NGAL, TNF-a, and IL-6 by RT-PCR with densitometry) were obtained for analysis.

Results and Discussion: Serum levels of BUN and creatinine were increased in Control or TF vs. Sham, as a result of RIR (P < 0.05). Serum levels of AST and ALT were also increased in Control or TF vs. Sham (P < 0.05). TF had more severe hepatic injury than Control, as indicated by serum AST and ALT (P < 0.05). The hepatic mRNA expression of antioxidant enzymes such as HO-1 and NGAL was increased in TF, compared to Control or Sham (p < 0.05). However, the hepatic mRNA expression of TNF-a and IL-6 was no statistical differences among the three groups.

Conclusion: Transfusion of SRBCs exacerbates RIR-induced hepatic injury without triggering hepatic inflammatory responses. The mechanism of the hepatic injury may be oxidative stress.

6091
The impact of MELD values on transfusion need during liver transplantation
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Background and Goal of Study: Liver Transplantation (LT) surgery is complex with large bleeding risk, especially in patients with prior upper abdominal surgery, portal hypertension and severe coagulation disorder. Therefore, use of blood products is necessary in most LTs. MELD is a score that assesses the severity of hepatic disease, currently being the score used for including patients in the waiting list for LT. The objective of this work is to assess if high MELD values is associated with bigger consumption of blood products in the intraoperative and postoperative of LT.

Materials and Methods: The study was performed with 178 patients transplanted into the HGF’s LT service, dividing them into two groups (MELD ≤ 25 and MELD > 25), assessing the amount of intraoperative and postoperative blood products used - red blood cells concentrate (RBCc), platelet concentrate (PC), fresh frozen plasma (FFP), cryoprecipitate (CRYO), prothrombin complex (PCC) and fibrinogen concentrated (FC).

Results and Discussion: Of this population, 118 patients had MELD ≤ 25 and 60 patients had MELD> 25. The average use of blood products (RBCc, PC, CRYO, PCC and FC) was significantly larger (p <0.05), in patients with MELD > 25. Except the use of FFP that has not presented significance between the groups.

Conclusion: This study found that in those patients with MELD > 25, there was
Rivaroxaban withdrawal and rebound thrombosis in patient with atrial fibrillation: A Case report

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Background and Goal of Study: Rivaroxaban, the novel oral anticoagulants (NOACs) are increasingly used in patients with non-valvular atrial fibrillation for the prevention of stroke and systemic embolism.

Case Report: A 71-year-old woman with the medical history of obesity, hypertension, hyperlipidemia, atrial fibrillation and transient ischemic attack, was scheduled for both total knee arthroplasty. She took rivaroxaban 20mg once daily for 2 years ago. She stopped rivaroxaban for 5 days before surgery and there was no bridging anticoagulation. She had combined spinal epidural anesthesia. 4 hours after surgery, she was unresponsive to the stimul.us and seemed to be sleeping. Neurologic examinations were carried out immediately, and her mental status was stupor. The left arm could be lifted in the painful stimulus, right arm did not react and both legs could not be accurately evaluated due to the surgery. Immediately performed brain MRI and MRA showed infarction in middle cerebral artery and internal carotid artery territory. She received intra-arterial thrombolysis as an emergency and aspirin 100mg was administered as an antplatelet drug. 4 days after the operation, the patient recovered consciousness but remained right hemiplegia and severe dysarthria.

Discussion: In our case, her intrinsic stroke risk was high, so oral anticoagulant treatment was recommended. Though the researches and clinical data with rivaroxaban and other novel oral anticoagulant are limited, it might be important to know their individual risk factors and the potential rebound hypercoagulability after cessation of rivaroxaban, especially in high-risk patients. In patients with high risk for stroke, careful consideration should be given to minimize the duration of interruptions, and it could decrease the incidence of stroke in patients with atrial fibrillation.

Learning points: We should be aware of the risk of rebound hypercoagulability after cessation of rivaroxaban, especially in high-risk patients. In patients with high risk for stroke, careful consideration should be given to minimize the interruptions to decrease the incidence of stroke in patients with atrial fibrillation.

Impact of non-factor haemophilia therapy on standard laboratory assays

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Background and Goal of Study: Improved therapy options in patients with haemophilia A (PWHA) has led to normalization of life expectancy, leading however to an increasing number of surgical procedures in these patients’ lifetimes. A novel antibody treatment strategy challenges factor VIII substitution.1 Treatment with currently approved bispecific antibody compound Emicizumab (emi), Hemlibra® may replace factor substitution but leads to effects on standard laboratory assays (SLA) not related to the therapeutic effect or plasma concentration.2 Development of new laboratory routines is therefore urgently needed to specifically measure the therapeutic effect of the new compound especially in perioperative and/or emergency situations.

Materials and Methods: EC approval was not sought for this presentation of anonymised data derived from measurements in routine blood specimens. Due to its structural and functional differences, emi exerts distinct effects on aPTT-based assays, as it does not require activation by thrombin.3 In our cohort of PWHA, we switched three patients from FVIII concentrates to emi therapy regimen. We (1) demonstrate their laboratory course in SLA; (2) the influence of emi on different laboratory assays. Furthermore, we (3) implemented laboratory surveillance of emi drug level (modified one stage FVIII assay) and (4) tested for FVIII activity (after co-administration of FVIII concentrates) in the presence of emi (bovine chromogenic FVIII assay (CSA)).

Results and Discussion: aPTT normalized within few days after first administration (aPTT 85sec -> 35sec [25-42sec], although we detected sub-therapeutic plasma levels of emi [10.5µg/ml [35-80µg/ml]. But even at therapeutic levels of emi there is no complete restoration of coagulation. aPTT-based single factor (FVIII, FIX, FXI) one stage assays (OSA) showed falsly high results in the presence of emi. Measurement of co-administered FVIII activity was reliably possible in bovine CSA as emi does not bind to bovine forms of FIXa, FX.

Conclusion: Correct interpretation of SLA, OSA and CSA for PWHA receiving emi, is demanding and requires high expertise for patient safety in trauma or in even elective surgery situations.

References:

4559

Discontinuation of oral anticoagulation therapy is safe after successful surgical bialtrial ablation or pulmonary vein isolation for atrial fibrillation: A prospective follow-up study

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Background and Goal of Study: Atrial fibrillation (AF) is the most prevalent arrhythmia worldwide. Pulmonary vein isolation (PVI) and bialtrial ablation are common surgical treatments for this condition with the main purpose of reobtaining sinus rhythm. A potential benefit is entirely at the discretion of the physician and patient, and that is whether or not to stop the oral anticoagulation therapy (OAT). This is an important question as the bleeding risk associated with OAT is not negligible. The aim of this study therefore was to compare the outcome after either continuation or discontinuation of OAT following surgical correction for AF.

Materials and Methods: In this prospective follow-up study, patients who underwent treatment for AF either by PVI or bialtrial ablation were included. Patients were followed up at 3 and 12 months postoperatively, and OAT was discontinued if a 5-day Holter monitoring showed sinus rhythm, if the CHADS score<2, and if no other indications for OAT were present. However, all patients with CHADS2 score>2, spontaneous contrast in the left atrium, and absence of T-waves continued OAT regardless of rhythm status. At 12 months, patients were divided in an OAT-group, which still received OAT, and in a nonOAT-group, in which OAT had been discontinued.

Results and Discussion: Between 2004 and 2016, a total of 456 consecutive patients were included of which the nonOAT-group consisted of 162 patients and the group receiving OAT consisted of 294 patients. Survival analysis revealed no difference between the two groups (p=0.817) (Fig. 1). Mean postoperative survival time for the nonOAT-group was 6.1±3.1 years compared to 6.2±3.4 years in the OAT-group (p=0.708). No differences were found when comparing major adverse cardiac or cerebral event (MACCE) between the two groups (nonOAT-group=13 patients vs. OAT-group=26 patients, p=0.899). There were no differences in demographics and pre-operative risk factors between the two groups. Conclusion: It is safe to terminate OAT following PVI or bialtrial ablation based in the abovementioned criteria.
May-Hegglin anomaly and anaesthesia

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**Background:** May-Hegglin anomaly (MDA) is a rare autosomal dominant congential disorder, which results from the mutation of MYH9 gene that encodes a protein expressed in platelets and other tissues. Patients exhibit varying degrees of thrombocytopenia, giant platelets and characteristic inclusion bodies in granulocytes. Clinical manifestations depend mostly on platelet count (PC).

**Case Report:** A 48 years male, ASA II, was transferred to our institution for major surgery. He had MDA diagnosed due to familial history. Despite known low PC, he had not had haemorrhagic events nor needed any transfusions. Blood tests admission showed a PC of 3 x 10^9/L, lacking aggregation; the rest of the investigations were within normal range. After urgent haematological consultation, the patient was scheduled on the next morning, as he was haemodynamically stable. Haematologists recommended transfusion of 2 platelet pool before surgery. Preoperative PC was of 66 x10^9/L. A balanced anaesthesia was carried out. Intubation was rescued with Glidescope® since Cormack grade was III. Tranexamic acid 1 g was administered prior to deflation of tourniquet. Surgery was uneventful.

Postoperative PC was of 60 x10^9/L, so an ultrasound guided femoral nerve block was performed, as a postop analgesia was closely monitored to rule out haemorrhage. Patient did not require any other blood products during hospital stay and was discharged home on 5th postoperative day.

**Discussion:** In general terms a PC of 50 x 10^9/L are considered haemostatic.2 Thrombocytopenia is inherited thrombopathies is controversial and should be used cautiously, as it can lead to sensitisation. A threshold for transfusion in this setting has not yet been established and the decision must be made case by case. In our case the patient had not received any blood products before and the PC was extremely low. Peripheral nerve blocks in compressible areas can be helpful.

**Learning points:** The anaesthesiologist should be familiar with therapeutic options for the prevention of complications in people with thrombocytopenia.

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4806

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Acute pulmonary thrombosis in the early recovery of ambulatory septoplasty

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**Background:** Thromboembolic events are quite rare in patients submitted to ambulatory surgery (1) with an estimated incidence of 0.04% (2). In our hospital, for day surgery, thromboembolic prophylaxis is only prescribed in high risk procedures (vascular or orthopedic).

**Case Report:** 64 years old male scheduled for septoplasty in daycase surgery. ASA II.BMI 33,81kg/m\(^2\). Ex-smoker. Hypertension under medical treatment and depression. D dimer 10970 ng/ml (N <500). Despite fibrinolysis with rTPA he presented acute dyspnea and pleuritic chest pain. Intrahospital emergency team was quickly activated, detecting cardiac S1 & S3 sounds, normal WBC and platelet count (PC). Sat 89%. He remained calm, without dyspnea. Before discharge, he was successfully extubated and transfered to PACU room after a 10 minutes of glidescope intubation.

**Discussion:** In general terms a PC of 50 x 10^9/L are considered haemostatic.2 Thrombocytopenia is inherited thrombopathies is controversial and should be used cautiously, as it can lead to sensitisation. A threshold for transfusion in this setting has not yet been established and the decision must be made case by case. In our case the patient had not received any blood products before and the PC was extremely low. Peripheral nerve blocks in compressible areas can be helpful.

**Learning points:** The anaesthesiologist should be familiar with therapeutic approach of inherited thrombocytopenias.

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5047

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5218

Perioperative haemostatic management of a case with terminal polycystic liver disease with resectional thorboelastometry

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**Background:** Polycystic liver disease (PLD) is a rare genetic disorder due to embryonic ductal plate malformation of the intrahepatic biliary tree. Several PLD entities are recognized in adults: polycystic liver disease associated with autosomal dominant polycystic kidney disease ADPKD – PCLD, polycystic liver disease associated with autosomal recessive polycystic kidney disease ARPKD – PCLD, isolated polycystic liver disease (autosomal dominant disease) and Von Meyenburg Complexes or multiple biliary hamartomas. Large multiple cysts obstructing hepatic vein outflow give rise to symptoms & signs such as abdominal pain, hepatomegaly, ascites and lead to progressive hepatic failure and coagulation disorders.

**Case Report:** A 45 y old woman with a 10y history of ADPKD, stable chronic renal failure and hypothyroidism was admitted. Cysts enlargement started in 2016, growing ever since up to exceptionally huge size. Abdominal pain & distension during the last 1,5 months, 13kg gain in 15 days were prominent symptoms. She was referred to our hospital for further management, after 10L ascites removal in a local facility. On examination, she suffered from dyspepsia and was in very poor general state. Her abdomen was extremely overdistended, with palpable liver. CRP presented bilateral pleural effusions. Lab tests showed Hbg 8.7g/dl, WBC 12000/mm\(^3\), PLTs 14000/mm\(^3\), PT 12.6s, APTT 47.0s, INR 1.12, urea 145mg/dl, serum creatinine 3.18mg/dl. Intra-abdominal pressure was 30 mmHg. She underwent a 5 hour laparotomy for cyst aspiration and extended hepatectomy. Multiple enlarged cysts occupied nearly the three fifths of the liver. Point-of-care (POC) haemostatic monitoring, revealed a hypercoagulative state. Baseline/Intraoperative ROTEM® values: CTINTEM 217/217s, CTEXTEM69/59s, MCFEXTEM 70/70mm, MCF FITTEM 30/21mm. Apart from 2 PRBCs units transfusion no other blood product/ factor concentrate was necessary.

**Discussion:** Patients with PLD often present as hypercoagulopathic, due to elevated FVII after endothelial activation or injury and low protein C after decreased hepatic biosynthesis and increased consumption.

**Learning points:** POC rotational thromboelastometry is a rapid viscoelastic assay, useful for perioperative haemostatic management even in rare diseases.

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5501

Approximation of emicizumab plasma levels in the absence of dedicated assays. A practical approach

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**Background and Goal of Study:** Emicizumab (EMI) is a bsicpecific antibody mimicking the function of activated factor VIII (FVIIIa), which is used for bleeding prophylaxis in hemophilia A (HA), EMI - unlike FVIII - does not require activation for its procoagulant activity, which leads to a very strong effect in the aPTT and one stage FVIII assay (OSA). Therefore both assays are oversensitive towards EMI. To overcome this problem a dedicated EMA assay was developed, which is based on the OSA, using a higher sample dilution than the standard FVIII assay. This assay is available in hemophilia centers. In situations where patients need emergency medical care in centers other than dedicated hemophilia centers, a practical approach to assess the EMA plasma level based on a widely available assay would be desirable. The goal was to develop and validate a method for approximation of
EMI based on the OSA assay.

Materials and Methods: 28 anonymized left-over samples from routine coagulation analysis from HA patients with (n=23) and without (n=5) emicizumab treatment were analyzed. The EMI concentration was determined using the available standard assay (R2 Diagnostics, Haemochrom Diagnostica GmbH, Essen, Germany). In addition FVIII activity was determined using the OSA following a sample pre-dilution of 1:8 in saline. The FVIII assays were determined in two different laboratories using the Siemens ECS (and respective Siemens reagents) and Werfen ACL TOP (and respective Werfen reagents) analyzer systems.

Results and Discussion: EMI determination in patients on EMI therapy provided levels of 8-94 µg/ml (mean±SD: 43±25µg/ml). In patients without EMI therapy EMI levels of 0-1 µg/ml were reported. Standard FVIII assays revealed >200 % FVIII in 14/23 (Siemens) respectively in 20/23 (Werfen) samples under EMI therapy. The determination of the 1:8 diluted samples provided FVIII activities which correlated excellently to the EMI levels (Siemens: r=0.99, FVIII%=0.79*EMI level;Werfen: r=0.99, FVIII%=0.88*EMI level).

Conclusion: The determination of the widely available FVIII OSA in samples diluted by 1:8 in saline might provide an attractive option to approximate the EMI plasma level when a dedicated assay for EMI is not available. The FVIII activity in the diluted samples correlated with the EMI concentration and were on average just 12% (Werfen) or 21% (Siemens) lower than the EMI levels reported by the standard assay.

5642

Pre-operative acquired von Willebrand Syndrome related with extracorporeal membrane oxygenation and Heart Transplantation: Utility of intraoperative treatment with human von Willebrand Factor

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Background: Von Willebrand factor (VWF), a glycoprotein that takes part in primary and secondary hemostasis, contributes to platelet adhesion and aggregation and is a carrier protein for coagulation factor VIII. VWF is synthesized in endothelial cells and platelets and metabolized by ADAMTS13. Inherited von Willebrand syndrome (vWS) is the most common hemostasis disorder with an increased bleeding risk. Acquired von Willebrand syndrome (aVWS) is less common (1-5% of vWS) though its prevalence is unknown due to its underdiagnosis. AVWS is associated to autoimmune diseases or hypothyroidism. Also with increased shear stress (altered blood flow), such as extracorporeal membrane oxygenation (ECMO) or left ventricular assist devices (LVAD), with a reported prevalence of 100% and 50%, respectively. In addition to shear stress, a low platelet count is not an absolute indication for treatment with human von Willebrand Factor (hVWF). A low platelet count alone in these patients is not sufficient to justify hVWF treatment.

Case report: We present a 69 year-old woman who suffered an acute myocardial infarction and developed a cardiogenic shock requiring ECMO support as a bridge to heart transplant (HT). Four weeks after ECMO, she presented a massive posas hemorrhage that required hemoderivatives, stopping anticoagulation (AC) and antiaggregation (AA) therapies and embolization. Three days later AC was restarted however, 2 weeks after, she presented a new bleeding. Besides the past history of recent ECMO support and hydropthrombosis, VWF:RCO/VWF:Ag ratio was <0.7, thus she was diagnosed of aVWS. During HT, 16 red blood cell concentrates, 6600cc fresh frozen plasma and 5 platelet pools were transfused guided by viscoelastic test(ROTEM). We administered intraoperatively tranexamic acid(4g), fibrinogen(4g), prothrombin complex(2000IU) and human VWF (WILLFACT® 9000IU). Nine months after HT she does normal life.

Discussion: Patients with LVAD or ECMO develop very frequently (up to 100%) aVWS, an underdiagnosed disease with relevant bleeding disorders in more than half of the cases. A high index of suspicion is needed to diagnose aVWS which must be confirmed by Lab tests. Intraoperative use of human VWF is safe and effective for treating hemorrhagic complications related to aVWS.

References:
2. Learning points: AVWS has to be taken into account in patients with risk factors. Use of human VWF is safe and effective reducing hemorrhagic complications

5722

Anesthetic management of living donor renal transplantation without platelet transfusion in a patient with macrothrombocytopenia using thromboelastometry

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Background: Epstein syndrome is a MYH9-related disorder characterized by healing loss and macrothrombocytopenia with renal failure, which often needs renal transplantation. Most of these patients received platelet transfusion, but we report a case of a patient undergoing living donor renal transplantation without platelet transfusion using thromboelastometry.

Case report: A 22-year old man with Epstein syndrome was scheduled to undergo living donor renal transplantation. The peripheral blood examination revealed a platelet count of 37 × 109/L with giant platelets. Anesthesia was induced with fentanyl, propofol, and rocuronium, and maintained with isoflurane and remifentanil. In addition to standard laboratory coagulation test including platelet counts, thromboelastometry (ROTEM®, TEM international GmbH, Munich, Germany) was monitored. Intraoperative laboratory data of coagulation were platelet counts, 0.0 (uncounted) - 17 × 109/L by automatic blood cell counter and 28-31 × 109/L by microscopy, fibrinogen, 256 mg/dL. EXTEN of thromboelastometry were normal. The estimated blood loss was 150 g during operation and the patient had no bleeding complication without platelet transfusion.

Discussion: There is no consensus for the safety value of platelet counts for surgery in these MYH9-related disorders’ patients. The safety platelet counts for living donor renal transplantation with macrothrombocytopenia were above 100 × 109/L with platelet transfusion based on several case reports.2 Thromboelastometry is measured by whole blood and platelets are also involved in this measurement, but platelets aggregation ability cannot be measured. However, it is reported that this was acceptable in clinical use for platelet deficiency.3 In the present case, α, clotting time, maximum clotting formation in EXTEN and FIBTEM were normal, which suggested that coagulation ability and function via activated platelets were normal. In addition to this, according to the absence of bleeding tendency at surgical field, we did not transfuse platelets even when platelet counts were 26-33 × 109/L during perioperative periods and 38-72 × 109/L during POD1-4.

References:

Learning points: Platelet transfusion could be avoided in patients with macrothrombocytopenia by monitoring of thromboelastometry.

6282

Improving patient safety: developing user-friendly national algorithm for the management of massive bleeding

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Background and Goal of Study: One of the most challenging situations in anesthesia are massive bleeding cases. In Croatian hospitals, young anesthesia residents are often first responders to such emergencies. Algorithms are a useful tool for promoting correct decision making, especially where point-of-care devices (POC) are available, and not all doctors know how to interpret this results fast and act accordingly. During 2019, a team of Croatian anesthesiologists, hematologists and transfusion specialists were developing a national algorithm for the management of patients with massive bleeding, based on up-to-date guidelines adapted to local circumstances. Two algorithm branches have been developed: first one for clinical setting in which POC devices (ROTEM and Multiplate) are available, and second, when those are unavailable.

Materials and Methods: Algorithm was tested on a group of anesthesia residents (N=38) in different phases of their training at the University Hospital Centre Zagreb. Examinees were given two clinical cases involving massive bleeding (patient with ruptured abdominal aortic aneurysm (AAA), and polytraumatized patient whose resuscitation was guided with POC devices). They had to answer multiple-choice questions regarding the management of these cases twice: first time before the algorithm, and the second time with the algorithm provided, with 5 minutes in between to study the algorithm for the first time.

Results and Discussion: Results showed significant main effect for the administration of the algorithm (p < 0.001), with an increase from 3.74 to 7.29 points (out of 8) in case with ruptured AAA, and for polytraumatized patient case an
increase from 3.63 to 6.89 points. There were no significant differences in scores achieved before or after the administration of algorithm for different cases based on previous experience with ROTEM, Multiplate or the year of residency. Results of the study imply that the algorithm is user-friendly. It therefore reliably guides clinical approach based on up-to-date guidelines and contributes to patient safety in the setting of massive bleeding, regardless of previous clinical experience of the provider.

6261

Management of anesthesia on a patient with factor X deficiency

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Background: Factor X(FX) or Stuart Power factor deficiency is amongst the rarest of the inherited coagulation disorders. There is limited research on patients undertaking surgery, therefore we describe the anesthetic management for a mild FX deficiency during total knee arthroplasty.

Case Report: An 85 year old female patient with a history of obesity, essential hypertension, laryngeal dystonia, atrial fibrillation and depressive syndrome was diagnosed with FX deficiency (39% levels) on the basis of family history. No treatment was administered in previous surgeries because they were minor procedures and did not incur major bleeding. In the last hematological evaluation the levels of FX were 50% (normal values 50-150%), the activated partial thromboplastin time (aPTT) was 1.1 (normal value 0.8-1.2) and the prothrombin time (PT) was 1.3 (normal values 0.8-1.2). A femoral and sciatic nerve block was performed in pre-op, followed by a general anesthetic by laryngeal mask. There were no intraoperative incidents. Time of limb ischemia was 100 minutes. No major bleeding was detected after the tourniquet was deflated or in the next 24 hours. The patient was discharged on the 4th day post-op.

Discussion: Inherited FX deficiency is autosomal recessive, with heterozygotes most often remaining asymptomatic or having only mild bleeding tendency; homozygote individuals may experience hemorrhaxis, recurrent epistaxis and menorrhagia. It is characterized by prolongation of PT, aPTT and Russell viper venom time, with normal bleeding and thrombin time, as well as decreased levels of FX antigen or FX activity. Knight el al. reported that 35-50% levels of FX during surgery and up to 20% postoperatively are needed to achieve correct hemostasis. The treatment of FX deficiency must be individualised and includes fresh frozen plasma, prothrombin complex concentrate and factor X concentrate. In our case, the preoperative FX levels didn’t require treatment and there was also no significant bleeding in the first 24 hours post-op, therefore we decided to only closely follow signs of bleeding and the coagulation test.

References:

Learning points: We believe that careful monitoring of blood coagulation and personalized treatment, based on the severity of the FX deficiency and the complexity of the surgery, in addition to a multidisciplinary approach can greatly decrease any complications that may occur.

6419

Management of patient with undiagnosed coombs positive auto immune hemolytic anaemia coming for an emergency blunt trauma surgery

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‡Cegmas-Daya Hospital - Thrissur (India)

Introduction: Pretransfusion testing is an essential serological test to protect the recipient from hemolysis and provide compatible blood product. Although all products are crossmatched in same cases, compatible products may not be available. Autoimmune hemolytic anemia (AHA) is caused by the presence of non-specific and identifiable antibodies that react with antigens on the surface of red blood cells.

Case report: A 48-year old male patient previously healthy, without any history of priors transfusions or anesthetic-surgical procedures was scheduled for exploratory laparotomy for a BLUNT INJURY ABDOMEN. Focused assessment with Sonography in Trauma (FAST) scan was found to be positive, which indicated hemoperitoneum, thus the patient was shifted immediately to the operating room.

Fluid resuscitation was done using two wide-bore intravenous (IV) cannulas. The patient was intubated uneventfully. Controlled fluid resuscitation to a mean arterial pressure (MAP) of 55–60 mmHg was targeted. At around 1.00 am a call was received from the blood bank stating that Patient has positive Coombs test DAT (IgG4+) and the blood bank staff were unable to determine his blood type. IBP was 70/40 mmHg, CVP 10 cmH2O. Controlled fluid resuscitation continued. MAP of 55–60 mmHg was targeted; The patient continued to be hypotensive. The patient was shifted on to an intensive care unit. The patient was mechanically ventilated. Post op hb level was 4 g%. The least incompatible RBC product was selected by the transfusion specialist and was transfused under iv steroid cover after in vivo biological compatibility test. In icu patient received 4 more units of blood and was extubated on the 3rd post op day and discharged on 10th post op day.

Conclusions: In incompatible cross match we should not avoid transfusion if it is urgently required; select least compatible RBC. In vivo compatibility test is safe, predictive, can be feasibly applied at the bedside and lifesaving for many patients.

References:
A prospective cohort evaluation of effect of cardiac surgery on early cognition

Glumac S.1, Kardum G.2, Bulat C.1, Fabris M.1, Carev M.1, Karanovic N.1
1University of Split - Split (Croatia), 2University Hospital of Split - Split (Croatia)

Background and Goal of Study: Postoperative cognitive decline (POCD) is a common postoperative complication, the most frequent following cardiac surgery.1 This study aimed to investigate the impact of selected POCD definition on POCD incidence, which cognitive domains are predominantly affected and the role of cardiopulmonary bypass (CPB) in POCD development.

Materials and Methods: This prospective cohort study enrolled 120 patients scheduled for elective cardiac surgery with or without CPB. A battery of 6 neuropsychological tests to assess various aspects of cognition was administered to patients 2 days before surgery and on the 6th postoperative day. POCD was defined as a decrease in performance of 1 SD or greater in 12-item WHODAS 2.0 components compared to preoperative scores in 1 or more tests. To deeper understand the methodological impact of the applied definition on the POCD incidence, we performed 2 additional analyses using the strict POCD definition (i.e., as a decrease in performance of 1 SD or greater between 2 testing points in at least 2 and 3 tests, respectively).

Results and Discussion: On the 6th postoperative day, 66 of the 120 (55.0%) patients fulfilled the diagnostic criteria for POCD. After a strict POCD definition was applied, cognitive deterioration was present in 23 of the 120 (19.2%) patients compared to preoperative scores in 1 or more tests. To deeper understand the methodological impact of the applied definition on the POCD incidence, we performed 2 additional analyses using the strict POCD definition (i.e., as a decrease in performance of 1 SD or greater between 2 testing points in at least 2 and 3 tests, respectively).

Conclusions: The POCD incidence was significantly related with applied POCD definition. The domains of global cognitive status, psychomotor speed, visual short-term and working memory were particularly impaired after cardiac surgery. There was no clear relationship between CPB usage and POCD occurrence.

References:

4429

Cognitive decline on three months after noncardiac surgery evaluated using cognitive component of 12-items World Health Organization Disability Assessment Schedule 2.0.

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Background and Goal of the Study: Several factors including older age, history of stroke and low educational level were reported as associated factors with postoperative cognitive decline. However, adjustable factors such as preoperative nutritional status on postoperative cognitive decline has been poorly documented. Therefore, in this study, we aimed to investigate the impact of preoperative nutritional status on postoperative cognitive decline after 3 months of noncardiac surgery.

Materials and Methods: Individuals aged ≥65 years who were scheduled to undergo surgery in our hospital between April 2016 and March 2018 were eligible for prospective observational study evaluating postoperative functional disability. Patients with diseases requiring psychiatric treatment and patients who were unable to complete the questionnaire without help were excluded. In this study, we focused on postoperative cognitive decline defined as a worsening score of cognitive components of 12-item WHODAS2.0 in the patients undergoing noncardiac surgery which was evaluated before surgery for baseline assessment and on 3 months after surgery. Patient’s demographics including nutritional status, postoperative complications and recovery were also evaluated. Preoperative nutritional status was assessed using the mini nutritional assessment-short form. Logistic regression analysis was applied to determine associated factors with postoperative cognitive decline.

Results and Discussion: Of 3070 patients registered in our original study, 2341 were included in the analysis, in which 633 (27.0%) patients experienced postoperative cognitive decline after three months. The factors shown in Table 1 were independently associated with increased cognitive decline after 3 months, whereas use of preoperative statin was associated with decreased cognitive decline.

Table 1 Associated factors with cognitive decline on three months after noncardiac surgery.

<table>
<thead>
<tr>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.63</td>
<td>1.07-2.94</td>
</tr>
<tr>
<td>Preoperative symptomatic stroke</td>
<td>1.4</td>
<td>1.02-1.92</td>
</tr>
<tr>
<td>Serum creatinine</td>
<td>1.15</td>
<td>1.04-1.28</td>
</tr>
<tr>
<td>Body mass index &gt; 30</td>
<td>0.75</td>
<td>0.57-0.99</td>
</tr>
<tr>
<td>Malignancy</td>
<td>1.85</td>
<td>1.06-3.25</td>
</tr>
<tr>
<td>At risk of malnutrition</td>
<td>1.34</td>
<td>1.08-1.68</td>
</tr>
<tr>
<td>Malignancy</td>
<td>1.35</td>
<td>1.07-1.69</td>
</tr>
<tr>
<td>Reoperation</td>
<td>2.65</td>
<td>1.15-3.66</td>
</tr>
</tbody>
</table>

5104

Perioperative Medicine

Perioperative Medicine 345

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Perioperative Med Perioperative Preoperative (PREPARE), a multimodal prehabilitation program targeted at improving postoperative outcomes in frail elderly patients undergoing major abdominal surgery: A single tertiary centre experience

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Background: Prehabilitation is a multimodal program encompassing preoperative physiotherapy (PT), nutritional intervention and psychosocial support to increase functional reserves. The ‘at risk’ group includes the frail, elderly with multiple comorbidities undergoing major surgery. The goal of prehabilitation is to reduce postoperative complications, leading to shorter length of stay (LOS). The Perioperative Program 40 Elderly (PREPARE) program was initiated at Singapore General Hospital in January 2019.

Methods: Patients aged ≥65 and scheduled for elective major abdominal surgery were screened in the clinic. Frail patients (defined by Edmonton Frail Scale (EFS) scores ≥ 6) were recruited. Standardized medical optimization included anemia intervention, smoking cessation and titration of medication. In-house PT assessment and exercise sessions were formulated for patients. Nutritional intervention by dietitians was done for patients with Malnutrition Universal Screening Tool (MUST) score ≥ 2. A pre-post PREPARE implementation results for LOS is presented.

Results: Between January to June 2019, 142 of patients met the criteria for frailty. Of these, 35 had surgery planned for >2 weeks ahead and were recruited into PREPARE. 15 patients had EFS score 6-7 and 16 had EFS score of ≥8. Median age was 79 years. Prior to PREPARE, median LOS was 9 days for those with EFS score 6-7 and 11 days for those with EFS score ≥8. Post PREPARE, LOS was reduced to 5 days for patients with EFS 6-7 and 5 days for those with EFS ≥8 (Fig 1).

Discussion: As more elderly patients undergo elective surgery, a goal-oriented approach is essential. Pulmonary complications (PPC) remain the most serious adverse outcome after major abdominal surgery. Evidence suggests that in reducing PPC, PT is superior when taught in supervised sessions compared to providing information booklets. PREPARE reinforces a minimum of 2 one-hour sessions supervising inspiratory muscle training. Surgery creates an overall catabolic state and anaerobic resistance is more prevalent in the elderly. The MUST score reliably predicts risk of malnutrition. PREPARE provides a tailored dietetics review for patients when surgery is planned ≥2 weeks ahead. The effects of nutrition and exercise-induced muscle synthesis are synergistic. PREPARE effectively combines both and targets ‘at risk’ population. Identifying eligible candidates earlier ahead of planned surgery will allow more patients to reap the benefits of PREPARE.

References:

4322

A prospective cohort evaluation of effect of cardiac surgery on early cognition

Glumac S.1, Kardum G.2, Bulat C.1, Fabris M.1, Carev M.1, Karanovic N.1
1University of Split - Split (Croatia), 2University Hospital of Split - Split (Croatia)
Preoperative cognitive assessment in elderly: retrospective observational study
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Background and goal of the study: Advanced age and impaired cognition are generally reported to be associated with postoperative cognitive complications. However, cognitive evaluation is not a standard routine part of the preoperative risk stratification of the surgical patient. The goal of this study is to present a descriptive analysis of surgical elderly patients of a tertiary medical center, including performance on cognitive screening tests.

Material and Methods: Surgical patients over 60 years are submitted to cognitive evaluation by the physician anesthesiologist in a preoperative assessment clinic. The initial screenings are the Clock Drawing Test and the 10-point Cognitive Screener (10-CS). If the patient had one or both screening impaired, Montreal Cognitive Assessment (MoCA) and the Geriatric Depression Scale (GDS-15) were applied.

Results and Discussion: Eighty-nine patients were included, being 56.2% male with a mean age of 71.5 years and mean schooling of 5.1 years. Fifty-six percent was classified as ASA 2 physical status with 90% reporting previous surgery. Urology and Ophthalmology were the surgical specialties more frequent. Twenty-four percent presented at least two comorbidities. High blood pressure, diabetes mellitus and chronic coronary artery disease were presented in 71%, 38%, and 30%, respectively. Sixty-eight percent reported a cognitive complaint. The MoCA test was performed in 75 patients and the mean score was 19.6. Using cut-off according to schooling, this test was altered in 27 patients (36%). The MoCA test was independently influenced by schooling and age, and according to the Cramer V test, did not correlate with any comorbidity. The GDS-15 was applied to 75 patients, in which 33% had a score greater than 5, suggestive of depressive symptoms.

Conclusion: Cognitive screening protocols are feasible and provide information for perioperative care planning. On the other hand, such cognitive screening tests could be influenced by covariates. In this analysis, the MoCA was influenced by schooling and age, which could be a bias from the population of this preoperative assessment clinic. Besides, considering the low schooling of the Brazilian population, which contributes to cognitive decline, such preoperative cognitive assessment is very important.

Reference:

6013
Effects of fish oil on cognitive function after splenectomy in rats
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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is a common complication after abdominal surgery. Several studies have reported that POCD is related to neuroinflammation induced by surgery. Fish oil (rich in a variety of ω-3 polyunsaturated fatty acids) can effectively inhibit the systematic inflammatory response. So we study the effects of fish oil on inflammation, immunity and cognitive behavior after splenectomy in rats.

Materials and Methods: 60 SD rats were randomly divided into control group (Group C, n=20), surgery group (Group S, n=20) and fish oil intervention group (Group F, n=20). Fish oil was injected intraperitoneally from 3 days before surgery to 7 days after surgery in Group F, and normal saline was injected simultaneously in Group S. Rats in Group S and Group F all received splenectomy under general anesthesia. Morris water maze behavioral tests were performed on the first, third, fifth and seventh day after surgery. The levels of IL-1β, IL-6, TNF-a, SOD and GSH-PX were detected.

Results and Discussion: Serum IL-1β, IL-6, and TNF-a concentrations in Group S and Group F were higher than those in Group C (P <0.01), while those inflammatory cytokines in Group F were significantly lower than those in Group S (P <0.01); serum SOD and GSH-PX levels in Group F were higher than those in Group S (P <0.01). The Morris water maze performance behaviors of Group F were better than those in Group S (P <0.05).

Conclusion: Fish oil can effectively improve postoperative inflammatory response, reduce the damage of antioxidant defense system, and improve postoperative cognitive function.

5833
Preoperative assessment of cognitive function: a pilot study
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Background and Goal of Study: Postoperative neurocognitive disorders (pNCD) are considered a significant complication affecting up to 30% of people after surgery, being the preexistence of cognitive impairment one of the main risk factors associated. Assessment of cognitive function usually requires time consuming specialized tests that could be a bias from the population of the preoperative assessment clinic.

The goal of the study was to evaluate the feasibility and results of a reduced self-administered test battery during the preoperative evaluation.

Materials and Methods: Three self-administered validated tests were provided to patients over 65 years of age, consecutively submitted to preanesthetic examination for urological surgery. They were asked to answer the tests by themselves after the medical visit. The tests were Cognitive Reserve Questionnaire (CRQ)1, Functional Activities Questionnaire (FAQ) of Pfeffer2 and Self Administered Gerocognitive Examination (SAGE)3. Time employed in tests accomplishment was registered. Results of the tests were recorded.

Results and Discussion: 31 out of 33 patients successfully answered the test. The mean time for tests completion was 31 minutes, and none of the patients needed more than one hour. Only 1 of the 31 patients (3.2%) showed an altered result in the evaluation of functional activities (FAQ test). According to the results obtained in the CRQ test, 7 out of 31 (22.6%) cases showed low cognitive reserve. The incidence of POCD in the patients (40.3%, 12 out of 31) showed a significant result in the SAGE test and 9 out of 31 patients (29%) scored 14 points or below, suggesting that the real incidence of cognitive dysfunction in the elderly population could be underdiagnosed.

Conclusion: The incidence of postoperative cognitive impairment in the population over 65 years of age may be higher than expected. Since POCD is a non-negligible complication, especially in the elderly, the assessment of cognitive function prior...
to surgery could improve the management of these patients. The use of self-administered and shortly completed validated test may enhance the adherence of patients for optimal evaluation.

References:

Background and Goal of Study: In developed countries surgery is very common and most patients suffer from a variable degree of preoperative anxiety. Excessive anxiety is associated to increased postoperative complications, including pain. We aim: to evaluate the performance of the Surgical Fear Questionnaire (SFQ) and Anxiety Numeric Rating Scale (ANRS) as instruments for assessing preoperative anxiety in Portuguese patients; identify predictive factors for preoperative anxiety; evaluate how anxiety scores relate to postoperative outcomes.

Materials and Methods: Multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inguinal hernia repair patients were recruited in 3 Portuguese ambulatory units, from September 2018 to November 2019. Perioperative data included pain and anxiety ANRS (0-11) and SFQ (0-80). Postoperative outcomes were assessed through blind telephone interviews up to 3 months after surgery. Student's t-test and ANOVA were used to determine differences among groups; association between pain, patient satisfaction and anxiety scores but only the SFQ showed statistically significant differences among genders (preliminary results).

Results and Discussion: 237 men and 29 women were included, mean age 57.0 (12.9); 17% were smokers and 96% ASA< 3. Mean ANRS was 3.8 (2.5) and SFQ 21.7 (15.6), with a biggest contribution of short term items. 20% were considered to have high preoperative anxiety (scored higher than 1 standard deviation over the mean) in the ANRS and 15% in the SFQ. Women had consistently higher anxiety scores but only the SFQ showed statistically significant differences among genders (p<0.037). Age correlated with the total SFQ score (r=2.13, p<0.001) but not to the ANRS. We found a significant correlation of ANRS with SFQ (r=0.549, p<0.001); education level (r=0.150, p=0.015) and age (r=-2.13, p<0.001) correlated to total SFQ score. Multivariate regression identified preoperative pain as risk factor for preoperative anxiety, using both total SFQ (p=0.007) and NRS (p=0.001); analyzing the short term SFQ items, education level was also significant (p=0.043) and for the long term SFQ items the professional status (p=0.025). Preoperative anxiety was an independent risk factor for pain at 24h (p=0.010), 7 days (p=0.015) and 3 months (p=0.043).

Conclusions: Female gender, younger age, preoperative pain, higher education level and active working status predicted higher preoperative anxiety, which is a strong predictor of postoperative pain.

5325

Measuring the futility: prospective observational study on unneeded tests requested for preoperative assessment at the Hospital Clinic of Barcelona

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Background and Goal of Study: Recent preoperative guidelines recommend the request of specific test guided by medical history and physical examination, avoiding systematic routine tests. Presumably, implementation of these guidelines depends largely on healthcare services organization. At our hospital, surgeons order preoperative tests before referring patient to the anesthesiologist. These recommendations are in line with Right Care movement, which advocates to avoid overuse of healthcare resources. We have carried out a study to evaluate the level of adoption of these recommendations and to document the unneeded preoperative tests performed, as a previous step to modify our preoperative assessment strategy.

Materials and Methods: We conducted a prospective observational study at the Hospital Clinic of Barcelona, including all patients with appointed anestheists visits (in-person/by phone) during a 30-day period. The staff anesthesiologist in charge evaluated the suitability, according to recommendations, of the chest X-ray and electrocardiogram performed, and classified them into adequate or unneeded. Descriptive analysis of the collected data was performed.

Results and Discussion: Results are shown in the table:

<table>
<thead>
<tr>
<th>Unneeded chest X-ray</th>
<th>Unneeded EKG</th>
</tr>
</thead>
<tbody>
<tr>
<td>50/185 (27.0%)</td>
<td>37/101 (36.6%)</td>
</tr>
</tbody>
</table>

Right Care movement promotes a clinical practice that takes into account patients’ specific circumstances, values and perspectives. It must be based on the best and most updated scientific evidence, as well as cost-effectiveness studies. It works towards guaranteeing a healthcare model that minimizes excessive use of resources and its inherent iatrogenia. Patients’ well-being is in the core of the clinical practice. Routine tests are time-consuming, for both patients and healthcare professionals. They have a high economic cost and make patients anxious about the results. They can even cause delays in surgery date due to the request for more tests.

Conclusions: A high rate of inappropriate tests for preoperative assessment has been documented. This study will help us to measure the impact of implementing a new preoperative strategy for individualized patient assessment, avoiding irrational use of healthcare resources, just as Right Care recommend.

4546

Perioperative levels of neurofilament light (NFL) in serum and its association with postoperative delirium (POD) after cardiac surgery

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Background and Goal of Study: POD remains a major issue after cardiac interventions. Direct neuronal damage ensuing anesthesia and surgery might play a key role in its pathophysiological mechanism. NFL is a sensitive biomarker of neuronal injury. Our aim is to evaluate whether higher perioperative NFL levels in serum are predictors of POD.

Materials and Methods: The study is a secondary analysis from an ongoing research project (NCT03706989). Blood samples were collected pre- and postoperatively (H2, D1, D2, D5) in 30 patients undergoing elective cardiac surgery with cardiopulmonary bypass. Quantitative determination of NFL in serum was performed using the Simoa technique, a single-molecule array method. POD was detected by CAM-ICU, CAM and a chart review until hospital discharge. Mann-Whitney U test was used to compare patients with or without POD. A Friedman’s ANOVA and Wilcoxon tests were used to compare NFL over time in each group.

Results and Discussion: NFL at baseline increased significantly with age (p=0.001). All 30 patients presented a significant increase in NFL levels up to D5 (Fig 1). Patients who experienced POD had higher levels of NFL at D1 and D2 (Table 1).

Conclusion: These preliminary results show that NFL could be a potential biomarker of POD in cardiac surgery. We will further investigate the value of baseline NFL as a predictive biomarker of POD.

Reference:

Results: Median (P25-P75).
Use of palonosetron and fosaprepitant in the prophylaxis of postoperative nausea and vomiting in women undergoing laparoscopic cholecystectomy. A randomised double-blind study

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1Universidade Federal Fluminense - Niterói (Brazil), 2Hospital Federal de Bonsucesso - Rio de Janeiro (Brazil), 3Universidade Federal do Rio de Janeiro - Rio de Janeiro (Brazil), 4Universidade Federal do Rio de Janeiro - Niterói (Brazil)

Background and Goal of Study: Postoperative nausea and vomiting (PONV) occur in 30–50% of patients undergoing general anesthesia and in 70–80% of high PONV risk patients. In this study, we investigated the efficacy of palonosetron, a selective, second generation 5-hydroxytryptamine type 3 (5-HT3) receptor antagonist, compared to fosaprepitant, a neurokinin-1 (NK1) receptor antagonist. The study hypothesis is that an administration of a single dose of palonosetron 75 µg or a single dose of fosaprepitant 150 mg, immediately after induction of anaesthesia, has similar effectiveness in the prophylaxis of PONV in women undergoing laparoscopic cholecystectomies.

Materials and Methods: Seventy-four, non-smoker women, aged in 18-60 years, American Society of Anesthesiologists physical status (ASA) 1 to 2, were randomly allocated into two groups. The primary objective was to compare the number of patients who had vomiting in the first 48 postoperative hours. The antiemetic solutions were prepared in 250 ml (0.9% saline) by an anaesthetist not involved on patients with absolute contraindication to surgery, it is unclear whether this is true for criteria such as patient’s quality of life, external opinions and personal beliefs, and this particularly for patients with emergency hospital admissions. We explored differences on criteria used to define futility among anesthesiologists and surgeons involved in the treatment of emergency patients.

Results and discussion: In palonosetron group, 13.5% of the patients experienced vomiting in the first 48 postoperative hours, compared with 16.2% in the fosaprepitant group, P=0.74. There were no differences in the total frequency nausea (51.4 vs 61.2%, P=0.34%), number of complete responders (48.6 vs 37.9%), P=0.34% and use of rescue medication (32.4 vs 35.1%), P=0.80. There were also no difference in the incidence of nausea and vomiting in the other periods evaluated.

Conclusion: Based on the results, the administration of a single dose of palonosetron after the induction of anaesthesia was as effective as the administration of single dose of fosaprepitant for the prophylaxis of PONV in women who underwent laparoscopic cholecystectomy.
Postoperative nausea and vomiting (PONV) is a frequent complication in patients undergoing laparoscopic interventions. It has been demonstrated that target administration of PONV prophylaxis to those with one or more risk factors (RF) according to the Apfel Score (female, non-smoking status, previous surgery) is highly suggested (1). The goal of this retrospective study is to compare the prophylactic antiemetic effect of droperidol and dexamethasone in patients undergoing laparoscopic interventions.

**Materials and Methods:** The study included 111 patients, ASA physical status I and II, that had undergone laparoscopic cholecystectomy. All demographic data, anesthesia time and anesthetic drug dosage was similar. All patients received propofol for induction of anesthesia, desflurane for maintenance of anesthesia, fentanyl and morphine for pain and rocuronium as a neuromuscular blocking agent. Patients received either iv droperidol 1 mg (Group Dro, n= 53) or dexamethasone 8 mg (Group Dex, n=58). Nausea and vomiting were evaluated during the first 24 postoperatively. Data were analyzed by Fisher’s exact test (significance level p< 0.05).

**Results and Discussions:** The incidence of PONV during the first 24 hours after surgery was 15% for Dro group and 12% for Dex group (p=0.35). Rescue antiemetic treatment was significantly lower in dexamethasone group compared to droperidol group.

**Conclusion:** Droperidol and dexamethasone had similar effects on preventing the incidence of PONV. The need for rescue antiemetic treatment was significantly lower in dexamethasone group compared to droperidol group.

**References:**

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**4920**

**Postoperative nausea and vomiting in a tertiary center - are anaesthesiologists acting correctly? An audit**

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**Background and Goal of Study:** Postoperative nausea and vomiting (PONV) are reported as a frequent complication in patients undergoing general anaesthesia. Portuguese recommendations for the management of this condition are published, referring strategies to identify PONV risk and prophylaxis. It has been demonstrated that target administration of PONV prophylaxis to those with at increased risk of PONV reduces its incidence. Previous studies demonstrated the guidelines for PONV prophylaxis are implemented widely but their effectiveness may be limited by poor adherence. The aim of this work is to verify the compliance of anaesthesiologists (ANE) in adopting the appropriate prophylactic strategy according to patient’s PONV risk stratification.

**Materials and Methods:** Prospective audit, performed in 09/2019, in a inpatient surgery unit of a tertiary center. Paediatric patient were excluded. Validated risk factors (RF) according to the Apfel Score (female, non-smoking status, previous history of PONV and motion sickness, opioids in the perioperative period) were registered as well as intraoperative prophylaxis therapy administered.

**Results and Discussion:** We analyzed data related to 151 patients (P). Mean age was 61±17 years old, with 52% male, from different surgical specialties: general surgery 42%, orthopedic surgery 16%, urology 18%, vascular surgery 8%, neurosurgery 8% and gynecology 8%. 0-1 RF was found in 22.5%, 2 RF in 35.8%, and 3 RF in 41.7%. Prophylaxis was adequate in 56% of patient with 1RF, in 59% of patient with 2 RF and in 32% of patient with 3 RF. Overall, prophylaxis was adequate in 47% of the cases. 40% of the patient had more prophylaxis and 12% had less than the recommended. The results obtained demonstrated a low compliance rate by ANE in PONV prophylaxis taking into account the patient’s risk. They also show that the ANE tend to over medicate the patients.

**Conclusion:** This audit demonstrated the need for a reflection in medical conduct in order to bring ANE action closer to the recommendations and don’t jeopardize the effectiveness of a clinical guideline.
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Is there a time frame for PONV; A retrospective study

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Background and Goal of Study: It is considered that PONV occurs mainly during the early postoperative period (1). The goal of this retrospective study was to determine the pattern of incidence of PONV.

Materials and Methods: We retrospectively examined the anaesthetic charts and the medical records of patients that had undergone elective surgeries that are considered as highly emetogenic, such as laparoscopic cholecystectomy, breast and ENT surgery, as well as gynecologic operations for a period of six months. All operations enrolled in the study were performed under general anaesthesia. All patients should have similar demographic data, antemetic prophylaxis, anaesthetic drugs and drug dosage. 568 patients fitted the criteria. The incidence of PONV at 0-4, 4-8 and 8-12 hours postoperatively was noted.

Results and Discussion: 73 patients suffered PONV (12.8%). Only 11 patients (15%) had PONV 0-4h postoperatively. The peak of incidence was noticed during 4-8th postoperatively, when 45 patients (61.6%) suffered from PONV. From 8-12h postoperatively, 17 patients (23.3%) experienced PONV.

Conclusion: Patients develop PONV mainly in the late recovery period than in the early recovery period. Patients should be followed for at least 12th postoperatively for PONV. A second dose of antemetics is suggested.

References:

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Patient reported outcome measures for anesthesia: are patients ready?

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Background and Goal of Study: To measure effects of patients (pts) centered care, pts reported outcome measures (PROMS) have been defined. Few PROMS for anesthesia have been defined or tested. The Quality of Recovery-15 score (QoR-15) could be suitable for PROMS for anesthesia, as it is a comprehensive and validated score, covering most postoperative issues about recovery after anesthesia. Primary goal: to determine the ideal moment of collecting QoR-15, hereby assessing QoR-15 at postop days +1, +4, +7, +14, +28. Secondary goal: reasons why pts are not included or why they drop out.

Materials and Methods: All pts scheduled for elective TKP and THP were screened during a pre-anesthesia assessment 1 month before surgery. Exclusion criteria: revision or urgent surgery. Reasons for non-inclusion were documented. 2 ways for reporting QoR-15 were offered: electronically or on paper. Interventions to minimize drop out: visit on postop day +1, contact per email or telephone when electronic reporting was absent, contact per email to return papers and when papers were not returned. The study has been approved by the Committee for Medical Ethics of AZ Sint-Blasius. Informed consent is registered. EU-GDPR requirements are met.

Statistical tests: ChiSquare and Student t; p<0.05 is statistically significant.

Results and Discussion: In Fig.1 we present the results of the first 5 months of inclusion (May 24-Sep 25 2019). 56.5% of screened pts were included. 11.5% were excluded post hoc (revision surgery, surgery postponed, technical problems with electronic reporting). 42.3% chose electronic reporting, 46.2% on paper. Finally, only 33.3% of the included completed the questionnaire, statistically more in the electronic group (51.6% vs. 25%, p<0.05). Mean age did not differ between included and not included pts: 66±10y (p=1).

Conclusions: Pts do not seem to be very interested in PROMS for anesthesia. Despite interventions to minimize drop out after inclusion, drop out numbers were high, especially in the paper-reporting group. Electronic reporting seems to give better results. It remains unclear whether these PROMS are worth the effort in this population, anno 2019.

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The impact of midazolam on postoperative pain - a multicentric prospective observational study (preliminary results)

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Background and Goal of Study: Midazolam may affect postoperative pain, with animal studies suggesting systemic midazolam is hyperalgesic. In humans, scarce data show conflicting results. Anxiety contributes to pain and may be a confounder. We aim to clarify the relation between anxiety, midazolam and pain, and hypothesize that midazolam administered preoperatively might increase pain perception.

Materials and Methods: Multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inguinal hernia repair patients were recruited in 3 Portuguese ambulatory units, from September 2018 to November 2019. Perioperative data including pain and anxiety were collected. Postoperatively, pain was assessed through a blind telephone interview 24h, 7 days and 3 months after surgery. Association between pain, anxiety and midazolam were assessed, including subgroup analysis and multiplev regression techniques; alpha=0.05.

Results and Discussion: 237 men and 29 women were included, mean age 57.0 (12.9); 17% were smokers and 96% ASA< 3. Patients administered midazolam (any dose) were less satisfied at 7 days (p=0.012 ) and 3 months (p<0.001) than patients not administered midazolam, however there was no direct impact of midazolam administration on postoperative pain. Multivariate regression identified risk factors for postoperative pain: lower age (p=0.012), preoperative pain (p=0.039), preoperative anxiety (p=0.010), non smoking (p=0.041) and female gender (p=0.008). Chronic benzodiazepine consumption (p=0.016), higher education level (p=0.025) and presence of preoperative pain (p=0.017) were associated to lower patient satisfaction. 24h-pain correlated to 7-day (p=0,001) and 3-month pain (p=0,005). The odds of referring moderate to severe postoperative pain (NRS >3) decreased with age - adjOR 0.963 (0.929-0.997) and increased with preoperative anxiety - adjOR 1.167 (1.034-1.318) - and pain adjOR 1.199 (1.049-1.370).

Conclusion: In open inguinal hernia repair, the administration of preoperative midazolam did not show any impact on postoperative pain. However, a randomized controlled trial would best answer this question, as anxiety is a clear risk factor for postoperative pain, being a confounder in this relation.
Effect of anesthesia technique by anesthesiologist on intra-operative and post-operative morphine equivalent daily dose (MEDD) and highest post-anesthesia care unit (PACU) pain score in open gynecologic surgery in an Enhanced Recovery after Surgery (ERAS) pathway

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Background and Goal of Study: To examine the effect of anesthesia technique by anesthesiologist in an ERAS pathway on intra and post-operative morphine equivalent daily dose (MEDD) and PACU pain score. Inhalational, total intravenous anesthesia (TIVA); and combined technique of inhalational and intravenous anesthesia were analyzed. Anesthesiologists were divided into groups, group 1 included anesthesiologists adhering to ERAS goals for our pathway and group 2 anesthesiologists who did not adhere to pathway. The hypothesis was that anesthesiologists adhering to ERAS pathway goals would have lower MEDD and PACU pain scores.

Materials and Methods: Patients undergoing open gynecologic surgery under an ERAS program from November 3, 2014 through December 31, 2018 were included. Patients were categorized into three groups: 1) Inhalational 2) TIVA and 3) combined inhalational and TIVA. Cases were eliminated if the anesthesiologist performed < 1% of total cases. Anesthesiologists were grouped according to the number of inhalational cases:< 35% inhalational=group 1, all others in group 2 (316 cases among group 1, 349 cases among group 2).Less than <35% inhalational cases assured us of a core group of anesthesiologist providing pathway management. Descriptive statistics were used to summarize the demographic and clinical characteristics of patients overall and by anesthesia technique (inhalational, intravenous, and combined). MEDD was recorded as the total dose received intra-operative and post-operative including doses received through post-operative day 3.Separate Kruskal-Wallis tests were used to compare intraoperative and post-operative MEDD among the anesthesia provider groups.All statistical analyses were performed using SAS 9.4 for Windows.

Results and Discussion: There were 665 patients included in analysis. Patients who underwent anesthesia from group 1 received significantly less intra-operative MEDD (mean (standard deviation]): [47.2(22.4)] versus group 2 [62.4(45.7)], p<0.001.Patients who underwent anesthesia from group 1 had lower highest pain MEDD [mean (standard deviation)] 4.3(3.0) versus group 2 5.1(3.0), p<0.003. There were no differences between the groups in respect to post-operative MEDD, surgical time, or length of stay.

Conclusion: Anesthesiologists have an impact on patient outcomes on an ERAS pathway by decreasing intra-operative MEDD and reducing highest pain scores in PACU by adhering to ERAS pathway principles of multimodal analgesia.

A systematic review of published qualitative research pertaining to the field of perioperative anaesthesia

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Background and Goal of Study: Qualitative research (QR) draws on a wide range of data collection, analysis methods and theoretical frameworks to explore people’s beliefs, behaviors, perspectives and experiences. QR contributes to evidence-based healthcare through hypothesis generation, development and validation of research instruments, intervention development and evaluation. While QR has contributed to many areas of healthcare, it appears to be underused in the field of anaesthesia. The purpose of our review is to describe the current state of QR in anaesthesia, identify topics, and highlight current limitations.

Materials and Methods: We conducted a systematic mapping review of published QR studies pertaining to the field of perioperative anaesthesiology. We selected articles published between 2000 and June 2018 from 3 databases: CINHAL (241), PubMed (520), Embase (1370). A total of 107 articles were included. Data were extracted and coded into predefined categories.

Results and Discussion: We observed an 8-fold increase in the number of QR publications between 2000 and 2018, reflecting a growing interest in QR in anaesthesia. Top publishing countries are both Scandinavian (mainly Danish and Swedish) and anglophone (UK, USA, CA, AUS). Publications are balanced between medical (42%) and nursing (38%) journals. The latter publish more studies on patients’ experiences and opinions than medical journals. Research teams are both interprofessional (69%) and uniprofessional(27%) and include anaesthesiologist specialists in 79% of the cases. In 55% of publications in medical journals, at least one author is a scientist outside of the classical healthcare professions. We found that methodologies were missing or misunderstood by some authors. Details regarding methodologies and author’s reflections on their own cultural backgrounds, beliefs and bias were frequently missing.

Conclusion: It is encouraging to see that journals are increasingly publishing anaesthesia related QR. However, QR reports need better description, analysis, reflection and transparency. We advocate for a better understanding of QR theoretical concepts, involvement of QR scientists, and improved quality and exhaustivity of reporting.


Can routine perioperative haemodynamic parameters predict postoperative morbidity after major surgery?

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Background and Goal of Study: Postoperative morbidity occurs in 10-15% of patients undergoing major, non-cardiac surgery. Predicting which patients are at higher risk of morbidity may help to optimize perioperative prevention. Preoperative haemodynamic parameters, Systolic Arterial Pressure (SAP)<100mmHg, Pulse Pressure (PP)>52 mmHg or <53 mmHg, and Heart Rate (HR)>87min-1 are all associated with increased postoperative morbidity. We evaluated the correlation between these and other routine haemodynamic parameters, measured intraoperatively during anaesthesia, with postoperative morbidity. Postoperative morbidity was , measured by using the Comprehensive Complication Index(CCI) and length of stay (LOS). Additionally we also correlated CCI with the cardiac risk biomarker, pro-BNP.

Materials and Methods: This is a retrospective analysis of patients in MET-REPAIR, a pan-European observational study correlating self-reported physical activity with postoperative morbidity. Patients' electronic anaesthetic records (EARS), including perioperative haemodynamic data, was correlated with 30-day postoperative morbidity, CCI and LOS parameters. Statistical analysis to assess for correlation was by Kendall's Correlation Coefficient for tied ranks (Tau-B) or Spearman's Correlation Coefficient. Blood for NTproBNP measurement was collected <31 days before surgery.

Results and Discussion: Data from n=150 patients was analysed. The intraoperative duration of PP>62 mmHg was associated with a patient's postoperative LOS(tau=0.317, p=0.007). When stratified according to age>70 years, the duration of MAP>75 mmHg was associated with a higher CCI(tau=0.57, p=0.001) and prolonged LOS(tau=0.39, p=0.02). When stratified according to ASA=3, the duration of SAP<100 and PP>62 were also associated with an increased CCI and LOS. There was no correlation between preoperative NTproBNP and either CCI or LOS. Conclusion: In older patients the duration of intraoperative pulse pressure (PP)>62 mmHg and mean arterial pressure (MAP)>75 mmHg, as well as SAP=100 mmHg in ASA=3 patients, are associated with increased postoperative CCI and LOS. These findings warrant confirmation in larger databases and evaluation of whether real-time intraoperative intervention could reduce postoperative morbidity.

MINS for prediction of cardiac and non-cardiac complications after non-surgical cardiac procedures

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Background and Goal of Study: Myocardial injury after non-surgical cardiac (MINS) is defined by a postoperative elevation of high sensitive Troponin T (hsTnT) and is associated with cardiovascular events and mortality (1). The aim of this study was to investigate whether different definitions of MINS can predict cardiac as well as non-cardiac complications after elective non-cardiac surgery.

Materials and Methods: hsTnT was determined preoperatively and at the postoperative anaesthesia care unit (PACU) in 1011 high risk patients undergoing surgery at the TU Munich. High risk is defined by ASA ≥3 and/or an elective high-risk surgery. Two MINS definitions were analysed for prediction of postoperative complications: the postoperative definition of MINS ignores the preoperative
Intraoperative hypotension is frequent during major urological surgery and is a common side effect of anaesthesia. Mean arterial blood pressures (MAP) below thresholds of 65 mmHg have been progressively associated with acute kidney injury (AKI) in a non-urological population. The aim of this study was to confirm these findings in a homogenous population undergoing major urological surgery.

Materials and Methods: In this retrospective observational single tertiary high caseload centre cohort series we analysed intraoperative data of 416 patients undergoing open radical cystectomy with urinary diversion between 2013 and 2019 as well as the hypotension threshold variables (minutes under a certain threshold). Patients were divided into groups falling below MAP < 65 mmHg, MAP < 60 mmHg and MAP < 55 mmHg.

Results and Discussion: Intraoperative hypotension is frequent during major non-cardiac surgery and a common side effect of anaesthesia. Mean arterial blood pressures (MAP) below thresholds of 65 mmHg have been progressively associated with acute kidney injury (AKI) in a non-urological population. The aim of this study was to confirm these findings in a homogenous population undergoing major urological surgery.

Materials and Methods: In this retrospective observational single tertiary high caseload centre cohort series we analysed intraoperative data of 416 patients undergoing open radical cystectomy with urinary diversion between 2013 and 2019 as well as the hypotension threshold variables (minutes under a certain threshold). Patients were divided into groups falling below MAP < 65 mmHg, MAP < 60 mmHg and MAP < 55 mmHg. The probability of developing postoperative AKI using all risk variables as well as the hypotension threshold variables (minutes under a certain threshold) was calculated using regression method.

Results and Discussion: Postoperative AKI was diagnosed in 128/416 patients when using the perioperative definition and 17.2% with the postoperative definition. The incidences of complications are displayed in the table. Both MINS definitions can predict postoperative complications. The perioperative definition shows a better positive predictive value for cardiac and non-cardiac complications (p < 0.001).

Conclusion: Our study supports the need for hsTnT determination at the PACU in order to predict postoperative complications in high risk patients. While preoperative hsTnT does not improve overall risk prediction, it may help to better discriminate between cardiac and non-cardiac complications.

Reference:

5053
Duration and Timing of Intraoperative Hypotension and its Impact on Early Postoperative Acute Kidney Injury in Cystectomy Patients – A Retrospective Cohort Analysis

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Background and Goal of Study: Intraoperative hypotension is frequent during major non-cardiac surgery and a common side effect of anaesthesia. Mean arterial blood pressures (MAP) below thresholds of 65 mmHg have been progressively associated with acute kidney injury (AKI) in a non-urological population. The aim of this study was to confirm these findings in a homogenous population undergoing major urological surgery.

Materials and Methods: In this retrospective observational single tertiary high caseload centre cohort series we analysed intraoperative data of 416 patients undergoing open radical cystectomy with urinary diversion between 2013 and 2019 and their correlation to postoperative AKI judged according to the Acute Kidney Injury Network criteria. We assessed the risk for postoperative AKI for different hypotension thresholds in form of time below a fixed threshold. Patients were divided into groups falling below MAP < 65 mmHg, MAP < 60 mmHg and MAP < 55 mmHg. The probability of developing postoperative AKI using all risk variables as well as the hypotension threshold variables (minutes under a certain threshold) was calculated using regression method.

Results and Discussion: Postoperative AKI was diagnosed in 128/416 patients when using the perioperative definition and 17.2% with the postoperative definition. The incidences of complications are displayed in the table. Both MINS definitions can predict postoperative complications. The perioperative definition shows a better positive predictive value for cardiac and non-cardiac complications (p < 0.001).

Conclusion: Our study supports the need for hsTnT determination at the PACU in order to predict postoperative complications in high risk patients. While preoperative hsTnT does not improve overall risk prediction, it may help to better discriminate between cardiac and non-cardiac complications.

Reference:

4761
Elevated preoperative Pulse Pressure is not associated with postoperative acute kidney injury in patients undergoing colo-rectal surgery

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Background and Goal of Study: High preoperative pulse pressure (PP) has been identified as a predictor of postoperative acute kidney injury (AKI) in cardiac and non-cardiac surgery. The present study was aimed at determining whether baseline PP is associated with increased postoperative AKI in patients undergoing elective or emergency colorectal surgery.

Materials and Methods: Retrospective chart review of all patients submitted for colorectal surgery at our institution during a 6-year period. Baseline PP and other relevant preoperative and intraoperative data were investigated as predictors of AKI, cardiovascular complications, and mortality. Associations were analysed by the chi-square and Mann-Whitney U tests, and adjusted by multivariate logistic regression.

Results and Discussion: 798 patients were included. The baseline PP was <40 mm Hg in 105 (13.1%), 40-80 mm Hg in 622 (77.9%), and >80 mm Hg in 71 (8.9%). The incidence of postoperative AKI was 11.4%. There was a trend for a higher incidence of AKI with increasing time below hypotension thresholds of MAP <65mmHg and <60mmHg the risk for developing postoperative AKI escalates. Special attention has to be paid to the time between induction of anaesthesia and surgical incision as many episodes of hypotension occur in this period.

Conclusion: With increasing time below hypotension thresholds of MAP <65mmHg and <60mmHg the risk for developing postoperative AKI escalates. Special attention has to be paid to the time between induction of anaesthesia and surgical incision as many episodes of hypotension occur in this period.

Acknowledgements: Arturo Pereira, Senior hematologist from Hospital Clinic Barcelona, for his advice and for performing the statistical analysis.
Intraoperative hypotension is frequent during major non-cardiac surgery with Deep Inferior Epigastric Perforator (DIEP) artery flap surgery: a retrospective study

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Background and Goal of Study: Anaesthetic management in reconstructive breast surgery with DIEP artery flap may influence on success rate of this surgery. Fluid therapy, vasopressor administration and blood management are controversial. The aim of our study was to audit hemodynamic management and to assess its impact on perioperative outcomes in our patients.

Materials and Methods: We gathered data from medical records of patients who underwent DIEP flap surgery in our centre between 2014 and 2019. Data collected: anthropometric data, ASA, comorbidities; anesthetic technique, length of surgery, perioperative complications, perioperative fluid therapy, vasopressors administered, transfusion rate, reintervention requirements and hospital stay. Results were reported as mean (SD) in quantitative data and percentage in qualitative data. Student’s t-test was used to test differences between continuous data and χ2 test to assess relationship between categorical data. If not applicable, we run a Mann–Whitney U or a Fisher’s Exact Test respectively. P values <0.05 were considered statistically significant. Analyses were carried out using SPSS v 22.0.

Results and Discussion: Sixty-seven patients were included. Preoperative hemoglobin (Hb) was 12.61(1.47) g/L and postoperative Hb 10.36(1.53) g/L. Intraoperative fluid therapy was 6.54(2.85) ml/Kg/h in the perioperative period, 3.17(0.69) ml/Kg/h. Colloids were administered in 44.8% patients and 20.4% needed ephedrine, 5.25(10.81) mg to optimize hemodynamics. Blood transfusion was required in 26.9% patients. Thirty patients had postsurgical complications and 25.8% of them needed reintervention. Postsurgical complications were higher if colloids were administered (p=0.006). Red Blood Cell (RBC) transfusion was higher in patients who had postsurgical complications (p=0.034) and this therapy was also related to an increase in postsurgical complications (p=0.028). Neither perioperative fluid therapy, nor vasopressor use nor transfusion therapy were related to a longer hospital stay.

Conclusion: Intraoperative colloids administration and perioperative RBC transfusion may worsen outcomes in DIEP flap surgery. RBC transfusion has been related to a potential increase in flap thrombotic events and infectious complications. PBM programs may optimize perioperative outcomes and reduce postsurgical complications due to RBC transfusion.

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Increasing Number of Episodes of Intraoperative Hypotension is associated with Early Postoperative Acute Kidney Injury in Cystectomy Patients – Results from a Retrospective Cohort Analysis

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Background and Goal of Study: Intraoperative hypotension is frequent during major non-cardiac surgery and a common side effect of anaesthesia. It has been progressively associated with acute kidney injury (AKI). In a sub study of major urological procedures, we hypothesized that the number of episodes of falling below a certain hypotension threshold intraoperatively is a risk factor for postoperative AKI.

Materials and Methods: We analysed data of 416 patients undergoing open radical cystectomy with urinary diversion at our high caseload centre between 2013 and 2019. We performed a probability prediction to analyse the risk of AKI depending on minutes below a certain hypotension threshold. We focused on subgroups of patients that recorded events below a given threshold and assessed the number of episodes as a grouped variable (1 to 3, 4 to 8, 9 to 15, > 15 episodes) in order to improve comparability. This led to conditional probabilities with 1 to 3 episodes as the reference group. We predicted the conditional probabilities for AKI with the help of quadratic splines with knots at 20, 60 and 120 minutes.

Results and Discussion: Figure 1 illustrates predicted probabilities for postoperative AKI using an average of our patient population. For a MAP decrease on 65 mmHg, the probabilities for AKI increased with increasing number of episodes (1 - 3 episodes: 23.7%, 4 - 8 episodes: 27.3%, 9 - 15 episodes: 37.0%, > 15 episodes: 69.2%). This leads to an OR of 5.671 compared to baseline (95% CI 1.444 - 25.498, P=0.016). A similar trend was seen for a MAP below 55 mmHg (1 - 3 episodes: 26.9%, 4 - 8 episodes: 37.0%, 9 - 15 episodes: 47.1%) and 55 mmHg

Conclusion: Our results suggest that avoiding repeated episodes of intraoperative hypotension will protect postoperative renal function in cystectomy patients.

4705

Perioperative AKI and mortality in elective major non-cardiac surgery at Queen Elizabeth Hospital, Birmingham (QEHB)

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Background: Perioperative acute kidney injury (AKI) is associated with an increased morbidity, mortality, length of stay (LOS) and costs. Most large studies have not investigated this in purely elective major surgical cohorts.


Methods: Retrospective analysis of patients having elective major non-cardiac surgery for 2015-2017. Surgery was deemed major if it fulfilled the definition in...
Lee’s Revised Cardiac Index, or if it was listed as major under BUPA categorisation. Data was retrieved from two patient electronic record systems: Patient Administrative System, and Describing Information and Communications System. Suitable inclusion and exclusion criteria were applied to the data sets. AKI was defined according to KDIGO criteria. Differences between groups was compared using the Chi Squared and Student’s t-test.

**Results and Discussion:** A total of 48,246 episodes were screened. 33,976 episodes were excluded leaving a cohort of 14,270 patients. Of these, 6596 patients had suitable data for analysis. A summary of the significant findings is as below.

<table>
<thead>
<tr>
<th>No AKI</th>
<th>AKI n=510</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>53.8</td>
</tr>
<tr>
<td>Male %</td>
<td>58.6</td>
</tr>
<tr>
<td>LOS &gt; 8 days %</td>
<td>22.3</td>
</tr>
<tr>
<td>Median LOS (days)</td>
<td>4</td>
</tr>
<tr>
<td>Chinese ethnicity %</td>
<td>10.7</td>
</tr>
<tr>
<td>Mortality %</td>
<td>0.4</td>
</tr>
<tr>
<td>Needing RRT n (% of group)</td>
<td>10 (0.3%)</td>
</tr>
</tbody>
</table>

**Conclusion:** In our large QEH data set, AKI occurred in a high proportion of patients and was clearly associated with a longer length of stay and a severer-fold increased risk of mortality. Risk factors associated with AKI included older age and Chinese ethnicity. Male sex was not a risk factor, which conflicts with published data. More research is required to understand how AKI can be prevented.

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**4339**

**Contribution of the novel pulse oximeter–based index in determining the amount of postoperative supplemental oxygen needed**

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**Background and Goal of Study:** Postoperative supplemental oxygen to prevent hypoxia can cause hyperoxia in some patients, which is reported to be associated with adverse effects, such as acute lung injury, increased hospital mortality, and worse outcomes in patients with ischemic stroke. Although blood gas analysis (BGA) is necessary to detect hyperoxia, it is invasive and intermittent. Oxygen reserve index (ORI)1,2, Masimo Corp., Irvine, CA, USA) is a novel pulse oximeter–based index used to measure the oxygenation reserve status from 1 (much reserve) to 0 (no reserve). This study aimed to investigate whether the extent of postoperative hyperoxia can be limited by the use of ORI to determine the amount of supplemental oxygen needed and to evaluate the frequency of hypoxia.

**Materials and Methods:** We enrolled 50 patients with American Society of Anesthesiologists physical status class 1 or 2 scheduled for breast surgery. The patients were randomly assigned to one of the two groups: one received ORI-based oxygen treatment (group O) and the other received conventional postoperative oxygen treatment (group C). In group O, oxygen was administered at 4 L/min in the operation room after extubation. If ORI > 0.00, oxygen was decreased by 0.5 L/min until ORI was 0.00 for 30 min continuously in the post anesthesia care unit (PACU) and wards. In group C, oxygen was administered at a fixed amount (4 L/min) throughout the research period. Oxygen was administered via the nasal canula until the morning after surgery in both groups. BGA was performed 1 h after anesthesia induction (T0), after extubation (T1), before exit from PACU (T2), and on the morning after surgery in the wards (T3). Peripheral capillary oxygen saturation (SpO2) was measured every 2 s from 9 PM to 6 AM of the operation day. A two-way repeated-measures analysis of variance with post-hoc unpaired t-test was used to compare the mean peripheral arterial oxygen (PaO2) between the groups. Hypoxia was defined as PaO2 <120 mm Hg, whereas hyperoxia was defined as continuous SpO2 value ≤ 94% for more than 1 min.

**Results and Discussion:** PaO2 was significantly lower in group O than in group C at T2 [117.3 (28.8) vs. 170.0 (42.8) mmHg] and T3 [107.6 (16.5) vs. 157.1 (28.4) mmHg], whereas PaO2 was defined as PaO2 <120 mm Hg, whereas hypoxia was defined as continuous SpO2 value ≤ 94% for more than 1 min.

**Conclusion:** Determining postoperative supplemental oxygen amount using ORI can noninvasively suppress hypoxia, preventing hypoxia.

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**4405**

**Perioperative factors associated with postoperative morbidity after emergency laparotomy: A retrospective analysis in a university teaching hospital**

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**Background and Goal of Study:** Emergency laparotomy (EL) is a complex surgical procedure associated with increased morbidity and mortality. The UK National Emergency Laparotomy Audit (NELA) has identified variation in practice and patient outcomes, with 30-day mortality ranging between 7-15%. NELA and other observational studies show correlation between preoperative haemodynamic parameters (e.g. mean arterial blood pressure <80mmHg for >10 minutes) and increased postoperative mortality. The association between intraoperative haemodynamic parameters and overall postoperative morbidity has not been evaluated in EL patients. Our objective in this ana is to investigate the association between preoperative, intraoperative haemodynamic and other parameters and the post-operative morbidity.

**Materials and Methods:** The Comprehensive Complication Index (CCI) is a scale where higher scores indicate higher morbidity impact. In this retrospective clinical analysis, we correlated a range of perioperative parameters with CCI, among the patient who underwent EL during 2018.

**Results and Discussion:** Digital and paper records of all n=96 patients who had EL were evaluated. Mean±SD age was 64.1±16 yr, 44% being surgical category 1 Emergency. Median (25-75%) CCI was 27[9-45], and 30 day-mortality was 11.7%. While a number of intraoperative parameters correlated with CCI on univariate analysis, multivariable linear regression indicated only ASA status (P=0.005) and unplanned escalation to postoperative intensive care (P=0.03) were independently associated with CCI.

**Conclusion:** This retrospective analysis n=96 patients undergoing EL in a university teaching hospital has shown that ASA status and unplanned escalation to ITU, but not intraoperative haemodynamic parameters, were independently associated with increased postoperative morbidity. This warrants confirmation in a larger scale observational study.

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**Does the use of continuous non-invasive blood pressure monitoring during non-cardiac surgery reduce amount of intraoperative hypotension?**

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**Background and Goal of Study:** Intraoperative hypotension is strongly associated with postoperative morbidity.1 Even short periods of mean arterial pressure lower than 65mmHg are associated with worse outcomes such as myocardial injury and acute kidney injury.2 Continuous non-invasive monitoring may prevent long periods of hypotension but the extent of this reduction is unclear. The aim of this study is to investigate if continuous blood pressure monitoring with a non-invasive cuff in patients undergoing noncardiac surgery reduces the amount of hypotension when compared to standard intermittent oscillometric blood pressure monitoring.

**Materials and Methods:** We retrospectively reviewed medical records of forty eight patients undergoing EL in a university teaching hospital. BGA was performed 1 h after anesthesia induction, after extubation, before exit from PACU and 1 h after anesthesia induction in the post anesthesia care unit (PACU). We excluded patients with preoperative hypotension and those who underwent major abdominal surgery. The main outcome being the amount of intraoperative hypotension, lasting more than two hours. Forty five patients were monitored intraoperatively with continuous hemodynamic monitoring with ClearSight (Edwards) (Group A), whereas the control group (Group B) was monitored with the standard noninvasive oscillometric blood pressure measurement. Gender, ASA physical status, comorbidities, blood loss, transfusion rates were also recorded. Episodes of mean arterial pressure (MAP) below threshold of 65mmHg were compared between two groups using Wilcoxon rank sum test and Hodges Lehmann estimation of location shift with corresponding asymptotic 95% confidence interval.

**Results and Discussion:** There were no demographic differences between the two groups. Among 24 patients in each group, patients with continuous blood pressure monitoring had significantly lower total amount of MAP under 65mmHg [0.05 [0.0, 0.22] mmHg vs. intermittent blood pressure monitoring 0.11 [0.0, 0.54] mmHg (P=0.039, significance criteria P<0.048).

**Conclusion:** Continuous blood pressure monitoring during major non-cardiac surgery significantly reduced the magnitude of hypotension below threshold of MAP 65mmHg.

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5009
When you can’t explain perioperative hypoxemia: think platypnea-orthodeoxia syndrome, a challenging diagnosis

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Background: Platypnea-orthodeoxia syndrome (POS) is a rare condition of positional dyspnea and hypoxemia1. The aim of this paper is to describe a case of hypoxemia with no obvious reason in the perioperative scenario.

Case Report: A 75-year-old man was submitted, under general anesthesia, to a radical prostatectomy. His background included arterial hypertension, isquemic stroke and HIV infection. For several occasions after anesthetic induction, peripheral oxygen saturation (SpO2) decreased from 100% to 86-90% without any feasible cause apart from arterial hypotension, recovering right after phenylephrine administration. In the post-anesthesia care unit (PACU), severe hypoxemia (paO2 41 mmHg, SpO2 77%) occurred and computed tomographic pulmonary angiography showed peripheral subsegmental pulmonary embolism that couldn’t explain the clinical status. Due to the maintenance of severe hypoxemia without dyspnea, a right-to-left shunt was thought. Oddly, we’ve noticed hypoxemia correction with recumbency and aggravation with lifting the headboard and sitting position. A transeosophageal echocardiography showed a right-to-left intracardiac shunt through a patent foramen ovale (PFO) with no pulmonary hypertension, establishing POS

Discussion: This patient had no anesthetic background nor past desaturation events, so intraoperative hypoxemia with arterial hypotension was first related to peripheral hypoperfusion. Instead, it was due to a drop in systemic vascular resistance that raised intracardiac shunt fraction. Orthostatism leads to atrial distortion, promoting deoxygenated blood flow through a PFO leading to hypoxemia exacerbation with upright position as seen in the PACU. Achieving diagnosis of POS requires a broad workup and a high degree of suspicion2 but missing it can translate into higher morbidity3.


Learning points: This case shows that although rare and often unrecognized, POS is an important consideration in the differential diagnosis of hypoxemia with no clear or more obvious explanation. Prompt recognition is key.

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POSPOM (Preoperative Score to Predict Postoperative Mortality): useful tool for postoperative risk stratification? Application of the score at two centers in Brazil

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Discussion: When you can’t explain perioperative hypoxemia: think platypnea-orthodeoxia syndrome, a challenging diagnosis

Background and Goal of Study: Due to the importance to accurately predict the in-hospital mortality, Le Manach et al. created the POSPOM score. Although it has a wide range of comorbidities, some known mortality risk variables are not addressed, like anemia and smoking. The goal of our study was to apply the score at Clinics Hospital (HC) and Center for Integral Attention to Women (CAISM) and analyze anemia and smoking load (SL) as possible predictors of mortality.

Materials and Methods: Retrospective data analysis identified patients older than 18 years who underwent elective surgeries for 4 months in HC and CAISM. For each one we recorded: gender, age, primary diagnosis, surgery, comorbidities, preoperative hemoglobin plasma levels (HB) and SL. We calculated the POSPOM score and related it to mortality.

Results and Discussion: Data were collected from a total of 1,411 patients. The mortality rate of the two hospitals was 1.20% (95% CI). Our study showed a positive relationship between the POSPOM score, HB and SL with mortality (Table 1). Some preoperative scores such as ASA, POSSUM, EuSO was showed to have limitations, like data collected at hospital preoperatively, and used the POSPOM. Patients with a higher score have a higher chance of postoperative mortality (Figure 1). Anemia is a very prevalent worldwide and we found an inversely proportional relationship between HB and mortality, with similar and high odds ratio in previous studies. Few studies have considered smoking as an independent variable. We verified a positive correlation for the presence of smoking, with a proportional relationship of SL

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Comparison between the EXCARE Model, the SORT model and the ASA-PS scale in the prediction of in-hospital postoperative mortality within 30 days

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Background: Identifying the high-risk surgical patient in the preoperative period could improve care and enhance safety in this context, we developed a preoperative risk stratification model: SAMPE Model. Is a statistical model that estimates the probability of 30-days in-hospital death, by the analysis of four variables: age, ASA-PS, nature of surgery (elective vs emergency) and surgical severity (minor, intermediate or major). Recently, we have updated SAMPE model and created a new one: the EXCARE model. The minor and intermediate surgical procedures were grouped, because there was no significant difference in the probability of death between the two types of surgery. We also observed that the increase in the probability of death in relation to age was not linear, and used splines technique to adjust this variable. The aim of this study is to compare the accuracy of this new model – the EXCARE model - with the SORT model and the ASA-PS scale, in the prediction of postoperative in-hospital death within 30 days.

Methods: We analyzed a cohort of 1,173 patients submitted to non-cardiac surgery between January 2016 and August 2018. Patients under 16 years, neurosurgery, outpatient surgery, obstetric procedures, diagnostic procedures and procedures under local anesthesia were excluded. The variables of the SORT model and the ExCare model were collected by the analysis of electronic medical records by a trained research staff. The final outcome was postoperative in-hospital death within 30 days. Statistical analysis was performed by SAS version 9.4. To compare the accuracy ExCare model, ASA-PS and SORT model for prediction of 30-days in-hospital mortality we used C-statistic. To evaluate the overall performance we calculate the Brier score. The DeLong’s test was used to compare the three AUROC.

Results and Discussion: Mortality in the sample was 3.49% (n = 41). The ExCare model presented a good predictive capacity (AUC 0.89), superior to ASA-PS (AUROC 0.85). The SORT model presented an excellent accuracy (AUROC 0.92) in this cohort. There is a significant difference between AUROC ExCare and AUROC ASA-PS (p < 0.05) and there is no difference between AUROC ExCare and AUROC SORT (p = 0.25). The Brier score calculate to EXCARE, SORT and ASA-PS was, respectively: 0.026, 0.030 and 0.028.

Conclusion: The EXCARE model showed good accuracy, with advantage of using few variables that can be easily collected in the preoperative period.
Preoperative prediction of postoperative mortality using machine learning

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Background and Goal of Study: Preoperative prediction of postoperative mortality, which is the third leading cause of death [1], is essential for preoperative optimization and personalized perioperative care. However, the currently recommended scores ignore plenty of preoperative available data leading to an imprecise risk prediction. Machine learning (ML) may be suitable to organize and analyze these data in relation to postoperative mortality, and therefore, may offer better prediction of individual risk.

Materials and Methods: After ethical approval, all patients undergoing non-cardiac surgery at the university hospital of the Technical University of Munich between January 2014 and August 2019 were included. Data for training and testing the ML-algorithm were obtained from the electronic medical records. Features included in the model are procedural data (n=28), surgical codes (n=267), laboratory variables (n=988), data from preoperative assessment (n=181), and current medication (n=201) of 122,056 surgical procedures. The model to predict postoperative mortality was created by Extreme Gradient Boosting and the area under receiver operating curves (AUROC) was calculated. Information gain was displayed by information gain.

Results and Discussion: The perioperative mortality following any non-cardiac surgical procedure was 2.5%. The model predicts death based on 733 of 1665 factors with an AUROC of 96.3 (95.7-96.8). The most important five factors for mortality prediction are given in the table. In contrast to other ML based models with lower AUROC [2], we included procedural data as well as the planned surgery. Four of the top five factors with the highest information gain are such procedural features.

Conclusion: ML-based models for risk prediction of postoperative mortality need to include features without direct relation to the patients’ medical history and condition.

References:

Improving high-risk surgical patients outcomes: implementation of a bundle of extended-care during 48 hours in the postoperative period (the EXCARE Pathway): preliminary results

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Background and Goal of Study: While postoperative recovery is uncomplicated in the majority of cases, a proportion of high-risk surgical patients (HRSP) are prone to complications that have negative impact on rehabilitation, require disproportional amount of resources and are responsible for higher perioperative mortality rates. We aim to compare outcomes in HRSP population submitted to bundle of sustainable postoperative extended-care (EXCARE) to usual care. Our hypothesis is that EXCARE can increase the HRSP awareness and therefore reduce failure to rescue and postoperative morbimortality.

Methods: EXCARE bundle, implemented in a Brazilian tertiary hospital, comprises identification of the HRSP by the SAMPE Model, adoption of a HRSP handover, intensification of physician assistance on the ward (anesthetist, surgeons and clinical staff), frequent checking of the vital signs and high-sensitivity cardiac troponin (TnT-ts), measure for 48 hours. EXCARE clinical pathway will be analyzed using before-and-after comparison (historical controls). Primary outcome is composed of 30-day mortality and pulmonary, infectious, renal, gastrointestinal, cardiovascular, neurologic, hematological complications within 7 days. Secondary outcomes include hospital length of stay, number of Rapid Response Team (RRT) calls, unplanned postoperative ICU admission, surgical reintervention, elevation in TnT-ts and failure to rescue. A logistic regression model with individual propensity score will be calculated based on covariates that may influence the outcomes (significance level for all analysis of 5%).

Results: A prospective cohort of 361 patients was compared to a retrospective cohort of 963, both being HRSP was recruited so far. Preliminary results showed no change in most of postoperative clinical complications, except for higher transfusion rates (18 vs 12%, p<0.05), higher number of RRT calls (21% vs 11%, p<0.05), and higher number of surgical reinterventions (19% vs 8%, p<0.05) in the intervention group. There was significant decrease in postoperative death (9.1% vs 14.6%, p<0.05).

Conclusion: EXCARE bundle, using an objective risk communication tool and intensification of postoperative care based on processes changes in a sustainable proposal, decreased 30-day postoperative mortality. We believe that the extended care after surgery could speed-up recovery, reduce complications and provide instruments for better allocation of resources in health system.
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Pre and Post-Implementation Results of Enhanced Recovery After Surgery (ERAS) For Liver Surgery in an Asian Tertiary Institution

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Background and Goal of Study: ERAS was conceptualized in mid-90s for colorectal patients and has since been applied in other surgical specialties. ERAS allows faster recovery, reduction of complication rates and hospital length of stay, without an increase in readmission rate. Liver resection poses unique challenges such as pre-existing liver disease or malignancy, postop coagulopathy, fluid management, biliary leak and postop organ failure. Our study aims to demonstrate results of ERAS in liver surgery at our institution, Singapore General Hospital, which is the largest tertiary hospital in Singapore.

Materials and Methods: Consent was obtained from Singhealth Centralised Institutional Review Board. We used surgical outcome data for open and laparoscopic liver surgeries. The outcome data from January - September 2017 was used as the baseline for pre-ERAS implementation and data from October 2017 - July 2019 was used for comparison post-implementation. ERAS programme was a multidisciplinary effort implemented from October 2017, which included preoperative education, intraoperative protocols for anaesthesia, postoperative care and post-discharge followup (figure 1).

Results and Discussion: Pre-implementation of ERAS, there was significant variation in median length of stay (LOS) (3 – 18 days) amongst individual surgeons as compared to the hospital median for both laparoscopic and open surgeries (figure 2). Following ERAS implementation, there was decreased median LOS from 6 to 3 days and decreased inter-surgeon variation in LOS (figure 3). The mean Post Operative Morbidity Survey (POMS) score at postoperative days (P0D) 3, 5 and 7 was decreased for ERAS vs non-ERAS patients.

Conclusion: The ERAS programme reduced both the mean and variation of LOS, as well as the POMS score at P0D 3, 5 and 7 days. A standardized protocol with good compliance by surgeons, anaesthetists and nurses can improve surgical outcomes in patients coming for elective liver surgery.

References:

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Preoperative malnutrition in the elderly – Who is at risk and its association with very severe postoperative complications and prolonged hospital length of stay

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Background and Goal of Study: Malnourished elderly patients have longer hospital stays and more morbidities than those with normal nutritional state. Fortunately, malnutrition (MN) is potentially modifiable. To date, the prevalence of MN so that nutritional optimisation can be sought.

Materials and Methods: This is an audit of 1,033 elderly patients aged 65 years and older undergoing elective surgery at the Singapore General Hospital (SGH), a tertiary hospital, between January and March 2019. Patients were screened preoperatively for MN risk with MUST. Demographic data, comorbidities, operation details, postoperative complications and hospital length of stay (LOS) were recorded. Frailty was scored using the Edmonton Frail Scale, 30-day postoperative complications were scored using the Clavien-Dindo (CD) classification. Cusotabulation and multivariate logistic regression were done to determine the relationship between high MN risk (MUST ≥2) and high CD grade complications (CD grade ≥3) or infective complications. Multivariate ANOVA was performed to determine relationship between high MN risk and hospital LOS.

Results and Discussion: 11.9% of the patients were at risk of MN (MUST ≥1). Of this, 4.6% were at high risk (MUST ≥2). General surgery and gynaecological surgery had the highest prevalence of MN risk, (16.3% and 22.3% vs 11.9%, p = 0.001). Higher ASA score, frailty (EFSS ≥6), polypharmacy, and poor premorbid effort tolerance were associated with MN risk. Patients with high MN risk had higher odds of high CD grade complications compared to those with no risk (OR 2.2, p=0.04) and longer hospital LOS (B=1.2, p=0.04) after multivariate adjustment for type and severity of surgery, presence of malignancy, presence of moderate to severe anaemia, CCI, EFS and ASA score. High MN risk was not associated with increased odds of infective complications.

Conclusion: MUST is validated for preoperative screening of MN. Patients with high MN risk have a higher risk of severe post-operative complications and longer hospital LOS. Patients with high comorbidity burden and frailty should be screened for MN so that nutritional optimisation can be sought.

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Risk in surgery: an analysis of several morbidity and mortality risk scores in a Portuguese University Hospital

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Background: There’s conflicting literature regarding our perception of the perioperative risk. If clinicians tend to overestimate the benefit of certain treatment, we also may overestimate the risk in complex surgical patients. Some international guidelines include risk stratification as part of preoperative assessment. Our goal was to understand which risk scores were best related to the complications for which they were created, in our population.

Methods: We analyse the comorbidities of the various systems. We calculated the risk scores Revised Cardiac Risk Index, Gupta Perioperative Cardiac Risk, Multifactorial risk index for predicting postoperative respiratory failure (Arozullah), ARISCAT Score for Postoperative Pulmonary Complications, P-POSSUM and POSSPM. The outcomes analysed were in-hospital mortality; at 30 days: myocardial infarction (MI) or sudden cardiac arrest (SCA), pneumonia, pulmonary complications, morbidity and mortality; 6 month mortality.

Results and discussion: We collected data from 431 patients submitted to general surgery from March to May 2017. RCRI showed good discrimination in 30-day MI and SCA (AUC: 0.889; p-value: 0.007; CI: 0.742 - 1.000); GUPTA did not discriminate MI or SCA (curve crosses 0.5 and estimates may be biased); ARISCAT did not discriminate for pulmonary complications at 30 days (AUC: 0.646; p-value: 0.073); Arozullah showed reasonable discrimination for predicting postoperative respiratory complications (AUC: 0.704; p-value: 0.013; CI: 0.531 - 0.877); POSSPM showed good discrimination in in-hospital (AUC: 0.813; p-value: 0.009; CI: 0.880 - 0.998) and 30-day mortality (AUC: 0.902; p-value: 0.006; CI: 0.822 - 0.961), and reasonable discrimination for 30-day morbidity (AUC: 0.776; p-value: <0.001; CI: 0.680 - 0.872) and 6-month mortality (AUC: 0.703; p-value: 0.027; CI: 0.545 - 0.914); P-POSSUM showed good discrimination for in-hospital (AUC: 0.862; P-value: 0.031; CI: 0.747 – 0.977) and 30-day mortality (AUC: 0.873; P-value: 0.010; CI: 0.764 – 0.981); and did not discriminate at 6-month mortality (AUC: 0.653; p-value: 0.117).

Conclusion: POSSPM and POSSPM discriminated for the outcomes for which they were built, and they are an easy and fast tool to apply in risk assessment. RCRI showed good discrimination and is a simple and highly reproducible risk score. In the respiratory complications we had the most conflicting data: neither of the two scores showed good discrimination of postop pulmonary complications.

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Does the patient have normal nutritive score prior to digestive surgery anesthesia?

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Background and Goal of Study: Nutritive status assessment is one of the most important factors for post-operative recovery. On the other hand, the physiological stress of operation increases the risk of poor nutritional status which is related to poorer outcomes. The aim of this study is to estimate nutritional condition in pre-operative period and its relationship with other pre-operative factors like gender, BMI, ASA and Glasgow index in patient who undergoes gastrointestinal surgery.

Materials and Methods: Pre-operatively we collected general data of 75 patients who underwent gastrointestinal surgery like gender, ASA status, body weight, body height. The nutrition assessment was investigated with two nutritional screening tools: - Royal Marsden nutrition screening, - Mini nutrition assessment short form (MNA-SF). In each patient we calculated Glasgow index which is ratio between length of stay and severity of surgery, presence of malignancy, presence of moderate to severe anaemia, CCI, EFS and ASA score. High MN risk was not associated with increased odds of infective complications.

Conclusion: MUST is validated for preoperative screening of MN. Patients with high MN risk have a higher risk of severe post-operative complications and longer hospital LOS. Patients with high comorbidity burden and frailty should be screened for MN so that nutritional optimisation can be sought.
- 32 (42.66 %) patients had normal nutritional status. Most of the malnourished patients had RMMS ≥ 2 and significantly higher Glasgow score compared to patients with normal status and risk of malnutrition. According to BMI in malnourished patients’ group most of the patients were underweight which was 15 (71.43 %), but there were even two patients (9.52 %) who were overweight. Most of the patients or 17 (53.125 %) in total from the group of normal status patients according to MNA-SF and 14 (63.63 %) patients in the group of patients with risk of malnutrition had normal BMI. Gender wise most of the patients in all three categories according to MNA-SF and RMMS were male: - males (13+18+14) = 43 (57.3 %); - females (8+9+16) = 32 (42.6 %). According to ASA: Malnourished patients had higher ASA score compared with patients with normal status and the ones with risk of malnutrition.

Conclusion: Nutrition status determined with MNA-SF is strongly associated with BMI. Gender, ASA, RMMS score and Glasgow score, and could aid in pre-operative assessment of nutritive status. Future action is needed to optimize usage of MNA-SF and RMMS tool.

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A novel infection marker in perioperative medicine - Intensive Care Infection Score

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Background and Goal of Study: The prediction of infection remains difficult and long-lasting (microbial cultures) in perioperative and intensive medicine. Intensive care infection score (ICIS), derived from five blood-count parameters, characterize the immune response and routine blood samples. In diagnostics of infection we routinely use evaluation of clinical status of the patient, biomarkers of infection like white blood cell count (WBC), C-reactive protein (CRP), procalcitonin (PCT), ICIS levels and microbial cultures.

Materials and Methods: The goal was to verify, that ICIS as a biomarker differentiates infection from systemic inflammatory response syndrome (SIRS). We have enrolled 50 cardiac surgery patients in this prospective study. The cohort was divided into infected and non-infected patient groups for evaluation.

Results and Discussion: Elevated level of ICIS had been proved in patients with positive microbial cultures in contrast to patients with postoperative SIRS (elevated CRP and negative microbial screening). Before surgery CRP and ICIS values are in correlation (p=0.019). We confirmed the cut-off level of ICIS. CRP is not predictive for infection after surgery.

Conclusions: ICIS help us differentiate between infection and SIRS in critically ill patients. In contrast to CRP and PCT, the ICIS score can be obtained routinely without extra blood sampling and with lower costs, yielding results very fast (within 15 minutes).

References:

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Serum ketones as a diagnostic tool in the detection of patients' weight loss in the preoperative period. A pilot study

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Background and Goal of Study: Evidence suggests that increased serum ketones are associated with the presence of patients’ cachexia. This problem can be especially important among patients with cancer in perioperative period due to the loss of their weight caused by neoplastic process. Although most patients are fed with high protein diet before scheduled surgeries, still serum ketones bodies might be elevated. The main aim of this study was to assess if serum ketone elevations can be a diagnostic tool to reveal oncological patients in comparison to other surgical ones.

Materials and Methods: This was a prospective, observational study performed in the university hospital. The study was approved by the institutional review board [KE-0254/350/2016]. Each patient signed the consent before their inclusion in the trial. The patient previous medical history, type of surgery, loss of weight during the previous months, and intensity of preoperative nutrition was obtained. In the operating theater, two mL of patient blood was collected for ketones detection. Moreover, arterial blood gas analysis was performed. Blood for ketones detection was collected in heparinized sample tubes. After 10 minutes of centrifugation (3000g) plasma was collected from each sample tube and was frozen in 81 degrees Celsius. Ketone bodies detection was performed with mass spectrometry technique.

Results and Discussion: Twenty patients after different types of surgical procedures were recruited to the study. Of 21 patients, 10 were scheduled for surgery due to oncological problem. No difference was between oncological (88.4 [55.85-153] mcg/mL) and non-oncological patients (40.43 [22.19-73.86] mcg/mL) regarding serum ketones elevation. However, the percent of body loss before the surgery and perioperative glucose level was correlated with serum ketones. The area under the ROC curve was 0.785 obtained after computation with the logistic regression model including these two parameters. The odds ratio for glucose was 0.978 (0.961-0.996), p=0.019 and for the percent of body weight loss was 1.22 (1.01-4.19), p<0.05.

Conclusion: Preoperative serum ketones might help to discriminate patients with severe weight loss, but not oncological patients from non-oncological individuals.

References:

5364

Prevalence and risk factors for moderate-to-severe thirst in the post-anesthesia care unit: development of an optimized management protocol from a quality improvement program

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Background and Goal of Study: Post-operative thirst is common and may cause intense patient discomfort. Unfortunately, its clinical relevance is frequently downplayed, generally considered less distressing than other post-operative symptoms. Among various pathogenetic factors, proactive fasting and fluid loss may lead to hyperosmolality and hypovolemia. Moreover, certain drugs utilized in anesthetic practice may promote a thirst sensation, which can be further intensified by prolonged surgical and intubation times. We designed the current study with the following aims: (1) to examine the prevalence of moderate-to-severe post-operative thirst, (2) to identify the main risk factors for moderate-to-severe post-operative thirst, and (3) to develop an optimized protocol to maximize the efficacy and safety of thirst management.
The role of Dexmedetomidine and Hyperbaric oxygen therapy in Ludwig's Angina- a case report

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Background: Ludwig's Angina is a rare, but potentially life-threatening, diffuse cellulitis of the neck and floor of the mouth, usually secondary to odontogenic infection. We report a case of a patient with Ludwig's Angina, along with a review on the potential benefits of dexmedetomidine and hyperbaric oxygen therapy (HBO) in the post-operative approach of these patients.

Case Report: A 36-years-old male, ASA II, diagnosed with Ludwig's Angina underwent unforeseen surgical drainage under general anesthesia with standard ASA, BIS and TOF monitoring. Successful awake fibroptic intubation with a nasotracheal tube (NTT) was performed as a method of induction due to trismus. After appropriate neuromuscular block (NMB) reversal, the patient remained sedated (propofol and fentanyl), keeping the NTT in situ due to periotic edema. In the Postanesthesia Care Unit (PACU), both propofol and fentanyl infusion doses were progressively reduced and a dexmedetomidine loading dose (30mcg/kg) followed by maintenance 0.7 mcg/kg/h was infused. After 2 hours, the patient recovered spontaneous ventilation and a T-piece with oxygen was attached to the NTT. At time of discharge to Intermediate Care Care Unit (IMCU), he was hemodynamically stable, vigilant and collaborative. On day 1, HBO (anaerobic protocol) was initiated - 105' (60' at 2,8 ATA + 30' at 2,4 ATA) in two sessions and 90' at 2,4 ATA in the following sessions.

Discussion: He did 6 uneven sessions of HBO with the NTT in situ. On day 4 he was extubated. On day 7 was discharged from the hospital without any signs or symptoms of respiratory disease, completing a total of 14 HBO sessions in ambulatory regimen. Dexmedetomidine induces a unique sedative response, which shows an easy transition from sleep to wakefulness, thus allowing this patient to be cooperative and communicative when stimulated. HBO, as an adjuvant to surgery and directed antibiotic therapy, allowed a better and faster recovery.

References:

Learning points: This case demonstrates a successful example of articulation between different specialties, where dexmedetomidine and the hyperbaric chamber played a relevant role in the patient recovery.

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Effect of analgesia nociception monitoring during general anaesthesia with three different analgesia monitoring devices and clinical signs on remifentanil consumption and serum cortisol levels

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Background and Goal of Study: In recent years, analgesia monitoring devices estimating the effect of analgesia during general anaesthesia from different physiological variables have become available. The present study determined the effect of remifentanil titration by 3 different analgesia monitoring devices or clinical signs on remifentanil consumption and serum level of the stress hormone cortisol.

Materials and Methods: After obtaining ethics review board approval and informed consent, 96 patients undergoing radical retropubic prostatectomy with propofol/remifentanil anaesthesia were randomized into 4 groups to receive remifentanil either guided by 1 of 3 analgesia monitoring devices (Surgical Pleth Index [SPI], Papillary Pain Index [PPI], Nociception Level [NOL]) or by clinical judgment (Control). The primary end point was intraoperative remifentanil consumption.

Results and Discussion: The total amount of remifentanil administration (μg/kg/minute) differed between the groups: Control = 0.34 [0.32-0.37], SPI = 0.46 [0.38-0.55], PPI = 0.07 [0.06-0.08], NOL = 0.16 [0.12-0.21] (mean [95%CI]). All pairwise group comparisons P < 0.001, except Control vs. SPI P = 0.048. The AUC analysis indicated differences among groups in cumulative cortisol levels (μg/liter-minute): Control = 37846 [33263-43067], SPI = 38576 [33712-44142], PPI = 72030 [63068-82265], NOL = 54336 [47515-62136] (mean [95%CI]). Pairwise group comparisons Control vs. SPI P = 0.840, Control vs. PPI P < 0.001, Control vs. NOL P < 0.001, SPI vs. PPI < 0.001, SPI vs. NOL P = 0.001 and PPI vs. NOL P = 0.005.

Conclusion: The analgesia–nociception balance was differently reflected by the analgesia monitoring devices and led to different amounts of intraoperative remifentanil consumption. Groups with lower levels of opioids administered were associated with higher serum cortisol levels.

6141

Prehabilitation and Multimodal analgesia to reduce postoperative ileus

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Background and Goal of Study: Rectal cancer surgery is associated with the development of postoperative ileus, among other complications. The implementation of preoperative prehabilitation and perioperative multimodal analgesia might decrease the incidence of ileus. The goal of the study is to confirm if the incidence and characteristics of postoperative ileus has improved in patients scheduled for rectum surgery after a prehabilitation-multimodal analgesia program.

Materials and Methods: Cohort study with 2 groups of patients scheduled for elective rectal cancer surgery after neoadjuvant therapy within an Enhanced Recovery After Surgery environment. Management of both groups was similar excepting: - Prehabilitation and Multimodal Analgesia group (2017-2019): Preoperative prehabilitation program (4 weeks) before surgery and perioperative multimodal analgesia (intraoperative analgesia with ketamine + lidocaine infusion); - Historical group (2013-2014): Patients without prehabilitation period nor intraoperative lidocaine infusion. Principal variable: incidence of postoperative ileus. Secondary variables: Length of ileus, need of total parenteral nutrition and hospital stay; demographic (age, sex, ASA) and intraoperative characteristics (duration, laparoscopy approach and fentanyl needed). Database included data from electronic medical records. Statistical analysis included Student’s t test or Chi-square to compare both groups.

Results and Discussion: A total of 96 patients were included (37 patients Historical Group and 59 Prehabilitation-Multimodal Analgesia Group). There were no statistically significant differences between both groups regarding demographic or intraoperative characteristics. We found a decrease of postoperative ileus (55% of Historical Group vs 29% Prehabilitation-Multimodal Group), p<0.05. However, there were no statistically significant differences between Prehabilitation and Multimodal

6346

The necessity of postoperative phosphates monitoring in patient treated with i.v. iron preoperatively

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Background and Goal of Study: Hypophosphatemia is defined as serum phosphate level below reference range of 0.79-1.42 mmol/L, but, in clinical practice, phosphates are supplemented at levels below 0.65 mmol/L. In literature, hypophosphatemia occurs in about 25% (10-80%) of patients admitted to intensive care unit (ICU). Even moderate hypophosphatemia may impair diaphragmatic contractility, reduce left ventricular stroke work and can lead to insulin resistance. High dosage intravenous iron therapy can potentially cause hypophosphatemia. In our prehabilitation program for surgical patients in an anaemia clinic, patients receive intravenous iron therapy, and those who are at a high nutritional risk (nonvolatile weight loss more than 10% during last 6 months, BMI less than 18.5kg/m², NRS 2002 score more than 5 and albumin levels less than 30 g/l) are instructed to take nutritional supplements for at least 2 weeks preoperatively.

Materials and Methods: We analysed retrospective data of heterogeneous cohort of consecutive critically ill adult patient in 2 weeks in ICU in UHC Zagreb and compared them to data of patients who were treated by intravenous iron before the surgery through our anaemia clinic.

Results and Discussion: Compared to consecutive ICU patients, where 13 %
patients had hypophosphatemia on their 0. postoperative day (but only 3.3% below 0.65 mmol/L), patients from prehabilitation program treated with iron supplementation had greater degree of hypophosphatemia (44.4%, and 33% needed phosphates supplementation), regardless of the i.v. formula of high dosage iron. Conclusions: Phosphate levels should be checked and corrected perioperatively in all patients receiving i.v. iron supplementation before the operation since they demonstrate hypophosphatemia significantly more often then is baseline for the same population, despite nutritional supplementation.

6302

Complementing beta-blocker titration in the operating room - is it possible?

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Background: Cardiovascular complications (CC) are an important cause of morbidity and mortality after non-cardiac surgery. The use of peri-operative beta-blockers (BB) for cardiac protection is controversial1. The ESA guideline recommends considering pre-operative BB use in patients with ischemic heart disease, starting more than 1 day before surgery2. This report intends to present anaesthetic management with supplemental dose of BB in the operating room (OR) for a patient with previous use of BB but with heart rate (HR) above target.

Case report: SCBS, female, 83 y.o., 1.50 m, 80 kg, with hypertension, diabetes mellitus, dyslipidemia, coronary artery disease and dilated cardiomyopathy, was hospitalized for a parotidectomy due to a malignant tumor. She reported use of metformin, losartan, trimetazidine, isosorbide, bisoprolol, ASA, atorvastatin and clofazin. Dyspnea and angina were present on small exertion. Cardiac catheterization showed a patent stent, 70% obstruction in anterior descending artery and total occlusion of the right coronary artery. Cardiology, Anaesthesiology and Surgical teams decided to perform the procedure in a class IV cardiac risk patient considering the underlying disease. In the OR, with an initial HR of 83 bpm and blood pressure (BP) at 140/90 mmHg, esmolol was started with 50 mcg.kg⁻¹. min⁻¹ for titration leading to CC induction (aiming a HR around 60 bpm), and raised until 100 mcg.kg⁻¹.min⁻¹ in some moments. Surgery and anaesthesia were uneventful. She was discharged one week after surgery.

Discussion: BB treatment should be adjusted before surgery to achieve a resting heart rate of 60-70 bpm with systolic BP above 100 mm Hg. In this case, despite previous use of BB, the optimization of HR was not achieved and the main goal of the anaesthesia team was to avoid tachycardia or hypotension. Starting BB during surgery is not supported by ESA guideline, but using intravenous (IV) complementation during surgery to tailor plasmatic concentration in a patient which previous BB use was not titrated may be of value.

References:

Learning points: HR control with BB is essential to prevent CC; Use of IV BB as complementation during surgery may be a strategy to adjust previous treatment.

5207

Efficacy and safety of Opioid Free Anaesthesia in total laryngectomy: a case series

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Background and Goal of Study: Opioids have played a crucial role in the quality of recovery after anaesthesia and surgery. However, questions have been raised concerning their use, especially in high risk patients. To this context, we evaluated the efficacy of Opioid Free Anaesthesia (OFA) in a case series of total laryngectomy patients and its effect on hemodynamics and perioperative recovery.

Materials and Methods: 7 patients undergoing total laryngectomy from July till November 2019 were enrolled. After an initial bolus dose of dexmedetomidine 0.4μg/kg, induction of anesthesia was performed with Mullimix solution (50μg dexmedetomidine, 500mg lidocaine and 50mg ketamine in 100ml N 0.9%) at a loading dose of 0.2ml/kg, propofol 2mg/kg and rocuronium 0.9mg/kg. Maintenance was achieved with mixture of desflurane/O2/air and continuous infusion Mullimix at 0.2ml/kg/h. Ondansetron 4mg, dexamethasone 8mg, droperidol 0.625mg, paracetamol 1g, parecoxib 40mg and MgSO4 40mg/kg were given. At the end, the incision was infiltrated with 20ml ropivacaine 0.375%, Mullimix rate was reduced at half and the infusion continued in PACU for 30min. Postoperatively, patients received ondansetron 8mg/24h, parecoxib 80mg/24h and paracetamol 3g/24h. Tramadol or morphine were administered if VAS score>4 and metoclopramide in case of vomiting. Intraoperative hemodynamics and SpO2 and postoperative VAS score, patient satisfaction score and extra medication demand were recorded.

Results and Discussion: 7 ASA II-III patients were studied (mean age 63.67±10.30 years, all male). Mean operative and Mullimix infusion time were 9.04±1.22 and 10.08±1.20 hours, respectively. Intraoperative hemodynamics remained stable (Fig 1) and SpO2 in normal levels. Mean VAS and satisfaction scores varied between 3.33 and 8.33 at awakening and 1.33 and 10 at 48h. Tramadol was given in 2 patients in PACU for VAS scores of 5. No nausea, vomiting or disturbing dreams were recorded. Mild oliguria was noted in all patients.

Conclusion: OFA provided a high level of perioperative analgesia in total laryngectomy, without totally excluding the need for opioids. Randomized trials are needed to further evaluate our findings.

6162

Implication of residual neuromuscular blockade on the quality of recovery after anaesthesia and surgery

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Background and Goal of Study: Residual neuromuscular blockade (RNMB) is a well-known postoperative complication associated with the use of neuromuscular blocking agents, and causative of potential life-threatening events1. The Quality of Recovery 15 (QoR-15) questionnaire is a validated, patient-reported form of evaluating the quality of recovery in patients who underwent anaesthesia and surgery2. QoR-15 evaluates 5 dimensions of health: patient psychological support, physical comfort, emotional state, physical independence and pain. The aim of this study was to assess the incidence of postoperative RNMB and its association with poorer quality of recovery.

Materials and Methods: After approval of the ethics committee, a prospective study was undertaken in 52 consenting adult patients who underwent scheduled surgery. The occurrence of RNMB was defined as an average train-of-four ratio (aTOF)<0.9 after three measurements in the post-anaesthetic care unit (PACU), and quality of recovery was assessed using the QoR-15, recorded 24h after surgery. After dividing the population into two groups according to the aTOF and RNMB diagnostic, differences in the quality of recovery were assessed.

Results and Discussion: The overall incidence of postoperative RNMB was 16.3%. The median QoR-15 score recorded was 125.5. There were no significant differences recorded in the QoR-15 scores between the two subgroups (aTOF < 0.9; aTOF > 0.9; p=0.859). Regarding the different dimensions evaluated by the QoR-15 questionnaire, the medians recorded between the aTOF<0.9 and the aTOF>0.9, respectively, were as follows: psychological support 8.5 vs. 10, physical comfort 9 vs. 8, emotional state 8.5 vs. 10, physical independence 7 vs. 7 and pain 8.5 vs. 9. No statistically significant differences were recorded within the dimensions.

Conclusion: RNMB occurred in 16.3% of the patients studied. Even though literature shows a greater incidence of complications in this population1 and an inferior quality of recovery, we could not demonstrate such an association, as assessed by the QoR-15 questionnaire, in the studied population.

References:

*Image*
Intraoperative magnesium has the effect of reducing postoperative RASS score and delirium. We suspect one of the reasons to be the rare incidence of RASS score >0.

References:

New insights for screening of etomidate analogues in the human H295R cell model

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Background and Goal of Study: Etomidate is a sedative hypnotic with excellent short-acting properties and is used in endovascular repair of aortic aneurysms. However, the safety of etomidate is controversial, and the combination of epidural local anesthetics and opioids may offset the potential benefits of EA to outcomes after cancer surgery. This study aimed to develop an approach for screening new etomidate analogues without endocine disrupting. Here, the objective of this study was to better define the relationship between etomidate analogues and its adrenocortical inhibitory potency in vitro.

Materials and Methods: In our study, the adrenocortical tumor cell line NCI-H295R was used as an in vitro system for etomidate analogues screening and the values of hormone in cells was detected by a HPLC-MS/MS-based method.

Results and Discussion: The H295R cell line, as a screening tool, can be used to analyze the adrenocortical toxicity of etomidate analogue. Then dose-response curves of hormone release and the concentration of the individual compounds were fitted. Besides "Adrenocortical Inhibitory Index" was used for the evaluation of the adrenocortical inhibitory potency of each test drug, which may be used as a preliminary evaluation criteria for adrenocortical suppression. As we all know, etomidate bind with high affinity to 11β-hydroxylase, inhibiting the synthesis of adrenocortical steroids, which may considered as "off-target" affinities. Such incidents keep cropping up in both pre-clinical trials and clinical performance during drug development. To address the problems, this study was conducted.

Conclusion: It would be beneficial to use the developed methods to screening etomidate analogues without suppressing adrenocortical function, especially when we combine in vitro system with in vivo animal tests.

Effect of intraoperative magnesium on postoperative RASS score after endovascular repair of aortic aneurysm: a preliminary randomized controlled trial

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Background and Goal of Study: Intraoperative magnesium has the effect of reducing postoperative opiate requirement and pain2, and recently was also reported to decrease postoperative agitation3. Given that its effect on postoperative sedation and delirium is unclear, we investigated its effect on the postoperative Richmond Agitation-Sedation Scale (RASS) score and delirium.

Materials and Methods: The study was approved by the Institutional Review Board and registered at the Japan Registry of Clinical Trials (URCTs041190013). Written informed consent was obtained from all patients. Forty-five consecutive patients diagnosed with abdominal(33) and thoracic(12) aortic aneurysm who underwent endovascular repair of aortic aneurysm under general anesthesia were eligible. Patients were allocated randomly to the magnesium group (magnesium infusion of 30mg/kg-1 in the first hour followed by 10mg/kg-1h-1 until the end of surgical procedure) or the control group (0.9% saline at the same volume and rate). Primary outcome was difference in postoperative RASS score between the two groups. Secondary outcomes were incidence of delirium (Confusion Assessment Methods for the Intensive Care Unit: CAM-ICU), analgesia score (numerical rating scale; NRS), use of analgesic drugs, and ICU stay.

Results and Discussion: At ICU admission, magnesium had not significantly reduced the RASS score (0(0), 0(0), 0(0), 0(0), 0(0), P=0.136), but the NRS score was statistically different, 0(0) vs 3(0.5, 6.5)(P=0.048). However, other data (RASS score, NRS score, CAM-ICU at 0, 1, 6, 12, and 24h and length of ICU stay) did not show significant difference. Measured (but not infused) magnesium was significantly different (0.6±0.08 vs 0.53±0.156 mmol/L, P=0.0001). During the observational period, no adverse events caused by magnesium infusion were recorded.

Conclusion: In this preliminary study, we could not show that magnesium reduces postoperative RASS score and delirium. We suspect one of the reasons to be the rare incidence of RASS score >0.

References:
induced by poly(I:C) was abolished (Fig.1f, g).

Conclusion: These results demonstrate that the poly(I:C) preconditioning yield a significant infarct-sparing effect, which is mediated through the TLR3/Pi3K/Akt-dependent signaling pathway.

5111

Asymptomatic hyperCKaemia?
Preanaesthetic finding of uncertain susceptibility to Malignant Hyperthermia (MH)

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Background: MH-related morbimortality is preventable and elevated CK may be the only alarm sign in susceptible patients. However, importance of preanaesthetic assessment and complementary tests in ASA I patients for elective ambulatory surgery is underestimated.

Case Report: A 20-y.o. patient undergoing preanaesthetic assessment for elective circumcision refers a history of elevated CK since the age of 2, and recurrent syncope thoroughly studied during infancy and adolescence (normal EEG, EMG, cerebral MRI, ECG Holter, echocardiogram and ECG). Discharged after a single normal CK result at 18 years of age diagnosed with recurrent vasovagal syncpe and unexplained hyperCKaemia. No family history regarding general anaesthesia. A new preanaesthetic test showed elevated CK value of 518 U/L [reference interval 30-200 U/L] so the patient is referred for a genetic study of RYR1 gene revealing heterozygous c.7025A>G (p.N2342S), a genetic variant of uncertain clinical significance.

Discussion: RYR1 mutations are associated with MH in up to 86% of cases. Mutations reflect structural or functional alterations of the ryanodine receptor but do not provide information on their clinical effect. Uncertainty regarding these genetic variations requires further investigation. This mutation has only been reported in a few cases, some associated with MH, not allowing to exclude or confirm pathogenicity. Since association with recurrent syncpe in our patient cannot be excluded, further evidence is needed. We report this case to highlight the importance of preanaesthetic assessment considering many medical specialists are often unaware of potentially life-threatening anaesthetic complications. Investigation of MH susceptibility is required in idiopathic hyperCKaemia where other causes cannot be excluded, further evidence is needed. We report this case to highlight the importance of preanaesthetic assessment including childhood past medical history is of key importance in all patients. Improved awareness regarding anaesthetic-related events among other medical specialists could allow earlier identification of MH susceptibility.

References:

Learning points: Thorough preanaesthetic assessment including childhood past medical history is of key importance in all patients. Improved awareness regarding anaesthetic-related events among other medical specialists could allow earlier identification of MH susceptibility.
Prevalence of undiagnosed and poorly controlled diabetes mellitus among elective non-cardiac surgical patients

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Background: Type 2 Diabetes Mellitus (DM) is a major comorbidity affecting more than 11% of the Singapore population and is expected to increase in the next decade. Recently, local clinical practice guidelines approved the use of HbA1c as an alternative screening test for DM. HbA1c ≥7.0% is used to diagnose DM directly, while HbA1c 6.1-6.9% required further tests with FPG or OGTT where DM can be diagnosed if either FPG ≥7.0 mmol/L or OGTT ≥11.1 mmol/L or pre-diabetes if FPG 6.1-6.9 mmol/L or OGTT 7.8-11.1 mmol/L. HbA1c also offers a more convenient and acceptable form of DM screening. Currently, the epidemiology of DM among surgical patients in Singapore is unknown. DM increases the risk of microvascular and macrovascular complications which impact surgical outcomes. Furthermore, the perioperative period is an effective “teachable moment” for the control of chronic diseases. We aim to determine the prevalence of undiagnosed and poorly controlled DM among surgical patients to establish the utility of the Preoperative Assessment Centre (PAC) for DM screening and intervention.

Methods: We conducted a prospective observational study at the PAC in a Singapore tertiary hospital. Adult surgical patients (excluding cardiac surgery) scheduled for routine preoperative blood tests were recruited. We performed HbA1c screening to assess the prevalence of patients at risk of pre-diabetes (HbA1c ≥6.1%), diabetes mellitus (HbA1c ≥7.0%) and poorly controlled DM (HbA1c ≥8.0%).

Results: A total of 549 patients were recruited. The median age was 57 (IQR 42-67) and 49.6% were males. The overall prevalence of HbA1c ≥ 6.1% and ≥7.0% was 19.85% and 9.11% respectively. Out of 109 (19.85%) pre-existing DM patients, 19 (17.43%) had poorly controlled DM. Of those not diagnosed with DM, 21 (3.83%) had HbA1c ≥ 6.1% and 2 had newly diagnosed DM (HbA1c ≥7.0%).

Conclusion: There is a high prevalence of undiagnosed and poorly controlled DM among elective surgical patients. Cohort screening of DM may be appropriate for selected surgical patients during their visit to the PAC. Further studies are needed to determine if preoperative interventions are effective in improving glycaemic control.

Anescardiocat as a predictor of Major Cardiac and Cerebrovascular Events in multilevel spinal surgery patients

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Background: Multilevel spinal surgery is associated with important blood loss, potentially contributing to Major Adverse Cardiovascular and Cerebrovascular Events (MACCE). ANESCARDIOCAT score considers intraoperative transfusion and hypotension as independent risk factors for MACCE.

Goal of the study: To evaluate ANESCARDIOCAT score as a predictor of MACCE in Major Spinal Surgery.

Materials and Methods: We retrospectively analysed data obtained from electronic medical records of patients who underwent scheduled multilevel spinal surgery (3 or more levels) in Parc de Salut Mar between Jun 2017 and Jun 2019. We collected demographic data, preoperative cardiovascular risk factors and data related to surgery. Dependent variables were the occurrence of any MACCE (myocardial infarction, myocardial injury, angina, stroke/TIA, cardiac arrest, acute heart failure and new onset arrhythmias) as well as global mortality until hospital discharge. We also analysed if perioperative transfusion was related to MACCE. A chi-squared test was used to determine the relationship between ANESCARDIOCAT score and MACCE.

Results and Discussion: A total of 91 patients were included, mean age 67.9 years. Prevalence of ANESCARDIOCAT risk factors: 3.3% cerebrovascular disease, 14% coronary artery disease, 18.5% abnormal ECG, 6.5% kidney disease, 24% intraoperative transfusion and 49% intraoperative hypotension. Anescardiocat score was 0 for 26 patients (28.3%), 1 for 28 patients (30.3%), 2 for 24 patients (26.1%) and 3 for 15 patients (16.3%). Intraoperative mean blood loss was 886 mL and 28 patients (30.4%) received postoperative blood transfusion. MACCE incidence was 16% (15 patients). Most frequent MACCE were non-fatal cardiac arrest (9.9%) and myocardial injury (MINS) (9.9%). MACCE were more prevalent in patients requiring transfusion (p=0.02) and with higher ANESCARDIOCAT score (p=0.0004).

Conclusion: According to our results, multilevel spinal surgery is associated with a high prevalence of perioperative cardiovascular events. Higher Anescardiocat score and perioperative transfusion could help to identify patients at risk of MACCE.

References:
Use of myocardial perfusion imaging in bariatric surgery patients

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Background: Bariatric surgery is the most effective treatment for morbid obesity, with increasing numbers reported as the burden of obesity increases. A significant proportion of this population have very poor exercise tolerance, making it difficult to evaluate their cardiovascular function with significant risk factors for cardiovascular disease being common. There are currently no guidelines or consensus for preoperative cardiovascular assessment and risk stratification beyond a 12-lead ECG.

Materials and Methods: We report our experience using myocardial perfusion imaging (MPI) to assess subclinical myocardial ischaemia in poorly mobile, high-risk patients. We identified a cohort of 100 patients who had a myocardial perfusion imaging for pre-operative evaluation during a 2 year period (Jun 2016 – Jun 2018). Patients had MPI if they were poorly mobile (<4 METS), had exertional dyspnoea, additional risk factors (e.g. diabetes, hypertension, smoking) and minor changes on resting ECG.

Results: 71 MPI scans were reassuring and 29 had inducible ischaemia. These 29 patients underwent further cardiac investigations i.e coronary angiogram or CT angiography. Significant stenoses were found in 11 patients and 3 had interventional revascularisation. Widespread atheromatous disease with no target lesions for revascularisation was the most common finding. Four patients were considered too high risk for surgery; the rest were optimised with medical therapy with subsequent uneventful surgery.

Discussion and Conclusion: Overall our cohort study suggests that previously unrecognised atherosclerosis of the coronary vasculature, of clinical relevance, is not uncommon in the high-risk bariatric patients, warranting either coronary revascularisation (~3%), cancelling of operations (~4%) or medical optimisation (~10%). MPI can be a useful, accessible, non-invasive and effective way of screening this population and can help to guide further management.

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Hand grip strength predicts postoperative day 1 mobility following Total Knee Arthroplasty

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Background: Handgrip strength (HGS) is a simple, quick bedside assessment that correlates with a patient’s physical fitness and frailty. HGS is an independent predictor of prolonged postoperative length of stay (LOS) in other surgeries, but its utility in total knee arthroplasty (TKA) has not been established. Early postoperative mobility is one of the key determinants for suitability for outpatient or short-stay TKA.

Questions/purposes: (1) What are the factors associated with a low HGS? (2) Is there an association between HGS and short-term outcomes such as mobilization on postoperative day 1 (POD1), hospital LOS and discharge destination?

Methods: This is a single-centre, prospective observational study. 385 patients undergoing elective total knee arthroplasty (TKA) were recruited. Preoperative HGS, demographic data, comorbidities, postoperative LOS, discharge destination and physiotherapy outcomes were recorded. Spearman correlation was performed to assess the correlation between HGS and demographic data. Mobility on POD1 was ranked in an ordinal likert scale from 1 to 10, with 1 being the best and 10 the worst, based on the gait aids and level of physiotherapist assistance required. HGS was categorized into gender-based quartiles. Multivariable logistic regression was performed to identify factors associated with better mobility (within the best mobility-rank quartile) on POD1, discharge to step-down facilities and hospital LOS ≤ 3 days (best quartile).

Results and Discussion: Majority of patients were discharged home (75.3%). Compared to patients in the lowest gender-based HGS quartile, patients in higher quartiles had higher odds of better mobility on POD1 (adjusted odds ratio (aOR) 2.4 - 3.5, P = 0.002 - 0.02). Patients with the best preoperative handgrip strength quartile had twice the odds (aOR 2.3, P = 0.01) of having a shorter hospital LOS (≤ 3 days), compared to patients in the lowest quartile. HGS was not independently associated with discharge to step down facilities. Taller, heavier, male patients were more likely to have higher HGS.

Conclusion: Preoperative HGS may be useful in predicting patients with better mobility on POD1 and shorter LOS after primary TKA.

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Validation of current risk indexes for prediction of cardiac and cerebrovascular events (MACCE) and myocardial injury (MINS) in a risk population in non-cardiac surgery

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Background and Goal of Study: Myocardial injury in non-cardiac surgery (MINS) is a new entity with short and long term prognostic implications. Several risk prediction scores for perioperative cardiovascular events have been described, some of them before the era of new cardiac biomarkers. The aim of the study was to validate current risk indexes for prediction of MACCE and its efficacy for prediction of MINS in a high-risk population.

Materials and Methods: Prospective, single centre cohort study (MINSMAR study) recruiting patients from May 2017 to May 2019. Eligible subjects were patients 45 years or older undergoing non-cardiac surgery: 1) high cardiac risk surgical procedures or 2) intermediate cardiac risk procedures in patients with clinical risk factors. All surgeries were elective and under general and/or neuraxial anaesthesia. Procedures or 2) intermediate cardiac risk procedures in patients with clinical risk factors. All surgeries were elective and under general and/or neuraxial anaesthesia. Patients had Troponin T (TnT) surveillance: baseline (after anaesthesia induction), and postoperatively at 3 hours, 1st, 2nd and 3rd day. Dependent variables were MINS and any MACCE until 30th postoperative day. MINS was defined as at least a Troponin value ≥ 30ng/L with a rise and/or fall +/- 20% regarding the baseline. We validated the Revised Cardiac Risk Index (RCRI), National Surgical Quality Improvement Program for Myocardial Infarction and Cardiac Arrest Calculator (NSQIP-MICA), ANESCARDIOCAT score and the Surgical Apgar Score (SAS). C-statistic was calculated for each score.

Results and Discussion: We recruited 746 patients, aged 72 (IQR 64-78) years, being 67% male. Patient comorbidities were: coronary artery disease 25%, heart failure 11%, diabetes with treatment 38%, peripheral artery disease 37%, previous stroke/TIA 18%, chronic kidney disease 23%. MACCE occurred in 78 patients (10.6%) and all-cause mortality was 2.6%. MINS occurred in 154 patients (20.6%). Results are shown in table.
Hypotension is a risk factor for adverse outcomes. The mean age of the participants was 63.78 ± 11.50. If asymptomatic and clinically stable, these patients may undergo anesthetic/surgical procedures without further studies. Avoidance of medications that may precipitate or induce bradycardia is essential. Postoperative should occur in differentiated care units with surveillance. Under these circumstances, awareness of which drugs can precipitate or induce bradycardia is imperative. The implementation of a specific protocol in the perioperative period is essential. Institutions allow optimization of perioperative care in these patients.

Discussion:
During the perioperative period, awareness of which drugs can precipitate or induce bradycardia is imperative. The implementation of a specific protocol in the perioperative period is essential. Institutions allow optimization of perioperative care in these patients.

Materials and Methods:
A multidisciplinar approach is essential in preparation for surgery. During the perioperative period, awareness of which drugs can precipitate or worsen ST-segment elevation and arrhythmias, and knowledge of how to manage this situation is imperative. The implementation of a specific protocol in the institutions allows optimization of perioperative care in these patients.

Bibliography:

Learning Points:
If asymptomatic and clinically stable, these patients may undergo anesthetic/surgical procedures without further studies. Avoidance of proarrhythmogenic factors and knowledge of specific pharmacological options are essential. Postoperative should occur in differentiated care units with surveillance for 36h or up to 5 half-lives of the drugs used.

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Preoperative transthoracic echocardiography predictive analytics using machine learning for postinduction hypotension prediction

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Background and Goal of Study: Hypotension is a risk factor for adverse perioperative outcomes. Machine-learning methods can process large amounts of data to develop robust predictive analytics. We hypothesized that machine-learning methods can help predict the risk of postinduction hypotension.

Materials and Methods: Data were extracted from the electronic health record of a single quaternary care center between April 2014 and September 2019 for patients aged ≥15 years who underwent general anesthesia, without catecholamine use and intubated cases. Multiple supervised machine-learning classification techniques were used, with postinduction hypotension (mean arterial pressure < 55 mmHg from intubation to the start of procedure) as the primary outcome and 95 transthoracic echocardiography measurements as factors influencing the primary outcome. We used 10-fold cross-validation with the training set (70%) to select the optimal hyperparameters and architecture based on the mean cross-validation performance. These optimal hyperparameters and architecture were assessed using a separate test set (30%).

Results and Discussion: Of 1958 patients, 640 (34%) had postinduction hypotension. Area under the receiver operating characteristic curve using deep neural network was 0.57 (95% CI 0.51–0.63), gradient boosting machine was 0.55 (95% CI 0.49–0.61), random forest was 0.54 (95% CI 0.47–0.60), naive bayes was 0.55 (95% CI 0.49–0.61), support vector machine was 0.52 (95% CI 0.46–0.59), and logistic regression was 0.56 (95% CI 0.50–0.62). Important factors influencing hypotension were left ventricular diastolic diameter, end diastolic volume, atrial echo, e’ wave, s wave, and ascending aortic diameter.

Conclusion: This technique was successful in predicting postinduction hypotension, demonstrating the feasibility of using machine-learning models for predictive analytics in preoperative assessments, with performance dependent on model selection and appropriate tuning.

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New-onset atrial fibrillation in non-cardiac operations: prevalence, recurrent rate and long-term MACE (POAF-NCS Study)

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Background and Goal of Study: Post-operative new-onset atrial fibrillation (POAF) is common after cardiothoracic surgery but not much has been studied about its occurrence after non cardiothoracic surgery. This study was conducted to examine the risk factors for the appearance of POAF, treatment strategy and onset of abnormal cardiovascular events (MACE) in the short and long term.

Materials and Methods: This is a retrospective cohort study that was conducted in Emek medical center, Afula, Israel. The study population consists of patients hospitalized in eight surgical wards from January 1, 2014 to the end of December 2018. Patients who met the inclusion criteria were divided based on the occurrence of POAF. Data was collected in accordance with International Diagnostic Code 10-ICD.

Results and Discussion: The mean age of the participants was 63.78 ± 11.50. The mean BMI of the participants was 28.89 ± 7.31. 67.1% of the participants were males. Smoking, CVA, diabetes, hypertension, hyperlipidemia, vascular dx, valvular dx, CHF and COPD were present in 23.1%, 20%, 69.2%, 36.9%, 55.4%, 30.8%, 20.0%, 7.7% and 9.2% of the patients. New onset of atrial fibrillation after non-cardiac surgery was significantly low compared to known cardiac related surgery (0.002 vs 0.287, p<0.001). From patients diagnosed with NOAF, prevalence was higher in general surgery ward (58.46%) and following laparotomy (36.92%). 60% of patients with NOAF were operated due to an acute situation. 29.23% of the patients were subjected to postoperative use. 60% of patients received rhythm control drug to control AF. Average length of hospitalization was 24 days. Rate of MACE at 1 year was 24.62%. Death at the same hospital stay was seen at 20% of patients. There was no significant association between occurrence of MACE and gender. For patients postoperative use, 22% experienced renal failure and 30.8% had various medical complications.

Conclusion: Although NSQIP-MICA showed the best predictive performance in our at-risk population, statistics showed only moderate discriminative ability. A new risk index is needed to better stratify cardiac risk patients and those who need troponin surveillance.
Bioreactance for fluid therapy guidance in the postoperative period of major abdominal surgery

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Background and Goal of Study: TFC (Thoracic Fluid Content) is a variable that provides Cheetah bioreactance cardiac output monitor, whose value has been studied in patients undergoing hemodialysis, finding a good correlation between changes in TFC and the volume extracted to patients with chronic renal failure undergoing hemodialysis. Our objective was to demonstrate that the variation of TFC in the first 24 h correlated with the postoperative water balance, and could be useful to guide fluid therapy during the postoperative period.

Materials and Methods: A prospective observational study was conducted with 50 patients undergoing scheduled abdominal surgery with a minimum admission of 24 h in Resuscitation. Patients were monitored with Cheetah monitor from before anesthetic induction and for 24 h. The monitor data were collected at different stages of the perioperative period. Intra and postoperative information, such as water balance and complications, were collected. Data were analyzed using IBM SPSS Statistics program, applying Pearson and T-Student parametric tests.

Results and Discussion: Water balance in the first 24 h showed a correlation (r=0.437, p=0.002) with the variation in the value of TFC the morning after surgery, coinciding with our hypothesis that TFC increases as the balance becomes more positive. We observed a statistically significant difference (p=0.05) between the mean of the variations of TFC in the first 24 h after surgery and the presence of respiratory complications during admission, being 28.99% (SD:15.43) in those who did not present complications of this type and 40.98% (SD:13.77) in those who did.

Prevalence of anaemia and iron deficiency in patients undergoing Radical Cystectomy and the role of intravenous iron therapy on postoperative haemoglobin levels within an enhanced recovery after surgery programme

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Background and Goal of Study: Perioperative anaemia in relation to major surgery is associated with adverse clinical outcomes. Iron deficiency (ID) is the most common cause of anaemia worldwide and intravenous (IV) iron therapy is increasingly used to treat ID. The goal of this study was to determine the prevalence of anaemia in patients undergoing radical cystectomy (RC) within an ERAS protocol, evaluate the accurate management of iron deficiency and inquire into whether IV iron treatment initiated perioperatively improves haemoglobin levels (Hb).

Methods: This study included 147 consecutive patients enrolled in an ERAS protocol, each of whom underwent RC from December 2016 to November 2019. Anaemia was defined using the current World Health Organization criteria. We stratified non anaemic and anaemic patients into iron deficient and iron replete groups and if they were treated with IV iron. We study the changes in Hb levels immediately before surgery, minimal Hb during the postoperative period, at the time of hospital discharge and 30 days after hospital discharge. Mann-whitney U test and Fisher exact test were used to compare quantitative and qualitative variables respectively.

Results: Thirty one percent of total patients had anaemia, of which 47.6% had iron deficiency and 29.8% had normal serum ferritin (p=0.035).

The effect of perioperative fluid balance on 30-day morbidity in women undergoing major surgery for advanced ovarian cancer

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Background and Goal of Study: Women undergoing cytoreductive surgery (CRS) for advanced stage epithelial ovarian cancer are susceptible to major fluid shifts during surgery which may increase risk for perioperative complications and prolonged hospital stay (1). Our objective was to determine the association between perioperative fluid balance and postoperative morbidity assessed by Clavien-Dindo classification (CDC) within 30 days after CRS.

Materials and Methods: This was an observational study from prospectively collected data and included patients who underwent CRS 2014-2016 at Karolinska University Hospital, Sweden. Women subjected for epithelial cancer were identified in an institutional database, variables were extracted from the database and electronic medical records of patients. Linear regression with 95% confidence intervals was used to study the association between 0.48 h perioperative fluid balance and CDC grade. Postoperative complications within 30 days were recorded.

Results and Discussion: A total of 270 women were registered in the database and a total of 184 patients were finally analysed. There was no significant association
between 0-48h fluid balance and postoperative morbidity according to CDC in the crude analysis (p=0.34) or in the multivariable adjusted analysis (p=0.08). There was a significant association between fluid balance 24-48 h and postoperative morbidity according to CDC (p=0.0195) after multivariable adjustment. There were 135 patients (73.4%) with postoperative complications (CDC grade ≥ 1). Forty patients (21.7%) had postoperative complications classified as Grade ≥ 3. Excess fluid load was associated with longer hospital stay but it did not delay start of chemotherapy.

Conclusion: Although 0-48 h perioperative fluid balance was not associated with an increased 30-day postoperative morbidity, excessive fluids administered during 24-48 h postoperatively had a clear relationship with morbidity. Patients should be carefully monitored, and fluid overload avoided, specifically during 24-48 h.

References:

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Prophylactic penehyclidine inhalation reduces postoperative pulmonary complications in high-risk patients: A double-blind randomized controlled trial

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Background and Goal of Study: Postoperative pulmonary complications (PPCs) is common in high-risk patients and is associated with worse outcomes. Inhaled muscarinic antagonists are the first line treatment for chronic obstructive pulmonary disease and have been used to prevent PPCs in these patients. We investigated whether prophylactic penehyclidine inhalation, a long-acting selective M1- and M3-receptor antagonist, could safely decrease the incidence of PPCs in high-risk patients.

Materials and Methods: This randomized, double-blind, placebo-controlled trial was conducted in a tertiary hospital in Beijing, China. We enrolled patients aged 50 years or older who were scheduled to undergo major upper abdominal or noncardiac thoracic surgery (≥2 hours) and had an expected ARISCAT risk score ≥25. Patients were randomly assigned to receive prophylactic inhalation of either penehyclidine or placebo from the night before surgery until the second day after surgery, in an interval of every 12 hours. The primary outcome was the incidence of PPCs within 30 days. Analyses were done by intention-to-treat and safety populations.

Results: Between Sept 1, 2015 and Dec 10, 2018, 864 patients were recruited and randomly assigned to receive penehyclidine (n=432) or placebo (n=432). Of these, 626 completed the study and were included in the final analysis. The incidence of PPCs was significantly lower in the penehyclidine group (18.9% [79/417]) than in the placebo group (26.4% [108/409]; odds ratio[OR] 0.651, 95% CI 0.469-0.905, P=0.010). Among the secondary outcomes, the incidence of bronchospasm was also lower in the penehyclidine group than in the placebo group (1.4% [5/417] vs. 4.4% [18/409]; 0.317, 0.125-0.807, P=0.016). Regarding safety, the incidence of high airway pressure during anesthesia (peak airway pressure >40 cmH2O) was also lower in the penehyclidine group than in the placebo group (26.4% [18/409]; 0.651, 0.469-0.905, P=0.010). Occurrence of delirium did not differ between groups.

Conclusions: For high-risk patients undergoing major upper abdominal or noncardiac thoracic surgery, prophylactic penehyclidine inhalation significantly reduces the incidence of PPCs. The therapy is safe.

Trial Registration: Chinese Clinical Trial Registry (www.chictr.org.cn, ChiCTR-IPC-15006603); ClinicalTrials.gov (NCT02644876).

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Do blood lactate levels differ between cancer and non-cancer patients undergoing elective non-cardiac surgery?

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Background and Goal of Study: Tissue lactate levels tend to be elevated in cancer patients due to the Warburg effect.1 Moreover, increased lactate levels were shown to be associated with high morbidity and mortality in critically ill patients.2 Blood lactate levels have also been used to risk stratify patients in order to determine prognosis and administer appropriate treatment.3 However, there is currently little evidence regarding the association between cancer and blood lactate levels. The aim of this study was to investigate a possible relationship between cancer and intraoperative blood lactate levels, by comparing arterial blood lactate levels between cancer and non-cancer patients.

Materials and Methods: We retrospectively review medical records of 80 adult cancer (n=80) and non-cancer (n=90) patients who underwent elective non-cardiac major abdominal surgery at our institution between April 2018 and December 2019. Collected data included demographics, ASA PS classification, the type of procedure performed, and the value of arterial blood lactate levels. Multivariate logistic regression was performed to investigate a possible association between cancer and elevated blood lactate levels.

Results and Discussion: Both cancer and non-cancer patients were stratified to normal (≤1.6 mmol/L) and high (>1.6 mmol/L) lactate levels. Without adjustment for demographics, there was no statistically significant association between blood lactate levels and cancer status for either the normal or high lactate categories. The odds ratio of having a higher lactate level for cancer patients was 0.975 (95% CI: 0.703-1.408) times that of non-cancer patients (p=0.977). After adjusting for patient sex, age, and ASA, the adjusted odds of having a higher lactate level for cancer patients was 1.076 (95% CI: 0.754-1.534) times that of non-cancer patients (p=0.688).

Conclusions: Our data did not show statistically significant higher blood lactate levels in cancer patients. Limitations to our study included a limited sample size, and the absence of co-morbidity analysis.

References:

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Postoperative opioid consumption after radical retropubic prostatectomy comparing two different intraoperative analgesic treatment protocols

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Background and Goal of Study: For open radical retropubic prostatectomy (RRP) over many years spinal anaesthesia (SPA) was combined with general anaesthesia (GA) to decrease immediate postoperative pain compared to GA alone. Nevertheless, there is a lack of evidence for an optimal pain management protocol for RRP. We aimed to re-evaluate existing postoperative pain treatment protocols for quality improvement and investigate influencing factors.

Materials and Methods: This study compared 318 consecutive patients in the SPA group (SPA with isobaric bupivacaine 0.5% preceding GA) with 318 patients in the GA only group regarding postoperative pain and opioid consumption in a single-centre retrospective chart review. The regional ethics committee of the Medical Council Hamburg, Hamburg, Germany waived the requirements for ethical approval on July 11th, 2017 because the study only involved a chart review and data collection included de-identified patient records (ERB reference number: WF-04017)). The primary endpoint of the study was opioid (piritramide) consumption in the post-anaesthesia care unit (PACU). Differences between the groups were analysed by a two-sided t-test. The influence of the study group and possible confounders on postoperative piritramide consumption were evaluated with a general linear model.

Results and Discussion: The mean piritramide administration was 1.9 mg higher in the SPA group (95% CI: [0.8: 3.1], P= 0.001) than in the GA group. The general linear model revealed next to the study group only age as an influencing factor with a decreased opioid amount of 1.5 mg per 10-year increase in the patient’s age (95% CI: -2.3 to -0.7), P<0.001. Post-operative pain levels did not differ significantly between the groups. Thus, the addition of spinal anaesthesia to general anaesthesia with a local anaesthetic but without intrathecal opioid administration
does not appear to be advantageous in RRP to decrease immediate post-operative pain.

Conclusion: Spinal anaesthesia in addition to general anaesthesia for RRP was associated with higher opioid consumption in the PACU compared to general anaesthesia alone to achieve a comparable postoperative pain level. Post-operative opioid consumption decreased with the patient’s age.

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**Forced warm air blanket attenuate redistribution hypothermia during induction of general anaesthesia**

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**Background and Goal of Study:** Redistribution hypothermia is recently smaller than before, because some devices are used to warm patients during induction of general anaesthesia. However, there is no research investigating the impact of forced warm air blanket on developing redistribution hypothermia. Measurement of core temperature used to be difficult during induction, because thermal probes could not be placed in nose, rectum or bladder. New thermometer (3M SpotOnTM) placed on skin surface can measure core temperature. It is possible to start measuring core temperature before induction of general anaesthesia. The aim of our research is to measure magnitude of redistribution hypothermia during induction of general anaesthesia, while patients are warmed with forced air blanket.

**Method:** We conducted prospective observational study. We measured core temperature using thermometer placed on skin surface in patients undergoing general anaesthesia. The thermometer was placed on patient’s neck just after arriving at operation room. The room temperature was set at 26°C. Patients were warmed with 40°C forced air blanket during the induction. The temperature was recorded on anesthesia record. We investigated the association between the magnitude of hypothermia and patients’ characteristics using multivariate regression models.

**Results:** We obtained body temperature data from 19 patients. Three patients were excluded because baseline temperature was not recorded. The body temperature significantly decreased during induction of general anaesthesia (baseline: 36.47 ± 0.59°C; lowest: 36.18 ± 0.34°C; p<0.012). The lowest temperature was recorded at 39.1 ± 9.9 min after the induction. Mean magnitude of hypothermia was only 0.29 ± 0.40°C. The magnitude was not statistically related to patients’ age, sex, body weight, or BMI.

**Discussion:** Patients’ body temperature decreased during induction of general anaesthesia. However, the magnitude of hypothermia was not as large as reported decades ago, that was 1 to 2°C (1). Conclusion: Mean magnitude of redistribution hypothermia was only 0.29 ± 0.40°C. Forced warm air blanket can attenuate redistribution hypothermia during induction of general anaesthesia.

Reference:  

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**A cohort study into intravenous drug provocation tests in perioperative allergy**

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**Background and Goal of Study:** Perioperative allergic reactions are rare, yet dangerous complications of anesthesia. Contemporary, skin testing (ST) is the most prevailing diagnostic in perioperative hypersensitivity reactions. However, STs are known to give false positive and false negative results. Therefore, intravenous (IV) drug provocation tests (DPTs) may deserve a more prominent place in perioperative allergy diagnostics. The goal of this study was to investigate the value of IV DPT testing in perioperative allergy diagnostics.

**Materials and Methods:** We conducted a cohort study of 27 patients, referred to our Dutch Perioperative Allergy Center (DPC) for assessing the culprit of perioperative allergic reactions from 2016 to 2019. All patients were subjected to a full allergological investigation including STs (skin prick tests and intradermal testing) and DPTs. The primary outcome measures were the culprit agent and discrepancies between STs and DPTs.

**Results and Discussion:** With the aid of DPT, a culprit was identified in 12 cases (44%). In 11 cases (41%) no perioperative used agent could be determined as the culprit or an alternative perioperative diagnosis was deemed more likely, 4 patients (14%) retreated from the diagnostic process. Discrepancies between the outcomes of STs and DPTs are displayed in Table 1. In 7/27 (26%) patients, negative STs were followed by a positive DPT, whereas in 4/27 (15%) positive STs were followed by negative DPTs. Hence, over 40% of our patients would have received a false diagnosis based on STs alone.

**Table 1:** Discrepancies between STs and DPTs

<table>
<thead>
<tr>
<th>Patient</th>
<th>Per-operative reaction</th>
<th>Agent</th>
<th>ST</th>
<th>IDT</th>
<th>Provocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 4</td>
<td>Anaphylaxis</td>
<td>Metamitrid</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 6</td>
<td>Generalized urticaria</td>
<td>Cefixin</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 7</td>
<td>Anaphylaxis</td>
<td>Cefadroxil</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 10</td>
<td>Nausea post-operative</td>
<td>Rosuvastatin</td>
<td>Negative</td>
<td>Negative</td>
<td>Antigenous</td>
</tr>
<tr>
<td>Patient 18</td>
<td>Urticaria / angioedema</td>
<td>Morphine</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 22</td>
<td>Anaphylaxis</td>
<td>Metamitrid</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 25</td>
<td>Anaphylaxis</td>
<td>Metamitrid</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 16</td>
<td>Anaphylaxis</td>
<td>Metamitrid</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 27</td>
<td>Non-generalized urticaria</td>
<td>Morphine</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
</tbody>
</table>

**Conclusion:** In our cohort, intravenous drug provocation tests proved to be of added value in perioperative drug allergy diagnostics. Solely performing skin tests for suspected perioperative allergy may lead to patients being re-exposed to the culprit drug or false allergy labels. Intravenous drug provocation tests for perioperative allergy are safe, provided that they are performed in a monitored setting with appropriate supervision from an anaesthesiologist.

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**Incidence of suspected perioperative hypersensitivity reactions in an Egyptian population**

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**Background and Goal of Study:** Epidemiological studies of perioperative hypersensitivity reactions have estimated the incidence to be between 1:353 and 1:1,000, with clear geographical variability. Our aim was to estimate the incidence of suspected perioperative hypersensitivity reactions in an Egyptian population.

**Materials and Methods:** Our methodology followed that of a multicentre snapshot study in the UK although this is a single centre study. Data were collected through a questionnaire completed by the responsible anaesthetist after each elective list in Assiut University Hospital over a 12 week period. We were asked to document the number of patients who had received general anaesthesia on the list and the number of those patients who had developed any of the following signs: unexpected unexplained hypotension, unexpected unexplained bronchospasm, angioedema, urticaria, widespread erythema or cardiac arrest. They were also asked their opinion on any likely culprit agent.

**Results and Discussion:** Data were collected from 1,092 general anaesthetics involving 16 different subspecialties, with 34 cases meeting our inclusion criteria. Widespread erythema was the most common presentation (n=26, 76%) while there were 4 cardiac arrest. Unexpected unexplained hypotension or bronchospasm were reported in 3 (8.8%) and 2 (5.8%) cases respectively. Urticaria was noted in 9 cases while angioedema was reported in only 2 cases. The reactions were graded according to the Ring and Messner scale3 (fig 1): 28 were Grade 1 (skin manifestations only) and many of these may represent non-allergic reactions (atracurium was the implicated culprit agent in 18 cases). There were 3 cases of Grade 3 (life-threatening hypotension and/or bronchospasm) or 4 (cardiac arrest) severity.

**Conclusion:** Even when excluding cases where erythema was the only feature there were 1:136 patients who met the inclusion criteria, which compares with 1:353 in the UK study with comparable criteria. The incidence of suspected anaphylaxis (Grade 3 or 4) was also high at 1:364 (95% CI: 1:115 – 1:111). We emphasise that these cases do not have a confirmed diagnosis and further work is required.

**References:**  
Non-intubated VATS under Thoracic Epidural Analgesia, Propofol, and Dexmedetomidine: an Opioid Sparing Anesthesia

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Background: The anesthesia of non-intubated video-assisted thoracic surgery (VATS) is composed of sedation and regional analgesia. Dexmedetomidine is an α2 agonist with effects of anti-anxiety, sedation, analgesia and less respiratory depression than Propofol. The application of Dexmedetomidine may reduce intra- and postoperative opioid consumption.

Materials and Methods: The data of this retrospective study was reviewed from patients treated with non-intubated VATS lung wedge resection with Propofol combined with opioid (Group A, n = 18) compared to Propofol combined with Dexmedetomidine (Group B, n = 12) between Jan. and Nov. 2019. Transnasal humidified rapid-insufflation ventilatory exchange was used in both groups to provide adequate oxygenation, prevent hypocapnia and acidosis which were usually occurred during non-intubated VATS. Thoracic epidural analgesia or paravertebral block was applied for intraoperative pain control. Alfentanil was administered through intravenous bolus to reduce respiratory rate and enhance sedation. Statistical analysis was performed using SPSS 17.0, Mann–Whitney U test and Pearson’s chi-squared test.

Results and Discussion: There are no significantly difference between two groups in all patient characteristics. Group B had significantly lower intraoperative CO2 retention (22.1 mg ± 27.6 vs 122.1 mg ± 112.8, p < 0.05) and postoperative average opioid consumption (1.9 vs 122.1 mg ± 112.8, p < 0.05) and postoperative average opioid consumption (1.9 mg ± 2.6 vs 1.3 mg ± 2.1) than Group A. The average postoperative chest tube retention time was shorter in group B (0.8 days ± 1.5 vs 1.1 days ± 1) (Figure 1). In addition, intraoperative CO2 retention status, surgical duration, the number of patients converting to thoracotomy, complications and perioperative mortality were similar in both groups.

Figure 1

Intraoperative and Postoperative Cardiac Output on Thoracic Epidural Analgesia

Statistical analysis showed Dexmedetomidine may be beneficial to opioid sparing for non-intubated VATS with TIVA, due to mechanism of α2 agonist related analgesia.

Conclusion: Opioid sparing and multimodal analgesia are essential components of ERAS protocols. Dexmedetomidine use in non-intubated VATS with TIVA is not only effective in achieving perioperative opioid-free analgesia, but also noninferior to Propofol in anesthesia quality.
phase in °C was 34.8±0.96, 36.3±0.93, 37.07±0.76 and 37.02±1.32 at 10 min, 30 min, 60 min and 90 min of HIPEC respectively. Mean lactate level during CRS phase and HIPEC phase are 2.65±1.74 mmol/L and 5.90±1.44 mmol/L respectively. In the post-operative period, 6.4%(7), 62.7%(89) and 18.2%(20), of patients were extubated in operating room, postoperative day (POD) 1, and POD 2 respectively. Median ICU stay was 3 days (range from 1 to 52 days). 25.5%(28) patients were re-admitted in ICU. 3.6%(4) patients were re-explored within 30 days. 30 and 90-day mortality was 2.7% and 5.5% respectively.

Conclusion: CRS-HIPEC is complex procedure and require intensive monitoring in perioperative period and leads to higher morbidity and mortality in postoperative period.

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Value of HbA1C in predicting outcomes in cardiac surgery in Asian Population

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Background and Goal of Study: About 30% of patients undergoing cardiac surgery has diabetes mellitus(DM)[1], and glycated hemoglobin (HbA1C) is an indicator of glycemic control. It is well established poorly controlled diabetes is associated with worse outcomes in general surgical populations. The aim of our study is to look for the predictive value of pre-operative HbA1C for post operative complications undergoing elective cardiac surgery in Asian population.

Materials and Methods: A retrospective review of patients undergoing cardiac surgery in a tertiary hospital between 2016 and 2018 was done. Ethics approval was obtained from Institutional Review Board. Patients were included if they had their HbA1C taken within 1 month of surgery. Other peri-operative data and post operative complications were collected. Patients were divided into 3 groups for analysis, HbA1C<6.5%, HbA1C 6.5 - 8.0% and HbA1C>8.0%. Multivariate logistical regression models were used where appropriate for the statistical analysis.

Results and Discussion: A total of 1339 patients were included, 977 patients met the inclusion criteria. The overall prevalence of DM was 364/977(37.3%) with 24(2.5%) newly diagnosed DM(A1C<6.5%). In total, 217/977(22.2%) had HbA1C 6.5-8.0% and 147/977(15.1%) HbA1C>8.0%. Table 1 shows the association between the groups and post operative complications. A preoperative HbA1C value of >8.0% is a positive predictor of renal complications (Adjusted HR(95% Cl) 1.63(0.08-0.90), p=0.020), but a negative predictor of cardiac complications in multivariate analysis corrected for type of surgery, HbA1C<6.5%, HbA1C 6.5 - 8.0% and HbA1C>8.0%. Multivariate logistical regression models were used where appropriate for the statistical analysis.

Conclusion: Higher preoperative HbA1C of >8.0% is predictive of post operative renal complications, but does not correlate well with other complications such as infections and re-operations. Further subgroup analysis with larger sample size may be useful to isolate specific group of patients that may benefit from postponing operation until better DM control is achieved.

References:

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Assessment of estimated blood loss during surgery

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Background and Goal of Study: Estimating intraoperative blood loss is one of the major concerns of anesthesiologists and surgeons during surgery. This is because estimated blood loss (EBL) is arguably the most important factor when planning out fluid management for intraoperative hemodynamic stability. In addition, the decision to administer blood products is largely based on visual EBL and clinical signs. However, there is a lack of a standardized method to measure the amount of intraoperative blood loss. The purpose of this study is to find an accurate way of measuring the exact amount of blood loss during surgery.

Materials and Methods: This study was approved by the Institutional Animal Care & Use Committee (IACUC) of Korea University College of Medicine (KOREA-2019-0045). Three YLD crossbred pigs weighing 30-40kg were used in this study. Two sets of experiments were conducted on 500ml of blood taken from the pigs. A total volume of 50ml was used in the experiment through mixing the blood sample with normal saline and diluting the blood concentration to 0%, 25%, 50%, 75% and 100%. Each blood concentration groups were then measured in terms of weight, optical density, and electrical resistance.

Results and Discussion: There were no significant differences in weight among the groups according to blood concentration. The optical density was significantly higher in blood concentration 25% than 0% (Fig.1). Electrical resistance was respectively 4.61±0.03, 4.67±0.04, 4.68±0.02, 4.63±0.03, and 4.61±0.05 at blood concentrations 0%, 25%, 50%, 75%, and 100%. There was a statistically significant difference (P = 0.04). We found an inversely proportional relationship between blood concentration and electrical density.

Conclusion: With the results of our findings, EBL may be more accurately estimated by measuring the total weight and electrical density of the intraoperative blood accumulated in the suction containers.
Neutrophil-lymphocyte ratio as predictor for the outcome of postoperative cognitive function in patients undergoing elective non-cardiac surgery

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Background and Goal of Study: Perioperative inflammatory response seems to play a major role in the pathogenesis of postoperative cognitive dysfunction (POCD). This study investigated the association of neutrophil to lymphocyte ratio (NLR) with the incidence of POCD in patients undergoing elective non-cardiac surgery.

Materials and Methods: The study included 162 consecutive patients undergoing elective non-cardiac surgery, under general anaesthesia with inhaled anaesthetic.

Results and Discussion: At 24 hours, 10 days, and 3, 6 and 9 months postoperatively, statistical analysis of the acquired data was performed with Stata 14.1 software (StataCorp, College Station, TX).

NLR was measured pre- and postoperatively at 24 hours and the cognitive function was assessed preoperatively and at 10 days, 3, 6 and 9 months postoperatively.

Conclusions: Perioperative inflammatory response as measured by NLR may be a useful prognostic factor for the outcome of short-term and long-term POCD in patients undergoing elective non-cardiac surgery.

Acute ischemic crisis of Raynaud phenomenon induced by terlipressine in a patient with scleroderma

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Background: Raynaud's phenomenon secondary to scleroderma can quickly progress to catastrophic ischemic events. Determining causes of a Raynaud's crisis can be difficult during an emergency, because local vasospasm and/or more widespread vascular disease can trigger the event. The efficacy of therapies varies widely. We report a case of a severe Raynaud phenomenon secondary to terlipressine therapy.

Case Report: A 57-year-old woman came to the emergency room with a history of cutaneous scleroderma, Raynaud disease and auto-imune hepatic cirrhosis with portal hypertension, classified as Child-Pugh A. She presented with upper digestive tract bleeding associated with hemodynamic instability. The patient was submitted to urgent upper digestive endoscopy (UDE) on the operation room which revealed acute active hemorrhage from esophageal varices, which were ligated and the procedure was uneventful. One hour after the first administration of intravenous terlipressine she developed bradycardia, hypertension and severe acute rest crisis. One day after the procedure was uneventful. One hour after the first administration of intravenous terlipressine, she presented bradycardia, hypertension and severe acute rest crisis. The patient was submitted to urgent upper digestive endoscopy (UDE) on the operation room which revealed acute active hemorrhage from esophageal varices, which were ligated and the procedure was uneventful. One hour after the first administration of intravenous terlipressine she developed bradycardia, hypertension and severe acute rest crisis. After the second administration of terlipressine she developed the same clinical picture. We assumed a Raynaud crisis triggered by terlipressine and it was decided to do a therapeutic switch to octradiate. There were no more recurrences of Raynaud phenomenon and the patient was transferred to Intermediate Care Unit for surveillance and continuation of therapy.

Discussion: For patients with mild vasopressive attacks, avoiding agents that can cause peripheral vasoconstriction is essential. Terlipressine has a possible toxic effect related to its vasoconstrictor action and has been associated with peripheral ischaemia and vasculitis-like lesions, like the ones observed in this case.

References:

Learning points: Acknowledge terlipressine side effects, contraindication and the importance of prevention and adequate treatment of acute ischemic crisis of Raynaud phenomenon induced by terlipressine.

Anesthesia for bilateral diaphragmatic paralysis - What we do not know?

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Background: Bilateral diaphragmatic paralysis is an uncommon cause of dyspnea which may lead to severe morbidity. Multiple etiologies are recognized as possible causes of diaphragmatic paralysis.1 However, even after an appropriate etiologic study, the causal factor may remain undetermined. We report the perioperative and anesthetic approach of this rare but very significant disorder.

Case Report: A 57-year-old man diagnosed with bilateral diaphragmatic paralysis was proposed to laparoscopic radical prostatectomy. He had no history of trauma, neurologic or neuromuscular disorder that could justify diaphragmatic weakness. Non-operative support followed by bilateral diaphragm paralgesis and anesthetic assessment was made two months before surgery. As part of preoperative otimization, we ensured patient total compliance to non invasive ventilation (NIV) and supine position tolerability with acceptable oxygen saturation (>90%). During induction of anesthesia an adequate pre-oxygenation was accomplished, without difficulties in ventilation throughout the course of procedure. In the extubation period, patient’s trunk was elevated and maintenance of adequate ventilatory volumes was ensured. In recovery room, NIV was used to achieve good oxygen saturation in supine position. He was discharged after two hours of surveillance.

Discussion: Bilateral diaphragmatic paralysis can occur in the course of several diseases, being usually a serious or life-threatening condition. As anesthesiologists we should be alert to some characteristic signs - unexplained dyspnea that worsens in the supine position and abdominal paradox ventilation should not be overlooked. Elevation of diaphragmatic domes, decreased pulmonary volume and bibasal atelectasis in chest radiograph, together with moderate/severe restrictive pattern in respiratory functional tests are complementary features that can help diagnosis. Eletromiography may help distinguish between neuropathic and myopathic causes. Ventilatory support is the basis of treatment of this disease and a good compliance can attenuate symptoms and play a key role in the recovery process.

References:

Learning points: This case report highlights that with proper perioperative management and otimization, patients with incomplete diaphragmatic function can recover uneventfully following general anesthesia.

Uterine Parangangioma: A multidisciplinary challenge

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Background: Parangangiomas are rare neuroendocrine tumours with extra-adrenal location. Due to catecholamine production, manifest frequently with hypertension and tachycardia. If symptomatic, surgery is the gold standard treatment, which can be challenging for anaesthesiologists. (1)

Case report: A 48-year-old woman, ASA III, proposed for hysterectomy due to suspicion of uterine parangangioma. Patient presented with hypertension paroxysms, hypotension, headache, shivering and palpitations. Analytical study found a blood level dopamine 37-fold above normal and uterine uptake in F-Dopa PET scan. It was initiated α and β blockers treatment a month before surgery. The surgery was performed under a balanced general anaesthesia with orotracheal intubation (OTI). Presenting an hypertensive profile after beginning of surgery, norepinephrine infusion was started. In the absence of other complications, she was extubated and transferred to PACU with suspension of perfusions and α and β blocker, remaining hemodynamically stable and asymptomatic till discharge.

Discussion: The approach to parangangioma resection must be multidisciplinary. The endocrinologist must carefully titrate α and β blockers therapy, minimizing the impact of catecholamine production. Anaesthesiologists have an essential role to maintain intraoperative hemodynamic stability, since anaesthesia induction and parangangioma manipulation can bring serious hemodynamic consequences. In the same way, the best surgical technique should be discussed involving all team members.(2,3)
Learning points: Preoperative evaluation of patients with paraganglioma is extremely indispensable. Simultaneously, a meticulous anaesthetic plan and a careful management patient’s hemodynamic contribute to a successful approach.

References:

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The use of atropine or glycopyrronium is not associated with a higher incidence of postoperative urinary retention

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Background and Goal of Study: Atropine and glycopyrronium are common anticholinergic agents used in general anesthesia. They are also associated with postoperative urinary retention (POUR). The aim of this study was to determine whether the specific agent or the dose may increase the incidence of POUR.

Materials and Methods: From January to June 2019, patients 50 – 80 years of age who underwent elective endoscopic functional sinus surgery or parotidectomy were recruited. POUR requiring urethral catheterization was recorded during postoperative visits. The association between the use of atropine or glycopyrronium and POUR was measured using bivariate analysis. Predictors of POUR were measured using a logistic regression model adjusting for the use of anticholinergic agents.

Results and Discussion: A total of 96 patients were included in this study, with a mean age of 61.4 ± 6.8 yr. Atropine was used in 25 patients (27%), and glycopyrronium was used in 88 patients (91%). POUR was found in 7 patients (7%). The use of specific anticholinergic agents or the accumulated doses were not associated with POUR. In multivariate analysis, neither age, surgical duration, the dose of atropine, the dose of glycopyrronium, nor the dose of intravenous fluid was found to be an independent factor of POUR.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Odds Ratio</th>
<th>p</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.067</td>
<td>0.002</td>
<td>1.252</td>
</tr>
<tr>
<td>Surgical duration</td>
<td>0.800</td>
<td>0.795</td>
<td>1.025</td>
</tr>
<tr>
<td>The dose of atropine</td>
<td>0.707</td>
<td>0.716</td>
<td>0.747</td>
</tr>
<tr>
<td>The dose of glycopyrronium</td>
<td>0.154</td>
<td>0.001</td>
<td>0.154</td>
</tr>
<tr>
<td>Intravenous fluid</td>
<td>1.001</td>
<td>0.345</td>
<td>0.008 - 0.0006</td>
</tr>
</tbody>
</table>

Table 1. Multivariate analysis of potential risk factors associated with postoperative urinary retention

Conclusion: The use of specific anticholinergic agents and the accumulated doses of these clinical practice were not associated with POUR. Larger prospective studies may be necessary to confirm the results.

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Time and cost savings from standardization and simplification of anesthesia methods for the vertebral fusion surgery

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Background: Routine surgery by fixed surgical teams can form higher medical safety through the sharing of each practice. We examined whether standardized anesthesia management would contribute to the reduction of the occupation time and medical cost.

Methods: From April 2016 to July 2019, we performed the thoracolumbar spinal fusion (posterior lateral fusion: PLF, posterior interbody fusion: PLIF, transforaminal approach interbody fusion: TLIF) in 122 cases. Among them, 59 patients (Post group) was received perioperative anesthesia management based on a unified protocol, while 63 patients (Pre group) were administered the standard control. The protocol was included safe airway management and posture changes, early recovery from general anesthesia, improvement of post-surgical analgesia, and post-surgical nausea and vomiting. The data were assessed with the Mann-Whitney U test and a significantly different with p<0.05. Besides, the operation theatre occupation time was evaluated with ANCOVA.

Results: There was no significant difference in preoperative background factors in each patient group. The Post group stayed shorter in the operating room (300 min vs. 280 min: p < 0.001), and ANCOVA showed the corrected occupation time was shorter in the Post group (p < 0.001) and no interaction between the surgery time and occupation time (p=0.83). The Post group was shorter in the time from the induction to posture change (from prone to prone position) (20 min vs. 10 min: p < 0.001), shorter in time from posture change (from prone to supine position) to extubation (20 minutes vs. 9 minutes: p < 0.001). Anesthesia drug costs (206€ vs. 139€, p < 0.001) were significantly smaller in the Post group. Post group patients completed the postoperative ambulation program faster. Still, there was no difference in the number of patients who received antemetic administration due to postoperative nausea and vomiting (30% vs. 20%: p = 0.3).

Conclusions: The standardization and simplification of anesthesia techniques contributed to the reduction of occupation time in the operation room and drug costs.

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Undiagnosed and known diabetes and their perioperative outcomes

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Background: Diabetes is known to have increased morbidity and 30-day mortality in adults undergoing non-cardiac surgery, but longer term outcomes are uncertain. In addition, a large proportion of patients with hyperglycaemia that present preoperatively may not be diagnosed as diabetics. This study was done primarily to explore the prevalence of undiagnosed diabetics in our perioperative Asian population, and how undiagnosed diabetes affects both 30-day and 1-year morbidity and mortality outcomes compared to the known diabetics and non-diabetics.

Methods: A retrospective cohort study of 2106 patients aged above 45 years undergoing non-cardiac surgery in a single tertiary hospital from January 2015 to July 2015 was performed. Undiagnosed diabetics were identified (defined by HbA1c ≥6.5% or fasting blood glucose ≥7.0mmol/L), and their relevant demographic, clinical and surgical data were analysed to elicit the relationship to adverse clinical outcomes and mortality. A univariate analysis was first performed to identify significant variables with p-values ≤ 0.1, which were then analysed using Fisher multiple logistic regression to calculate the adjusted odds ratio.

Results: The prevalence of undiagnosed diabetes was 7.4%. The mean and median HbA1c of known diabetics were 7.9% and 7.5%, while the mean and median HbA1c for undiagnosed diabetics were lower at 7.2% and 6.8% respectively. 36.4% of known diabetics and 20.5% of undiagnosed diabetics respectively had a random blood glucose >11.1 mmol/L. The undiagnosed diabetic group was more than three times more likely to die at one year (adjusted OR 3.46 (1.80-6.49) p<0.001). No statistically significant relationship was found between the known diabetics and 1-year mortality, however, they were at increased risks of new onset atrial fibrillation (adjusted OR 2.48 (1.01-6.25) p=0.047), infection (adjusted OR 1.49 (1.07-2.07) p=0.017) and readmission within 30 days (adjusted OR 1.62 (1.17-2.25) p<0.004), as well as 30-day mortality (adjusted OR 3.11 (1.16-8.56) p=0.025).

Conclusion: Although undiagnosed diabetics have a biochemically less severe form of diabetes than known diabetics at the point of testing, they are significantly more likely to die at the end of one year compared to known diabetics who were not found to have a mortality difference. This worrying trend highlights the importance of identifying and treating diabetes.
Implementation of ERAS Urology. Preliminary results and analysis
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Background and Goal of Study: Implementation of multidisciplinary approached ERAS programs results in a significant improvement of perioperative care in different surgical specialities. ERAS protocols result in a reduction of length of hospital stay (LOS), complications and improved outcome. ERAS was introduced in Urology in April 2018. The objective of this retrospective analysis is to evaluate outcome measures like LOS, compliance, complication rate and the pitfalls of implementing ERAS Urology.

Materials and Methods: Relevant data of a pre-ERAS and ERAS were extracted and analysed using the ERAS Interactive Audit System (EIAS) of the ERAS Society. Surgeries consisted of open partial nephrectomy and laparoscopic procedures including prostatectomy, nefro-ureterectomy, nephrectomy and radical cystectomy. Outcome measures like LOS, compliance, complication rate (up to 30 days) were compared between the two groups. The implementation process was extensively evaluated by the ERAS-team and the pitfalls in implementing ERAS in Urology identified and discussed.

Results and Discussion: Results of 150 patients could be analysed. Data are presented in Table 1. The compliance increased from 45.2% to 62.4% respectively. LOS was 6.1 days vs 3.4 days for the pre-ERAS group and ERAS group. Total complications decreased from 54.5% to 24.2%. A significant decrease of postoperative pain was observed in the ERAS group compared with the pre-ERAS group, 2% vs 20%. Pitfalls of implementation were availability of staff and nurses for extensive education and training. Furthermore, several elements showed low compliance in the ERAS-group: mobilization on the day of surgery until discharge (20%–41%), use of carbohydrate loading (51.7%) and removal of the urethral catheter (51.7%).

Conclusion: Preliminary results after introduction of ERAS Urology were promising. Implementation of ERAS Urology resulted in an increased compliance, a reduction of LOS, postoperative pain and complications. Availability of staff and nurses, takes more time and effort, in particular on mobilization and feeding. Further improvement is needed.

Results and Discussion: A total of 20 caregivers were enrolled. The understanding of the whole day surgery course was significantly higher in group B than group C (P = 0.0025). But the information of postoperative care was insufficient. The anxiety level showed lower tendency in group B than group C although the result was not statistically significant. The satisfaction score of caregiver was not different between two groups but showed slightly increased level (Figure 2).

Conclusion: The brochure about day surgery process with color pictures helped the caregivers to understand surgery and anesthetic care on day of surgery. However, it did not affect caregivers’ anxiety and satisfaction.

References:

Management of a parturient with Posterior Reversible Encephalopathy Syndrome (PRES)

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Background: Posterior Reversible Encephalopathy Syndrome (PRES) is a condition linked to several diseases, such as pre-eclampsia. In this case there is a (rare) presentation with severe paresis of a limb. Differential diagnosis was challenging, since this could also indicate a magnesium intoxication, complication of epidural placement or stroke.

Case Report: A G1P1A0, 28 year old woman, known with pre-eclampsia, is admitted to the recovery room after an urgent C-section due to foetal bradycardia. She is receiving a continuous magnesium infusion and has an epidural catheter in place. During recovery she develops a headache and oral paresthesias. Parameters at this point are normal. Lab tests, with special attention to magnesium levels, are taken. The patient is given paracetamol and diclofenac, with good result. An hour later the patient develops a clear paresis of the left arm and left facial muscles. After this the neurolgist is called and the patient is brought to radiology for urgent MRI scanning. Lab tests show a magnesium level of 2 mmol/l (therapeutic range 2 – 3.5 mmol/l), a LDH level of 1015 U/l (normal range 313 – 618 U/l) and a moderate trombopenia (135.000). Glycemia is normal. MRI shows bilateral areas of diffusion restriction frontoparietal and parieto-occipital. An EEG is also taken, which comes back normal. The patient is admitted to the stroke ward. Trandate is started as hypertension treatment and intensive physiotherapy is prescribed. Symptoms gradually improve over several days. Eventually there is a total recovery.

Discussion: PRES is a syndrome characterised by symptoms of headache, confusion, visual changes, paresis and seizures in combination with typical MRI findings of vasogenic edema in the subcortical white matter, predominantly localized to the posterior hemispheres. It is linked to hypertensive disorders, (pre-eclampsia and autoimmune diseases. The mainstay of treatment is treatment of hypertension, but antiseizure drugs and treatment of the underlying disease may also be necessary. Most patients have a complete recovery within two weeks. A small minority of patients have residual neurologic deficits resulting from secondary cerebral infarction or hemorrhage. (1)

References:
1. www.uptodate.com ‘PRES’,
2. Learning points: PRES can, in rare cases, cause paresis of the limbs. Differential diagnosis of magnesium intoxication (in case of preeclampsia), stroke and complications of epidural placement can be challenging.

The effect of the brochure of pediatric day surgery on the caregiver of the patient

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Background and Goal of Study: Caregiver’s anxiety has been reported to be associated with the fear that pediatric patients feel when inducing anesthesia. The increased perioperative anxiety may be associated with adverse outcomes such as increased pain and new onset negative postoperative behavioral changes. Therefore, active interventions should be provided to alleviate the caregiver’s anxiety. We hypothesized that a standard color brochure provided in the preoperative evaluation room can reduce anxiety and increase the degree of cooperation of a caregiver of pediatric patients.

Materials and Methods: Parents of the pediatric patients were randomly assigned into 2 groups. The parents or caregivers in control group received verbal explain of the day surgery process in anesthesia evaluation clinic before surgery (group C). In brochure group (group B), they get the brochure with picture and written information into 2 groups. The parents or caregivers in control group received verbal explain of the day surgery process in anesthesia evaluation clinic before surgery (group C). In brochure group (group B), they get the brochure with picture and written information.

Learning points: Our study shows that the brochure can be used as an effective tool for reducing parental anxiety and improving cooperation. However, further research is needed to determine the optimal design and content of the brochure.

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Impact of a revised ERAS protocol for lower limb arthroplasty

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Background and Goal of Study: Forth Valley Royal Hospital performs ~400 primary hip and knee arthroplasties per year. Our aim was to introduce a new Enhanced Recovery after Surgery (ERAS) regime to improve patient outcomes and reduce length of hospital stay. To achieve this, we used a local centre of excellence, reviewed their practice and adapted it to suit our hospital.

Materials and Methods: A standardised anaesthetic protocol was introduced, removing intrathecal diamorphine (ITD) and replacing it with a plain spinal for total hip replacement (THR) and a plain spinal, adductor canal block and local infiltration for total knee replacements (TKR). Oxycodeone MR 10mg is given in recovery
followed by a further 2(THR) or 3(TKR) doses post operatively. During introduction of the new protocol, a prospective audit from Oct 2016-March 2019 was performed. The following short term outcomes were measured: Mobilisation on day of surgery; Pain preventing mobilisation; Post-operative nausea and vomiting (PONV); Urinary catheterisation; Hypotension requiring ephedrine; Median length of stay. Results and Discussion: 64 patients had a THR; 68% were female, 56% had a plain spinal. Mobilisation increased and there was a reduction in pain, PONV, catheterisation and hypotension in the group without ITD. Median length of stay reduced from 3.5 days to 2 days (p= 0.031). 88 patients had a TKR; 57% were female, 58% had a plain spinal with adductor canal block. Mobilisation increased, there was minimal change in pain, a reduction in PONV and catheterisation and a mild increase in ephedrine usage in the group without ITD. Median length of stay reduced from 4 days to 3 days (p=0.031).

Conclusion: The new ERAS protocol has shown improvement in short term outcomes for THR and TKR. In addition to the removal of ITD, staff education, increased physiotherapy and ERAS leaflets are further interventions that may have contributed to positive changes seen. It is thought the high pain scores seen in TKR patients is due to high opiate consumption in this group pre-operatively. Plans to improve this include increasing the dose of post-operative oxycodone, and the possibility of an adductor canal catheter.

Discussion: Our results are in contrast to a study from the U.K finding no time-independent benefits of national fast-track implementation on LOS and complications, but without details on perioperative care and a mean LOS of 3.7 days[2].

Conclusion: Continuous use and refinement of established fast-track protocols resulted in further monotonic reductions in LOS and morbidity. Mainly due to fewer patients with LOS > 4 days due to no or "medical" complications and fewer readmissions due to disproven complications.

References:

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Time-trends and improvement strategies in fast-track hip and knee arthroplasty – a prospective multicenter study of 36,935 procedures from 2010-2017

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Background: Enhanced recovery or “fast-track” protocols have reduced length of hospital stay (LOS) and postoperative complications in total hip and knee arthroplasty [1]. However, the effect of continuous use and refinement of fast-track protocols has not been evaluated in detail.

Methods: Cohort study from Jan 2010 to Aug 2017 within a multicenter collaboration with continuous refinement of established fast-track protocols. Complete 90-day follow-up from The Danish National Patient Registry and medical records. Primary analyzes on monotonic time-trends in LOS and 90-day readmissions. Secondary analyzes on “medical” and “surgical” complications. Test for monotonic trends was done using the Mann-Kendall test.

Results: Median LOS declined from 3 [2 to 3] days in 2010 to 1 [1 to 2] day in 2017 (p=0.049). The fraction with LOS > 4 days declined monotonically from 9.7% in 2010 to 4.6% in 2017 (p=0.004). The reduction in LOS > 4 days due to “medical” complications (4.4% to 2.7% p=0.108) showed no monotonic trend, in contrast to “surgical” (1.5% to 0.6% p=0.035) and no recorded complications (3.8% to 1.3% p=0.035).

Discussion: Time-trends and improvement strategies in fast-track hip and knee arthroplasty – a prospective multicenter study of 36,935 procedures from 2010-2017

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Macrophage Extracellular Traps Play Crucial Role in Ischemia/reperfusion Induced Liver Injury

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Background and Goal of Study: Hepatic ischemia/reperfusion (I/R) injury is a common complication in the clinical setting. macrophages were implicated in the disease pathogenesis of ischemia/reperfusion induced liver injury, but the precise molecular mechanism remains unclear.

Materials and Methods: Liver tissue and serum samples from patients undergoing partial hepatectomy with or without hepatic portal occlusion were used to evaluate the function of macrophage extracellular traps in I/R induced injury. Hepatic histology, serum aminotransferase level, and serum MPO, dsDNA, NE, LPO and MDA were used to examine the relationship between macrophage extracellular traps and liver injury.

Results and Discussion: In the present study, we find that macrophages released extracellular traps (ETs) comprising DNA fibers and granule proteins in patients underwent partial hepatectomy with or without hepatic portal occlusion. ETs contained DNA and granule proteins, and showed significant differences in patients undergoing partial hepatectomy with or without hepatic portal occlusion.

Conclusion: Macrophage extracellular traps may provide a novel regulator of hepatic I/R injury.
Medical utilization of Kiosk in the preoperative assessment of the ASA physical status: A pilot study

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Background and Goal of Study: The use of healthcare Kiosk is increasing in the medical community. However, there are scarce data on its use in a preoperative clinic. The aim of this pilot study was to validate an electronic questionnaire designed to assess the ASA physical status.

Materials and Methods: 323 adult patients undergoing noncardiac surgery were included. A questionnaire including 20 items (yes/no) was designed and inserted in the Kiosk. The ASA score was then retrospectively estimated by an anesthesiologist not involved in preoperative visit, taking into account the total number of positive answers of the questionnaire inserted in the Kiosk. The answers to the questionnaire from the Kiosk were blinded to the anesthesiologist performing the preoperative visit. Agreement between both ASA scores provided from both anesthesiologists was analyzed using Cohen’s Kappa test (κ).

Results and Discussion: Table 1 illustrates the ASA scores estimated by the Kiosk answers and by the anesthesiologist involved in the preoperative visit. Agreement between both was substantially good with κ=0.628 (P<0.001).

<table>
<thead>
<tr>
<th>ASA score</th>
<th>N</th>
<th>Kiosk</th>
<th>Anesthesiologist</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>169 (52.3)</td>
<td>144 (44.6)</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>140 (43.3)</td>
<td>160 (49.5)</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>13 (4.0)</td>
<td>18 (5.6)</td>
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</tr>
<tr>
<td>IV</td>
<td>1 (0.3)</td>
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</table>

Conclusion: Our findings indicate that our electronic questionnaire is accurate in estimating patient’s physical status. A Kiosk can be used to detect ASA I patients in whom a preoperative visit by anesthesiologist may not be necessarily essential.

References:

Nonbeneficial Surgery in Patients undergoing Emergency Laparotomy

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Background and Goal of Study: Standards of care for patients undergoing emergency laparotomy (EL) continue to improve due to quality improvement initiatives. However, mortality remains several-fold greater than following elective surgery. The aim of this study was to describe patients who undergo emergency laparotomy (EL) in the UK who die soon after surgery, in order to make further recommendations to reduce mortality after EL.

Materials and Methods: Patients from the Emergency Laparotomy Collaborative (ELUCS) database from July 2014 to March 2017 were studied. Anonymised data was extracted on day of death, patient demographics, operative details, compliance with standards of care, and outcomes including mortality and length of stay.

Results and Discussion: Overall in-patient 30-day mortality was 9.8% (1 364/13 933). 38.1% of deaths occurred within 3 days of surgery. Patients who died within 3 days of surgery had significantly higher pre-operative lactate, ASA grade and P-POSSUM scores. In addition, these patients showed a greater degree of physiological derangement. The commonest surgical findings in patients who died within 3 days of surgery had significantly higher pre-operative lactate, ASA grade and P-POSSUM scores. In addition, these patients showed a greater degree of physiological derangement. The commonest surgical findings in patients who died within 3 days of surgery were perforation, peritonitis and bowel ischaemia.

Conclusion: Nonbeneficial surgery is identified. Compliance with perioperative standards of care were overall better in patients who died within three days of surgery. Mortality remains several-fold greater than following elective surgery. The aim of this study was to describe patients who undergo emergency laparotomy (EL) in the UK who die soon after surgery, in order to make further recommendations to reduce mortality after EL.
Feasibility study on Sarcopenia screening in preoperative patients with ultrasonographic assessment of muscle mass and functional assessment
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Background: Sarcopenia is associated with adverse health outcomes. Its diagnosis requires reduced muscle mass and function. Ultrasonography (US) is a novel modality for sarcopenia screening. It is advantageous as it does not require radiation and is portable and rapid. This is a feasibility study on the use of US and functional tests to screen for sarcopenia in the elderly population preoperatively. The primary aims of the study are to assess the feasibility of using US, in terms of time taken and inter-user correlation. Other secondary aims include speed of recruitment (number approached vs number accepted) and correlation between US and functional tests.

Materials and Methods: Prospective observational cohort study, involving preoperative elderly patients > = 65 years undergoing elective abdominal surgery. Patients undergo US measurement of rectus femoris (RF) muscle and distal forearm (DF) muscles by an anaesthetist and a radiographer separately on the same day. Upper limb strength was assessed via handgrip strength; lower limb strength was assessed via a 4-meter-gait speed and number of stands that the patient was able to perform while sitting and then standing in 1 minute (sit-stands). Spearman test was used for inter-rater correlation, and correlation between US and function.

Results: 31 patients were approached. 10 patients were recruited between 15 July 2019 and 10 November 2019. Mean time taken for US assessment was 9.9 min for each assessor; inter-rater correlation between US measurements was excellent for RF thickness, R=0.996 (p<0.001), and cross-sectional area, R=0.995 (p<0.001); however, it was poor for DF muscle thickness, R=-0.23. Correlation between US and function was not significant, likely due to small sample sizes. Recruitment rate was low - 31%. Often cited reasons for declining to participate in the study were patient fatigue and lack of time.

Conclusion: US measurement of RF thickness and cross-sectional area is the most reliable method of ultrasonographic measurement of sarcopenia. It is feasible within a busy clinical setting, as measurements require less than 10min to perform, and does not require skilled sonographers to perform. More patients are needed to assess the correlation between US measurement of muscle mass and function. This feasibility study will inform the design of a larger scale prospective study to determine the prevalence of preoperative sarcopenia using US and functional tests.

Surgeons’ experience and technical efficiency
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Background and Goal of Study: Surgeons’ experience certainly improves their technical efficiency although it also causes physiological changes with aging. We hypothesized that surgeons’ technical efficiency improves with increasing surgeon experience up to a point where it then decreases, which is modeled as a quadratic function of experience with a parabolic shape.

Materials and Methods: We collected data from all the surgical procedures performed at Teikyo University Hospital from April through September in 2015-2019. The dependent variable was defined as surgeons’ technical efficiency scores that were calculated using output-oriented Charnes-Cooper-Rhodes model of data envelopment analysis. Inputs were defined as (1) the number of assistants, and (2) the time of surgical operation. The output was defined as the surgical fee for each surgery. Surgeons’ experience was defined as the number of years since medical school graduation on the date of surgical procedure. Six control variables were selected; surgical volume, gender, academic rank (full or associate professor), surgical specialty and the year of surgery. We modeled efficiency scores as a function of experience and the square of experience. We performed multiple regression analysis using random-effects Tobit model for our panel data. The efficiency score is a limited dependent variable that lies within the range of 0 to 1, and its distribution is best described by a censored normal distribution. The right censoring limit was set at 1. A p-value < 0.05 was considered statistically significant.

Results and Discussion: We analyzed total 20,375 surgical procedures performed by 264 surgeons in 42-month study period. Their mean experience (standard deviation) was 18.9 (6.8) years. The coefficients of experience and the square of experience were not significantly different from zero (p = 0.694 and p = 0.228, respectively). The coefficients of surgical volume, gender and academic rank were also insignificant (Table).

Conclusion: Surgeons’ technical efficiency is not significantly related to their experience.

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Conclusion: US measurement of RF thickness and cross-sectional area is the most reliable method of ultrasonographic measurement of sarcopenia. It is feasible within a busy clinical setting, as measurements require less than 10min to perform, and does not require skilled sonographers to perform. More patients are needed to assess the correlation between US measurement of muscle mass and function. This feasibility study will inform the design of a larger scale prospective study to determine the prevalence of preoperative sarcopenia using US and functional tests.

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Conclusion: Surgeons’ technical efficiency is not significantly related to their experience.
Effect of different time-periods of prewarming on preventing perioperative hypothermia in transurethral resection under spinal anaesthesia

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Background and Goal of Study: Perioperative hypothermia is the most common anesthetic complications, increasing the morbidity/mortality of our patients. Active prewarming with hot forced-air devices has demonstrated to be the most effective tool to prevent hypothermia, but it is only recommended in long-term surgeries and its optimal duration has not been elucidated. Both spinal anesthesia associated to the irrigation with liquids at low temperature instilled during transurethral resection (TUR) cause a decrease in the core temperature of the patient. Our aim is to assess the effect of different time-periods of prewarming on preventing perioperative hypothermia during TUR with spinal anesthesia.

Materials and Methods: Once the approval of the Ethics Committee was obtained, we carried out a double-blind randomised clinical trial in patients undergoing TUR under spinal anesthesia. Patients were randomised into four groups: those prewarmed for 15 (p15), 30 (p30) or 45 (p45) min and non-prewarmed patients (control). Prewarming was performed at pre-anesthesia room using a forced hot air blanket. Following data were recorded: age, Body Mass Index, ASA physical status, length of surgery, glycine instilled and operating room (OR) temperature. Core temperature was measured using a tympanic thermometer on arrival at pre-anesthesia room (PreT), at operating room (T0), at 15-min intervals during surgery and at the end of surgery (EndT). Results among groups were analysed using SPSS 24.

Results and Discussion: During 6 months, 215 patients were enrolled and allocated to control group (n=53), p15 (n=54), p30 (n=54) or p45 (n=54). No significant differences were found among groups regarding patient’s characteristics, duration of surgery, litres of glycine, OR temperature and PreT. T0 and temperature measurements throughout surgery were significantly higher in prewarmed groups than in control group (p<0.05). However, no significant differences were found among different prewarmed groups. Average EndT was 34.97°C in control group, 35.66°C in p15, 35.72°C in p30 and 35.74°C in p45, being this difference significantly higher in prewarmed groups when compared to control group. No differences were found regarding EndT among prewarmed groups.

Conclusion: Prewarming during 15, 30 or 45 min prevent the appearance hypothermia in short duration TUR under spinal anesthesia. However, longer prewarming time-periods do not ensure higher perioperative core temperature.
Patient Safety

Using HFMEA (Healthcare Failure Mode and Effect Analysis) to Improve Drug Administration Safety in Anesthetized Patients

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Background and Goal of Study: Drug-related adverse events account for most and as much as 35% of the total events in the Taiwan Patient Safety Reporting System. The most reported causes were as the followings: a lack of standard operating procedure, an incomplete prescription, overloaded work, and unclearly conveyed oral medical orders. Improving drug administration safety therefore was set as one of the International Patient Safety Goal (IPSOG). The average drug administration times for one patient was six in our unit. And there were 2 events of drug administration error in recent one year. This project used HEMEPA as the tool and proposed an improvement program.

Materials and Methods: We used the Healthcare Failure Mode and Effect Analysis (HFMEA) as the tool, and finally decided whether an implantation of improvement measures was needed by decision tree. The targets were set as the followings: 1. Drug administration error rate dropped from two events per year to zero event per year. Reason: Because the possibilities of causing severe injuries or death existed, no margin was allowed; 2. Rate of repeating medical orders during drug administration above 95%; 3. Rate of confirmation of doctor’s reply during drug administration above 95%. We built a team in April, 2017. Then we drew the flow chart, and ran the hazard analysis. The hazard factors were calculated, and a decision tree analysis was done. The Risk Priority Numbers (RPN) was 489. The improvement measures were as the followings: modifying the procedure protocol documents, establishment of an audit mechanism, education courses, making drugs icons and posts, a consistence of drugs placement, and an exclusive place for drugs and syringes.

Results and Discussion: We re-evaluated the RPN in February 2017, and it dropped from 489 to 365. A 25.6% decline was seen. And drug administration error events dropped from two events per year to zero event per year. The rate of repeating medical orders during drug administration was 100%. The rate of confirmation of doctor’s reply during drug administration above 100%.

Conclusion: Continuous implementation and auditing are necessary. HFMEA could be used as one of the teaching and training topics for new-coming colleagues. The first-time experience might be somewhat subjective. We believe strengthening the reliability of the analysis table is the future direction to work while using HFMEA.

Learning form Excellence as a basis to improve the quality of patient feedback to theatre staff

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Background and Goal of Study: Learning from Excellence builds on the theory of Safety I where there is a focus on how teams reliably get things right rather than a traditional Safety I focus on when things go wrong. Using this more Appreciative Inquiry approach to patient feedback we aim to test if this has a more positive effect on staff morale. Positive feedback is an important means to shift conversations to support teams to flourish, counter staff burnout and improve patient care.

Materials and Methods: Previous safety culture measurement in 30+ theatres of a 900+ bed tertiary hospital has demonstrated that only 37% of theatre staff receive positive feedback on the work that they are doing. Staff were asked to complete a baseline questionnaire asking specifically about patient feedback. Using questions previously tested in the maternity unit we iteratively tested the questionnaire to assess if patients gave more positive feedback that was attributed to a named staff member. We will also identify the best method to give this feedback to staff and understand the barriers to collecting the feedback and giving it to staff.

Results and Discussion: The safety culture data demonstrated that over 60% of theatre staff do not perceive that they receive meaningful, frequent or useful feedback about the work that they do. Further questioning of 2 specialist theatre teams identified that 47% were unaware of the current patient feedback mechanisms and only 20% had received any form of feedback. In September 2019 there were no named members of staff in the current patient feedback system. Using the new questions 25% had a named job role and 25% a named staff member. This allows more targeted feedback to individuals. We intend to test ways to increase the positive feedback to named staff members and the best way to feed this back to staff. We anticipate having full results for Euroanaesthesia 2020.

Conclusion: We believe that will demonstrate the feasibility of taking the principles of Learning from Excellence to improve the patient feedback to named members of staff and identify the best methods to achieve this. We hypothesise that this will improve the theatre teams’ culture by reinforcing positive behaviours, and has the potential to improve patient outcomes and experience.

References:

MEDICALISATION THYROPLASTY:

Alternative strategy of sedation according to material available; When safety determines modus operandi

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Background: Medialisation thyroplasty is a surgical procedure that sometimes requires “speech monitoring” during the intraoperative period. Many strategies have been used for anesthesis management. We present our experience at a time when the current drug of choice, dexmedetomidine, was not available for these procedures in our hospital.

Case report: We present a case of a patient referred to our team for local anesthesia and sedation during a routine type 1 thyroplasty (medialization laryngoplasty) for repair of recurrent laryngeal nerve injury following total thyroidectomy. The case was managed with Midazolam/Fentanyl with the addition of a continuous perfusion of Remifentanil and Propofol. BIS (Bispectral index), respiratory frequency and level of sedation by Ramsay score (ranging from 2-4 according to surgical phase requirements) were used for monitoring. Patient and surgical teams expressed a high level of satisfaction.

Discussion: Medialisation laryngoplasty is a surgery scheduled for glottal insufficiency caused by vocal cord paralysis.1 It repositions the anterior larynx by placing an atolic material in the paralyzed vocal fold and it involves creating a window in the ipsilateral thyroid ala. Some surgeons perform the intervention with general anesthesia and direct visualization to verify medialization. In other centres, the suitable placement is verified by intraoperative voice monitoring, besides direct visual inspection. The latter requires an awake and cooperative patient, with no devices that may limit vocal chord visualization. Dexmedetomidine has been considered the best option in recent years3, but it is not always available. A further pharmacological strategy, of adjustable dose and with short half-life such as propofol and remifentanil, is ideal and may be an option when safety is paramount.

References:

Learning points: Continuous perfusion of Remifentanil and Propofol can be a safe optimal alternative for cases in which collaboration of the patient and a deep plane of sedation are both necessary.

The sterile cockpit, how are we doing in anaesthetics?

A survey of practise in a district general hospital

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Background and Goal of Study: In 1993, the Federal Aviation Administration in the US introduced the ‘sterile cockpit rule’ precluding pilots from non-essential conversation during the critical phases of flight. In Anaesthetics the concept of ‘the sterile cockpit’ during the critical phases of induction and emergence has gained traction as the importance of human factors in critical incidents has been realised. Background noise can be deleterious to the safe provision of anaesthesia. It is can
be distracting, impair effective communication and become a barrier to effective team working. Moreover, excessive noise on emergence from anaesthesia can affect the quality of patients' recovery through post-operative delirium in addition to adverse neuro-humeral responses. The goal of this study was to survey noise during the induction and emergence of anaesthesia which typically occurs in the anaesthetic room and theatre room respectively.

Materials and Methods: Mean noise data was collected from 30 episodes of induction and emergence across a variety of surgical specialties. The anaesthetic team were blinded to the recordings to ensure normal practise was captured. Induction measurements commenced at pre-oxygenation and ended at transfer to theatre. Emergence recordings commenced as surgery ended through to transfer from theatre.

Results and Discussion: Noise levels were consistently lower(64.1dB) during induction when compared with emergence (78.5dB). Multiple simultaneous staff conversations, door slamming and manipulating surgical instruments were the main contributors. Mean noise recorded during emergence was loud enough to drown out effective communication between anaesthetist and assistant or patient. Furthermore, Peak noise generated was louder than that of an alarming anaesthetic work station. Noise during induction was largely generated by alarming monitors and patient focussed conversation between anaesthetist and assistant. Noise impacts on the quality of patient’s emergence leading to post-operative confusion, disorientation and cardiovascular stress responses. The anaesthetic room environment is culturally quieter.

Conclusion: The ‘sterile cockpit’ rule was evident during induction but not emergence from anaesthesia. An educational package focussing on situational awareness of the extended theatre team could help to mimic the induction environment for anaesthetists and their patients.

A step further from the WHO checklist-The importance of debriefing in managing a complex patient with Duchenne’s Muscular Dystrophy in a District General Hospital in the UK

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Background: We would like to highlight how the effective use of debriefing and checklists helped manage a complex patient with Duchenne’s Muscular Dystrophy (DMD) for emergency endoscopic retrograde cholangiogram (ERC) in a District General hospital.

Case Report: A 23yr old boy with DMD presented as an emergency for the above procedure. Due to his condition it was decided by the Gastroenterology team for the procedure to be done in theatre. He was diagnosed with DMD at a young age, has been on steroids for the last 12 years and is wheelchair bound. His FVC was 1.92L, has mild cardiomyopathy and an ejection fraction of 60%. Due to severe upper procedure. Due to his condition it was decided by the Gastroenterology team for the procedure to be done in theatre. He was diagnosed with DMD at a young age, has been on steroids for the last 12 years and is wheelchair bound. His FVC was 1.92L, has mild cardiomyopathy and an ejection fraction of 60%. Due to severe upper

Discussion: We would like to highlight the importance of debriefing as a team and the performance of the WHO checklist correctly in reducing human error and improving the care of a patient with Duchenne’s Muscular Dystrophy. Evidence from National Audit Projects, NAP 5 specifically has reinforced that human factors, non-technical skills along with checklists reduce errors and improve patient safety. To streamline debriefing we have introduced in addition a new form which proved to be invaluable in this complex scenario which helped in better team working.

Learning points: Debriefing highlights important clinical and non-clinical factors which are significant in the total care of a patient especially when presenting as an emergency with a rare condition as Muscular Dystrophy in a DGH.

Survey to assess operating room personnel reported improved confidence and performance after In-Situ Interprofessional Operating Room Simulations

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Background and Goal of Study: Following a 2-year period of In-Situ Interprofessional Operating Room Simulations (IPORS) for Anaesthetists, nurses and ancillary staff, we conducted a survey to assess the OR personnel point of view regarding this program.

Materials and Methods: In-Situ IPORS of crisis events were performed since 2016 in the Tel-Aviv Souraski Medical Center, Israel. The simulations were conducted weekly, duration-30 minutes, during working hours, with support from OR personnel and management. In-Situ IPORS took place in an actual OR, utilizing available equipment and setting. After a 5 minutes briefing, each simulation included a 10-15 minutes scenario depicting perioperative emergency with a mock patient. This was followed by 10 minutes debrief focusing on communication and non-technical skills (teamwork/situation awareness). Over 90 In-Situ IPORS were conducted in a 2-year period. An anonymous electronic survey, 10-Likert scale questions, was sent by email to 200 OR personnel, including anaesthesiologists (n=88) and OR nurses (n=111).

Results: Survey responses were submitted by 48 OR nurses and 55 Anaesthetists (n=103, 51.5%). Among the responders, 80 (77.7%) have participated in > one In-Situ IPORS. Selected survey questions and results are presented in Figure-1. Thirty-six responders reported involvement in managing a real emergency after participating an In-Situ IPORS. When asked to assess the effect of In-Situ IPORS, most of the participants (25/36, 69.4%) stated that the simulation had improved teamwork and their personal performance during the subsequent emergency situation. The survey responses were similar between professions, seniority or age groups (data not presented).
Conclusions: In Situ IPORS enhanced confidence and teamwork as reported by the participants, and strongly contributed their performance during real crisis. Most responders stated that routine In-Situ IPORS is important and should be mandatory for providers at all levels. In-Situ IPORS were implemented and highly acclaimed by our OR personnel. Weekly In-Situ IPORS are routinely conducted in our OR to the current date.

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In situ high fidelity simulation for training and empowering an operating room team for an eventual malignant hyperthermia episode

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Background and Goal of the Study: During the last decades, in situ simulation has grown exponentially, improving clinical performances and outcomes. We describe a case in which we designed a simulation scenario consisting of a malignant hyperthermia (MH) episode. This was run in the operating room (OR) by a 7-member team that would be responsible, in a week, for a patient with a known ryanodine receptor mutation. We assessed if health professionals showed increased self-confidence in managing such an event after running this simulation scenario, for which we used high-fidelity SimMan® 3G simulation mannequin, by Laerdal.

Materials and Methods: All participants answered a pre-simulation questionnaire. Sociodemographic data and OR experience was recorded initially. Members were also asked to self-assess, using a 1-10 scale, their (1) competence, (2) assurance and confidence, and (3) knowledge on specific roles and duties, in case an MH episode occurred. They then run the simulation scenario and reassessed themselves on the same issues. Pre and post-simulation scores were then compared.

Results and Discussion: Team members were aged 24-52 years. 3/7 (42.9%) had > 10 years of OR experience but only 1 (14.3%) had been present in MH episode before. Initial scores on self-perceived competence on MH, self-perceived comfort if in need of managing an MH case and self-perceived knowledge regarding each member’s specific roles and duties in case an MH episode occurred were 5.71±1.98, 5.14±1.77 and 6.00±2.45, respectively (1-10 scale). After simulator was run, scores increased by an average of 3.10 (p<0.01) – 8.71±0.36 (p<0.01), 8.57±0.43 (p<0.01) and 8.86±0.55 (p=0.025), separately. All members found in situ simulation useful (all scored 10/10) and changes in MH’s institutional protocol and emergency cart were proposed and applied.

Conclusion: In situ simulation increases health professional’s self-perceived competence and confidence when managing an MH episode and allows changes in MH’s institutional protocol and emergency cart, which may ultimately improve clinical outcomes when MH episodes occur.


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The occurrence of fire in a manikin model of oculoplastic surgery

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Background and Goal of Study: Fire in the operating room is a catastrophic event. We develop a manikin model to study the influence of oxygen flow, degemming solutions, drying time, and the sterile field placement in the occurrence of fire and explosion.

Materials and Methods: Pieces of pork meat covered the manikin’s face, along with adjacent pieces toward the manikin’s abdomen, to emulate the path for the electric scalpel. Nasal cannula provided different oxygen flows (figure 1). The surgeon then applied the degemming solution over the pork meat and arranged the surgical fields. We then started to cautery the meat, emulating a real facial surgery. The variables included the oxygen flow (from 3L/min to 6L/min), the degemming solutions (10% hydroalcoholic povidone-iodine, 10% aqueous povidone-iodine or 0.5% alcohol-chlorhexidine), the surgical field arrangement (covering mouth and nose or face uncovered), and the drying time for the solutions (30 seconds, one, two and three minutes). Two cameras on tripods shot all the experiments, on both sides of the manikin (two videos are available).

Results and Discussion: We obtained flames on three occasions: using 0.5% alcohol-chlorhexidine (6L/min of oxygen flow and 30 seconds and one minute of drying time), and 10% hydroalcoholic povidone-iodine (6L/min of oxygen flow and one minute of drying time). There was no fire with aqueous povidone-iodine. The fire appeared only when the surgical field covered the mouth and nose. One of the videos shows fire inside the airway.

Conclusion: Our findings represent some critical hazards the surgeons and anesthesiologists must consider when dealing with a real scenario of oculoplastic surgery.


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Do you dare to anesthetize on board in a sailboat in half of the Atlantic ocean? Experience on board “Juan Sebastian Elcano”, Spanish Armada School vessel

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Background and Goal of Study: The Spanish Navy school ship is a 92-year-old vessel named Juan Sebastián Elcano, in honor of the first sailor who went around the world sailing, this year celebrating the 500th anniversary of that feat. The staff is approximately 250 men and women, including a general practitioner, general surgeon, anesthesiologist, nurse and paramedic. The objective of this study is to describe the ship’s healthcare and anesthesiologist capabilities, as well as analyze the anesthetic procedures that were carried out during the 2019 trip.

Materials and Methods: Retrospective descriptive analysis carried out during the year 2019 of the medical assistance provided, using sociodemographic and control variables, qualitative and quantitative variables. It also describes the anesthetic material on board and the surgical procedures performed. Appropriate permits have been obtained.

Results and Discussion: The on-board operating room has a Drager Fabius Tiro® anesthesia tower, gas station (oxygen, nitrous oxide and air), monitors, defibrillator, electrocardiograph, ultrasound, portable respirators, infusion pumps, hemogram analyzer, biochemistry and coagulation. In compliance with 2011 year Helsinki safety regulations there is material for airway (direct laryngoscopy, laryngeal masks, fastract mask, laryngeal tube, airtraq®, frova and cricotomy set), hemorrhage control (red blood cell concentrate, octaplex®, fibrinogen, tranexamic acid, CaCl2), malignant hyperthermia treatment (dantrolene), local anesthesia (lidocaine), infection treatment, anaphylactic shock treatment, medication labeling, anesthesiological documentation and on-board check. Also, regional anesthesia (epidural, intradural, combined, nerve plexus and ultrasound) can be performed. During the analysis period, only general anesthesia was performed for a perianal infection based on logistic and patient criteria. On three occasions, local anesthesia was performed for suctioning for hand wounds.

Conclusion: Anesthesia performance in an oceanic environment depends on logistic and personal factors. Authors recommend that the anesthesiologist have naval experience and be trained to practice anesthesia on board. The material and capabilities of the vessel allow for urgent procedures on this vessel.

Acknowledgements: Spanish Navy.
Patient safety in colorectal surgery ERAS protocol: hospital stay, complications and economic impact

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Background and Goal of Study: The implementation in recent years of ERAS protocols in abdominal surgery is supported by scientific evidence and it is very important for patient safety. In our hospital, a multidisciplinary work group was created since 2015 for the application of ERAS protocols in colorectal surgery. Our objective was to analyse in colorectal surgery, the average hospital stay, complications and its economic impact since the pre-ERAS period (2013-2015) until the present day (2016-2018). The average standard hospital and critical care unit stay, complications in colorectal surgery of the hospital's own database were analysed. The differences in average hospital stays were compared with the calculation of the average cost in euros (2019) of standard hospital and critical care unit stay day.

Results and Discussion: The average total hospital stay was: Pre-ERAS Period (2010-2013) =360, of 13 days (2 days critical care unit stay and 11 days of standard hospital stay). Initial ERAS period (2013-2015) =319, was 11 days (1.5 day critical care unit stay and 9.5 standard hospital stay). Consolidated ERAS period (2016-2018) =376, was 6.5 days (1 day critical care stay and 5.5 of standard hospital stay).(59.8%) patients developed at least one complication in the Pre ERAS group, versus (51.10%) in the Post-ERAS group . More patients in the Pre-ERAS group developed moderate or severe complications (31.9% vs. 22.36%, p = 0.009); and severe complications (15.5% vs. 5.3%; p < 0.001). The estimated cost of the average standard hospital stay per day in 2019 was 256 euros; 1,637 euros per patient week was: Pre-ERAS group 6,090, initial ERAS group 4,875, and Consolidated ERAS 3,045 euros. What is a saving comparing the consolidated group with the pre-ERAS and initial ERAS of 3,045 and 1,842 euros respectively. The consolidation of ERAS protocols in colorectal surgery would mean an economic reduction of 50% compared to Pre-ERAS and an initial 38% ERAS attending only medium stays.

Conclusion: The consolidated application of the ERAS protocols based on scientific evidence had an important patient safety and economic impact on the health system.

Incidence of residual neuromuscular blockade and postanaesthesia care unit complications

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Background and Goal of Study: Postoperative residual neuromuscular blockade (RNMB) continues to be a prevalent problem in the postanaesthesia care unit (PACU) despite the use of short acting neuromuscular blocking agents, availability of appropriate monitoring and neuromuscular blockade reversal drugs. The incidence of RNMB is estimated to be 26% in Portugal. This study aims to assess the incidence of RNMB and its perioperative impact in our hospital.

Materials and Methods: After approval by the institutional ethics committee, a prospective observational study was conducted for 6 months, including consenting adult patients scheduled for elective surgery, requiring general anaesthesia and neuromuscular blockade. Upon arrival at the PACU, neuromuscular blockade was assessed with a TOF-Watch SX® device. Three readings were made and the average train-of-four (aTOF) value was recorded. RNMB was considered when the aTOF<0.9. The primary outcome was to assess the incidence of postoperative RNMB. The secondary aim was to investigate the association between PACU complications and the aTOF ratio upon arrival at the PACU.

Results and Discussion: 104 patients were included in the study. RNMB incidence was 16.3%. Clinical signs of RNMB (failure to lift the head and inability to do tongue protrusion for 5 seconds) were associated with an aTOF < 0.9 (35.3% vs 8%, p=0.002). Patients with RNMB had more critical respiratory events, namely severe hypoxemia, hypotension and hyperkalemia with a peripheral capillary oxygen saturation <90%, (35.3% vs 3.4%, p=0.000). Hypothermia occurring intraoperatively and at admission at PACU was associated with an aTOF <0.9 (p=0.008 and p=0.000, respectively). Richmond Analgesia and Sedation Score at admission and Aldrete Score upon discharge were significant predictors of RNMB (p=0.11 and p=0.003). They remained in patients with RNMB (160 min vs 105 min, p=0.003; 6 days vs 3 days, p=0.002).

Conclusion: Despite the limitations of this study, it is evident that RNMB remains a common problem that must be prevented and treated promptly, since it is associated with important complications, such as severe hypoxemia, with critical implications for patients. Moreover, it is associated with longer PACU and hospital stays, with its inherent risks and costs.


Guideline for managing Deep Brain Stimulators’s in the OT-‘Stimulating’ Safe anaesthesia

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Background and Goal of Study: The increasing use of Deep brain stimulators (DBS) for a variety of movement, pain and psychiatric disorders will inevitably result in them being encountered more frequently by the anaesthetist. The increasing prevalence of these devices among the general population poses a new challenge for the unfamiliar anaesthesiologist when such patients present for elective and emergency surgery.

Materials and Methods: Here we describe the management of a 63yo gentleman with Parkinson’s disease and an implanted DBS, who presented for an emergency reverse shoulder replacement having fractured his Humerus in a motor vehicle collision. The patient had a device to turn off the DBS however could not use it. The unfamiliarity of the clinical staff with the device resulted in the inability to deactivate the DBS for surgery. This resulted not only in patient monitoring issues, a risk in itself but also a potential risk to the patient with regard to diathermy and damage to his Basal Ganglia. The lack of a formal guideline in our institution for such cases prompted a literature review and production of a local guideline. The aim of this is to provide the anaesthesiologist with a step by step guide in order to provide safe anaesthesia and decrease morbidity in this specific patient population.

Anaphylaxis drugs and equipment availability at Oxford University Hospitals NHS Foundation Trust: an audit

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Background and Goal of Study: The NAP6 audit of perioperative anaphylaxis (NIAA/RCOA) made recommendations for the drugs and equipment that should be immediately available in the event of anaphylaxis during anaesthesia1. We audited the availability of anaphylaxis equipment in 108 non-theatre locations across three major Oxford hospitals (John Radcliffe Hospital, Churchill Hospital, and Nuffield Orthopaedic Centre) and aimed to analyse how prepared each clinical area was in the event of anaphylaxis, with a view to creating a standardised high quality anaphylaxis kit based on the NAP6 recommendations, to improve its management.

Materials and Methods: A list of all 171 clinical areas equipped with a resuscitation trolley was generated and a visual audit undertaken during July 2019 in 108 locations (53%). Data were collected about: availability and form of anaphylaxis medications; availability of additional equipment recommended in NAP6; signposting and security of storage location; availability of a national anaphylaxis algorithm; and completion of daily checks.

Results: 33(31%) were not storing anaphylaxis medications in a secure location; 20(19%) had no signage to indicate the medication storage location; 59(55%) did not keep anaphylaxis medications together in a marked box; 9(8%) had no intramuscular Adrenaline available, and 33 (31%) did not stock second-line anaphylaxis drugs; 21(20%) did not store the needles and syringes required for administering Adrenaline; 78(72%) had no printed anaphylaxis algorithm; 17(16%) had no equipment for collecting serum tryptase samples; 51(47%) had not performed the required daily check of anaphylaxis medication.

Conclusion: Few locations stored the drugs, equipment, and protocols required to rapidly manage anaphylaxis according to national guidelines, with a small but alarming number stock no Adrenaline, and the majority having no access to guidance for managing this time critical situation. This demonstrates a clear need for standardisation of anaphylaxis equipment across clinical areas, for example with a kit containing the drugs, equipment and guidelines recommended by NAP6. A kit proposal is currently being created, with the intention of a staged introduction.
Implementation of nursing care protocol in anesthesia and its effect on safety and teamwork climate

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Background and Goal of Study: Using anesthesia care protocols can organize and standardize operating room nurse’s work, improve the exchange of information, highlight the importance of the operating room professional and contribute to patient safety and prevention of adverse events. This study aims to analyze the safety and teamwork climate of professionals involved in the anesthetic procedure before and after the implementation of an anesthesia nursing care protocol.

Materials and Methods: A quasi-experimental study with a pretest-posttest design, developed in three stages in the operating room of a private hospital in São Paulo, involving anesthesiologists and assistants nurses. In the first and third stages, the “Safety Attitudes/Operating Room Version (SAQ/OR)” and the “Team Climate Scale (TCS)” questionnaires were applied to all professionals included in the study. In the second stage, the care protocol defined as a Patient Safety Checklist: Nursing in Anesthetic Procedure (PSC/NAP) was implemented by nurses for a period of six months, in surgeries of adult patients undergoing general anesthesia. Data were analyzed using descriptive statistics and linear mixed effects regression model.

Results and Discussion: Nineteen (30.1%) nurses and 44 (69.8%) anesthesiologists participated in the study. From the implementation of the protocol, there was an increase in the SAQ/OR score, on average 4.12 points, related to the factors teamwork (β=0.004) and professional (β=0.04) domains, which generated an increase of 60.09 points and was related to the professional experience factor (β=0.12).

Conclusion: The implementation of the nursing care protocol CSP/EPA generated changes in the perception of safety and teamwork climate of nurses and anesthesiologists.

Should electronic anaesthetic record systems (EARS) be mandatory for all surgical procedures?

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Background and Goal of Study: The purpose of this study was whether it should be mandatory to implement electronic anaesthetic record systems (EARS) by evaluating the accuracy (percentage difference) between the manually documented data and electronically generated data.

Materials and Methods: Data was prospectively collected for forty patients who had their AAGBI recommended basic monitoring parameters recorded manually on the anaesthetic chart every five minutes. After the patient was discharged to the patient ambulatory care unit (PACU), a 30-minute time interval between the patient’s intraoperative period was selected randomly on the anaesthetic chart. The manual documentation of heart rate, SP02 (haemoglobin saturation), systolic and diastolic blood pressure was compared with the corresponding electronic readings recorded automatically on the anaesthetic machine. Microsoft® office 2010 excel was used to analyse the data.

Results and Discussion: There was a mean difference of 11.2% (s.d. 7.14%) between all electronically produced and manually recorded parameters. The range of absolute percentage difference between electronically produced and manually recorded observations was 39.54% (Figure 1). The interquartile range of absolute percentage difference between electronically produced and manually recorded variables was 7.61%. The difference between the manual and electronically recorded data was not significant (p value 0.14, two-tailed t test).

Conclusion: Our study showed a statistically insignificant (p value >0.05) difference of 11.2% between electronic and manual documentation of basic monitoring parameters. This suggests that EARS is not mandatory but should be used wherever available.

Assessing supervision in Forth Valley Royal Hospital using ‘The Cappuccini Test’

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Background and Goal of Study: The case of Frances Cappuccini has highlighted the importance of a robust system for supervision of non-consultant level anaesthetists. Our aim was to use ‘The Cappuccini Test’ to assess the level of supervision given to SAS (Staff Grade, Associate Specialist and Specialty Doctors) and trainee anaesthetists in Forth Valley Royal Hospital (FVHR). Trainees working independently have a named supervisor who is twinned with a competent assistant, so available if required. There is a ‘starred’ consultant for other issues, including problems from SAS anaesthetists, and if the named consultant is not available. Supervisors are highlighted at the team brief, identified on the rota, and written on the whiteboard, so the whole team is aware who to contact in an emergency.

Materials and Methods: Between July and August 2018, theatre lists with trainees acting independently were identified. Each trainee was asked if they knew who their supervisor was and how to contact them. The supervisor was then contacted to ensure their pager was working, asked if they were aware who they were
supervising, what list the trainee was covering and if they could assist if required. The ‘starred’ anaesthetist was also contacted to check if they were aware they were ‘starred’, if their pager was working, and if they could help if needed.

**Results and Discussion:** 17 theatre lists were audited. 100% of trainees knew who was supervising them and how to contact them. 1 supervisor could not be contacted via their pager as the battery no longer worked. 100% of supervisors knew who they were supervising and what list their trainee was covering. 94% were available to attend if there was an emergency. The ‘starred’ anaesthetist knew they were starred, had a working pager, and would be available if there was an emergency 100% of the time.

**Conclusion:** Compared to data presented at ‘Anaesthesia 2019’ (showing only 37% of independent trainee lists audited across 7 Trusts could answer yes to all above questions), we have an effective system in FVRH for supervision of non-consultant anaesthetists. Identifying a specific person allows trainees to discuss predicted issues/ concerns and to feel confident help would be available. Though a pager system may seem old fashioned, it avoids contact problems that could be associated with network/ Wi-Fi signal. We also have a Fast Page system to alert people to come directly to the theatre, minimising time wasting during an emergency.

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**5329**

**Peer responders: the second victims’ programmes clue**

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**Background and Goal of Study:** The development of second victim programmes is paramount in line with the growing culture of safety and opening disclosure of adverse events. Experience from important groups such as that of Johns Hopkins demonstrate that a first effective and accessible support source to second victims is necessary. The so-called “peer responders”, should have tools to help them emotionally and detect unusual second victims course. These skills are known as “psychological first aid”. The aim of this study is to assess health professional’s perception of the second victim phenomenon as well as the colleagues’ capability to become peer responder.

**Materials and Methods:** Different health professionals (nurses, training residents, anaesthesiologists, paediatrics and clinical assistants) were invited to respond anonymously an online survey between 2017 and 2019.

**Results and Discussion:** 130 (28.44%) residents and 327 (71.56%) health professionals completed the survey. 84% of responders were women, mostly nurses and anaesthesiologist (71% and 20.4%, respectively). When it comes to years of experience, 69% reported more than 10 years. Regarding the peer responder perception, almost 67% had faced a second victim situation as helpers. Despite 75% had actively sought ways to help them, 90.5% considered they did not have enough tools to help the second victim. Finally, only 39% believed their institution have an opening disclosure of adverse events, while the remaining 61% affirmed there is still a punitive, evasive or silent culture.

**Conclusions:** Almost 2/3 parts of residents and professionals have faced a second victim situation. Unfortunately, although most of peer responders sought to help second victims, they considered not to have enough skills. Therefore, institutional training, educational and organizational programs are urged to enable their professionals to act effectively as peer responders for a second victim.

**References:**

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**5935**

**Cappuccini Test for Clinical Supervision, its application in practice**

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**Background and Goal of Study:** In October 2012, Frances Cappuccini, died from airway complication following Caesarean delivery of her baby. The coroner argued that “the supervision arrangements in respect of the anaesthetist were undefined and inadequate and no-one was aware who was supervising him and their availability”. In 2018, Cappuccini Test was proposed and four questions (Appendix) were directed at the trainees and SAS doctors working alone and at their supervisors (1). The aim of the audit was to ascertain the level of supervision of the trainees/SAS doctors (supervisors) and theatre activities awareness by the consultant (supervisor) during an on call duty.

**Materials and Methods:** In our department we have the CLWRota system in use. This makes it easy to access anaesthetics staff phone numbers and contact staff directly. All anaesthetic trainees and staff grade doctors (supervisors) on call were contacted via their phones or through hospital beep system. In addition to the proposed four questions (1) we asked the supervisors further questions to gauge the level of situation awareness of the supervisee’s on call work activities. The audit lasted 2 weeks.

**Results and Discussion:** During the audit period we were able to contact 16 supervisors (5 trainees and 11 SAS doctors) and 8 consultants. During the audit period of the out-of-hours on call, 90% of supervisors (100% of trainees, 79% of staff grades) were able to correctly identify their supervisors. Similarly, 90% of supervisors correctly identified their supervisee (96% of trainees, 83% of staff grades). The supervisors were contactable immediately in 80% of the time. In 73% of the time, the supervisors have some level of awareness of what the supernisers were doing (80% for trainees, 65% for staff grades) in theatre.

**Conclusion:** Our audit highlighted areas of good level of supervision for our trainees and SAS doctors and a good supervisors’ awareness of theatre activities out of hours. However, we are still concerned with the small number of inability of trainees/SAS doctors to contact supervisors with potential serious patient safety issues. We have recommended a routine supervisor-supervisee ‘check-in’ at the start of duty.

**References:**

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**5928**

**A virtual early warning score using “fuzzy logic” – MEDIWARN**

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**Background and Goal of Study:** The regular measurement of vital parameters by nurses and evaluating them by using an Early Warning Scores (EWS) is crucial in detecting deteriorating patients. This allows a timely attempt at optimisation, reducing patients’ morbidity and mortality and potentially sparing critical care beds. However, EWS use is limited by human factors such as availability, subjectivity, tiredness and costs. The aim of our project is to devise a wireless system which calculates a parameter severity score directly and alerts medical practitioners via common handheld devices. This system has been coined as ‘MEDIWARN’.

**Materials and Methods:** We reviewed data sets from ambulatory tests such a Holter ECG, sleep labs and monitored in-patients to analyse the variability of data and establish criteria for normal patient parameter ranges for heart rate, oxygen saturation, respiratory rate, blood pressure and temperature. We have also used real live values available on the MIMIC-III Clinical Database to corroborate our initial data set. We hence devised an algorithm based on “fuzzy logic” electronic principles that allow early detection and warning of patient deterioration. The results were compared statistically to traditional early warning scores to establish reliability and validity of this new system.

**Results and Discussion:** Purposely designed computer simulators indicate that the Mediwarn algorithm is a useful tool that can be used to detect early deterioration using common non-invasive parameters. We intend to use the MEDiWARN “fuzzy logic” in a future trial on patients in comparison to traditional methods.

**Conclusion:** This innovative project will be advantageous to traditional methods to detect timely intervention in deteriorating patients, in acute medical and surgical wards. This quasi automatic system will also help in reducing staff and medical costs.

**References:**

**Acknowledgements:** European Development Regional Funds, as part of the INTERREG V A-ITALIA – Malta collaboration.
Would the Surgical Safety Checklist (Checklist) prevent or reduced the patient harm.

Materials and Methods: We retrospectively studied the Incidents related to the Checklist were those regarding equipment and medication.

Conclusions: Anaesthesia Incident reports are frequently related to the Checklist and its better implementation could further reduce or avoid harm. Incident Reporting Systems can provide a qualitative description to highlight the Checklist success histories or its gaps.

References:

Incidence of local anesthetic systemic toxicity (LAST) in a high complexity hospital

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Background and Goal of Study: Local Anesthetic Systemic Toxicity (LAST) can occur in any situation local anesthetic are used. The incidence of severe systemic toxicity varies, from 1:500 to 1:100000. In most adverse event reports, incidence of LAST is described as 1:10,000 for epidural anesthesia and 1:1000 for peripheral nerve blocks. Therefore, we wanted to describe LAST’s incidence in our institution surgical areas.

Materials and Methods: A retrospective analysis of 2018 was made using the clinical records and pharmacy records. We included all regional anesthetic techniques found in the anesthesia clinical records. Excluded were the cases where local infiltration or intravenous LA were used. From the pharmacy records we obtained the ID from patients who received lipid infusion as treatment. Then, a review of those clinical records to confirm the LAST event associated with regional anesthesia. We calculated the general incidence of LAST in 2018, per surgical area, and per regional anesthetic technique.

Results and Discussion: A total of 4964 regional anesthesias were performed in year 2018; 2365 spinal, 1023 epidural, 1575 peripheral nerve blocks. Six patients required lipid infusion; 3 cases of LAST were associated to regional anesthesia (1 TAP Block in Central Operating Room (OR), 1 femoral nerve block in Orthopedics OR, 1 epidural anesthesia Obstetrics OR). The other three cases were: 1 case of lidocain venous continuous infusion, 2 cases of use by the surgeon (these cases were excluded). General incidence was 0.6 /1000. Incidence per regional anesthesia technique was 0.9 /1000 per epidural anesthesia; 0/1000 for spinal anesthesia; 1.2/10000 per peripheral nerve block. We can say that our incidence of LAST in concordance with other reports. As study limitations we believe that there can be subclinical complications, non diagnostic by anesthesiologist; being the data collection based on reports, the incidence may be underestimated because of unreported and sub registry. However, with our method, we were able to detect case of LAST not reported by the anesthesiologist and not related to regional anesthesia.

Conclusion: Further investigation in this area is needed, and using LAST incidence as quality and safety indicator should be considered.

A systematic review with meta-regression and meta-analysis of perioperative mortality in older patients

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Background and Goal of Study: Population ageing around the world is increasing dramatically. The percentage of patients classified as ASA physical status ≥ 3 has increased with age and older patients contributed to 1/3 of all surgeries1. This is the first review on global perioperative mortality rates in older patients according to country Human Developed Index (HDI) and time. We tested the hypothesis that perioperative mortality rates are related to country HDI status and have decreased by time.

Materials and Methods: The Institutional Review Board deemed the study exempt from review. A systematic review was performed using electronic databases to identify studies in which older surgical patients presented perioperative mortality rates. Observational studies that reported perioperative mortality rates up to the seventh postoperative day in patients aged ≥ 60 were included. Perioperative mortality rates were analysed by time and country HDI status using a fixed-effects model to perform meta-regression. A random-effects model was applied to perform proportion meta-analysis to compare perioperative mortality rates by country HDI status (low HDI versus high-HDI) and by time periods (pre-1990 versus 1990-2019).

Results and Discussion: Twenty-five studies from 12 countries with more than 4 million anaesthetic procedures were included. Perioperative mortality rates increased compared to pre-1990 to 1990-2019 by meta-analysis in high-HDI countries, the rate per 10,000 anaesthetics of perioperative mortality decreased from 100.85 before 1990s to 12.98 in 1990-2019 (P < 0.0001).

Any analysis could be performed in low-HDI countries since no study evaluated perioperative mortality before 1990s. In the period 1990-2019, perioperative rates were not different between low- and high-HDI countries (P = 0.40). Both meta-regression and proportion meta-analysis showed similar trends of perioperative mortality decrease over time.

Conclusion: There is a decrease in perioperative mortality over time but not according to country HDI. There is evidence that perioperative mortality rates have declined over the past 55 years in the older patients, highlighting that perioperative safety is increasing regardless of HDI countries.

References:

Acknowledgements: CAPES.
with a failure-to-rescue after postoperative patient deterioration. The types of damaging events in failure-to-rescue anesthesia malpractice claims highlight the importance of timely recognition and treatment of postoperative respiratory depression, postoperative surgical bleeding, epidural or spinal hematoma, and patient comorbidities to improve surgical patient safety.

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Intrathecal Morphine: When the unexpected happens

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Background: Esophagectomy is a major surgical procedure associated with severe postoperative pain. Thoracic epidural analgesia has been considered the gold standard for pain management after open esophagectomy.

Case Report: A 50-year-old man, classified as an ASA III physical status and diagnosed with esophageal adenocarcinoma was scheduled for an Ivor-Lewis esophagectomy. The patient's medical history included recent upper digestive hemorrhage, mild anemia and chronic hepatic disease. A preoperative abdominal ultrasound revealed heterogeneous hepatic structure and mild signs of portal hypertension. After placing ASA standard monitors, 650 mcg lumbar intrathecal (IT) morphine were administered and general intravenous anesthesia ensued. Shortly after the beginning of the laparoscopic abdominal time it was realized that there were signs of micronodular hepatic cirrhosis and portal hypertension. After multidisciplinary discussion it was decided not to proceed with the esophagectomy. After 3h under observation in the post-anesthesia care unit he displayed no signs of respiratory depression, variation in conscious status, nausea, vomiting or pruritus. The patient was then transferred to a high-dependency post-anaesthetic care unit where he under surveillance for 24h. The next day he was discharged with no complications recorded.

Discussion: IT morphine can be a powerful adjunct in a multimodal analgesic approach. Dosing consideration should take into account the chronic pain stimulus the patient will be subjected. In the context of a clear intensity reduction of such stimulus, careful observation is required for early detection and treatment of possible dose related side effects due to their high risk.

References:

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Extradural fentanyl overdose- experience from inadequately labeled drug practice

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Background: Mediation errors are a major safety issue in perioperative medicine, intensive care, emergency and pain medicine. Recent observation study has put it as the one in 20.1Drug administration error case report could provide beneficial knowledge of correlation between single dose of extradural opioid and severity and duration of respiratory depression. Absorption and distribution from epidural space is difficult to measure.

Case Report: A 52 y old women was scheduled for elective colon cancer surgery. Due to anesthesia protocol epidural catheter was placed before induction in OETA for intraoperative analgesia with local anesthetic and for postoperative analgesia. After induction in OETA, administered a 4ml of 2% lidocain and monitored a vital sign. 10 min later, anesthesiologist ordered 20mlf fentanyl. The anesthesiologist did not notice the switch since both syringes had same labels with hand written drug names which consequently led to inject 4ml of fentanyl into epidural catheter. Next 4 hours patient did not breath spontaneously, therefore we changed our anesthesia plan and postoperatively she was admitted ICU for prolonged mechanical ventilation and monitoring.

Discussion: Besides case reports, there is lack of information about correlation between neuraxial fentanyl single dose and extent and duration of respiratory failure in practice. Virtually the only mechanism for drugs to make their way into the CSF from the epidural space is by diffusion across the spinal meninges, a small minority of drugs will penetrate the systemic circulation and then appear in the CSF after diffusing out of the spinal cord. Opioids have delayed effect. Extradurally administered 100mcg fentanyl causes profound respiratory depression occurred 100 min later. (3)

References:

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Residual neuromuscular blockade - concerns regarding monitoring practice

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Background and Goal of Study: Neuromuscular block monitoring is an essential tool to prevent residual neuromuscular blockade (RNMB) and its postoperative complications. The level of neuromuscular recovery to ensure patient safety is a train-of-four ratio (TOFr) >0.9. The only way to define precisely RNMB requires the measuring TOFr using quantitative neuromuscular monitoring devices1. Hence, the use of such devices should be encouraged as part of the anaesthetic plan. The aim of this study was to assess the incidence of RNMB and the use of TOF monitors in our hospital.

Materials and Methods: After approval by the institutional ethics committee, a prospective observational study was conducted for 6 months, including adult patients scheduled for elective surgery under general anesthesia (GA) with neuromuscular blocking agents. Upon arrival at the postanaesthetic care unit (PACU), neuromuscular blockade was evaluated using a TOF-Watch SX® device. Three readings were made and the average train-of-four (aTOF) value was recorded.

Results and Discussion: 104 patients were enrolled in the study. RNMB was detected in 7 patients (16.3%). TOF was <0.6 in one patient, <0.7 in one patient and <0.8 in 5 patients. No intraoperative neuromuscular block monitor was used in 89.4% of the patients. Clinical weakness (failure to lift the head and inability to do tongue protrusion for 5 seconds) correlated with an aTOF<0.9 (p=0.002). Severe hypoxemia, defined by a peripheral capillary oxygen saturation<90%, was also associated with RNMB (p=0.000).

Conclusion: At our hospital, neuromuscular block monitors are used in a minority of patients undergoing GA and neuromuscular block, perhaps because of low availability of such monitoring devices. Studies show that monitoring of neuromuscular block is essential and that clinical signs are unreliable for safe extubation. RNMB is associated with critical events and one way to prevent them is to use neuromuscular monitoring in all patients receiving neuromuscular blocking agents. This study shows the long path to make this monitoring standard of practice.

References:
A Retrospective Register Study to Investigate the Influence of Neuromuscular Block Reversal on 30-Day Readmission Rates

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Background and Goal of Study: Unplanned hospital readmissions could be an indication of suboptimal clinical procedures and have been previously shown to cause increased costs to the society. Identifying sources of readmission is therefore important to improve patient safety and enhance patient flow in a clinical setting. Muscle relaxants are routinely applied to facilitate endotracheal intubation, improve surgical working conditions and decrease respiratory adverse events. The aim of this study was to investigate whether reversal of neuromuscular block influences the rate of 30-day readmissions in a University Hospital setting.

Materials and Methods: This was a retrospective, non-interventional registry study that included all laparoscopic procedures conducted between 2013-2018, which involved the use of a neuromuscular blocking agent. Social registries were in addition used to define the use of primary care health services during a 30 day period after the surgery. The depth of neuromuscular block was estimated using the dose of rocuronium. Primary outcome was the rate of readmission during 30 days after the surgery. Secondary outcomes were length of post-operative hospital stay, postoperative complication type and use of primary healthcare services.

Results and Discussion: 316 out of 3787 patients (8.3%) were readmitted within 30 days of their surgery. Of those patients, 11.8 % were categorized as having a deep block and were adequately reversed. There were no differences in hospital stay between groups that received a reversal agent vs. no reversal agent. The most common causes of readmission were post-operative pain or infection. The patients receiving a deep block and a reversal agent utilized less primary care services during the 30-day post-operative period in comparison to patients who received a moderate block (5.3 % vs. 31.2 % ). Patients who received a reversal agent had less primary care visits than patients who were not reversed (10.8 % vs. 25.4 % ).

Conclusions: The incidence of readmission was lower among patients who received a deep neuromuscular block and a reversal agent. The use of a deep block and a reversal agent were both associated with less primary care visits.

Life after sugammadex: incidence of residual neuromuscular blockade in a post-anæsthetic care unit. A prospective, blinded study

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Background and Goal of Study: Neuromuscular blockers (NMBs) are used in everyday anaesthetic procedures to facilitate endotracheal intubation and optimize surgical conditions. Proper reversal of its effect is essential to prevent postoperative complications such as upper airway collapse and ventilatory impairment. This study aimed to determine the incidence of residual neuromuscular blockade (rNMB) in the Post Anaesthetic Care Unit (PACU) of a public hospital in Portugal.

Materials and Methods: The selected patients underwent general anaesthesia and antagonism of muscle relaxation according to train-of-four ratio (TOFr) at extubation with a muscle relaxant antagonist. Patients were monitored using TOF Scan® and TOF measurements were performed upon admission and discharge from the PACU. The drugs and doses administered were sole responsibility of the anaesthesiologist in the room and there was no interference from those responsible for the study. The muscle relaxant and antagonist used, demographic and anthropological data, classification of physical status according to the American Society of Anaesthesiology (ASA PS), TOFr at the times of extubation, admission and discharge from PACU, as well as other complications at the PACU, were recorded and analysed with descriptive statistics.

Results and Discussion: 42 patients met the eligibility criteria. Mean (SD) age was 50.4 (21.6) years and 61.5% of patients were female. 45% were classified ASA PS II and 40% ASA PS III. In all patients, neuromuscular blockade was performed using Rocuronium and its reversal using sugammadex. There were no episodes of rNMB in the PACU as all patients presented TOFr ≥ 90 % at admission and discharge. The mean TOFr was similar at admission was (96.6%; range: 91% - 100%) and at discharge (97.5%; range: 90% - 100%). No postoperative complications were reported in the PACU. The absence of rNMB in our study is consistent with an international study and with the trend shown in others.

Conclusion: This study confirms that sugammadex is an agent that assures full recovery of neuromuscular blockade. Nevertheless, the possibility of rNMB occurrence, and the potentially fatal complications that may arise from it, cannot be excluded, stressing the importance of reversal according to TOFr.
Are preoperative fasting recommendations safe?

About one case of unusual full stomach: peri operative haematemesis

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Background: The ESA guidelines recommend 6h of preoperative fasting (POF) for solids and 2h for clear fluids in adults. We present a case of perioperative haematemesis, which interfered with POF.

Case Report: This 34-year old patient scheduled for an outpatient surgical operation. Postoperative C-spine plain film showed CVC went cephalad to left lower rates of complications.

Background: Ultrasound-guided CVC catheterization has gain popularity due to its impact over the sigmoid colon. However, the operator suspected air leakage from colonoscopy, only had a history of asthma and atopic dermatitis, and no gastrointestinal symptoms. she had received instructions for POF preoperatively. On the day of surgery, while she was waiting to be transferred to the operating room (OR), 30 minutes before surgery, she drank 200mL of water. When arriving in the OR, this insobervance of the POF was detected during checklist. A 10mg intravenous dose of metoclopramide was administered and surgery was delayed for 2 hours. The patient was informed and the anaesthetic plan was changed.

Two hours after, a spinal anaesthesia was performed uneventfully and the patient went through surgery without incident. At the end of surgery, the patient began to be agitated and complained of dizziness and nausea. 2mg of IV Midazolam plus 4mg IV ondansetron were administered. Surgery was finalized and she was transferred to the PACU. Few minutes after admission to the PACU, she presented an episode of haematemesis which did not require blood transfusion, even though her haemoglobin had dropped 3g/dL. A sclerosis of a bleeding gastric ulcer was performed, and she was admitted to the ICU. During her stay in the ICU, she developed a pulmonary embolism and a pulmonary infection. After a favorable evolution, the patient was discharged to the ward after 6 days, and home on day 14.

Discussion and Conclusion: The emergence of an haematemesis as the revealing sign of a gastric ulcer in the perioperative period is a very infrequent sign of full stomach. The respect of guidelines for POF does not guarantee that the patient has an empty stomach. The performance of perioperative stomach ultrasound screening might help to assess gastric content preoperatively 1. The checklist, which is recommended by the OMS and the ESA, 2 permits to detect risky conducts of the patients, take corrective measures, to avoid further complications. Finally, stress ulcer prophylaxis might help to avoid this complication, even though it is not indicated in low risk patients 3.

References:
2. EJA 2010; 27: 592; 597.

Learning points: Gastric Ulcer can reveal in the perioperative period by an acute haemorrhage.

Bilateral tension pneumothorax with massive subcutaneous emphysema after diagnostic colonoscopy in a patient with ulcerative colitis: a case report

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Background: In previous reports, some patients suffer bilateral tension pneumothorax after colonoscopy1. We report a case with ulcerative colitis(UC) also had catastrophic complications with bilateral tension pneumothorax after colonoscopy. The patient was admitted to intensive care unit for conservative treatment. However, sepsis and peritoneal signs developed 3 days later, and the biopsy pathology reported adenocarcinoma. Total colectomy and protective ileostomy was performed. Finally, he was discharged 7 weeks after surgery. His pneumothorax and subcutaneous emphysema were resolved without any clinical sequelae.

Discussion: Ulcerative colitis is a risk factor for colon perforation during colonoscopy2. Persistent inadequate air inflation during colonoscopy is a warming sign of colon perforation. The massive air entry via the colonic perforation leading to passage into retroperitoneal space causing pneumomediastinum, pneumomediastinum, pneumothorax, and subcutaneous emphysema3.
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Postural change-related movement of peripherally inserted central catheter’s (PICC) tip may cause potentially severe cardiac arrhythmias: A report of 2 cases.

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Background: Safety of peripherally inserted central catheters (PICCs) has been widely accepted and introduction of magnetic tracking and ECG-guided tip confirmation systems (TCS) has allowed PICCs to be inserted bedside even without confirmatory X-ray or fluoroscopy. The TCS relies on ECG signals collected from the catheter guidewire and facilitates positioning of the catheter’s tip near the cavoatrial junction (CAJ), which is currently considered as the most optimal site for catheter tip placement. Notwithstanding reported safety of PICCs, complications related to tip placement have not been sufficiently studied. We present 2 cases of severe cardiac arrhythmias that occurred under general anesthesia upon changes in patient body position.

Case Report: Case 1. A 44-year-old woman, 155cm, 62kg, was scheduled for postural changes, taken immediately after PICC insertions might be necessary to detect arrhythmias and early adjust the position of the catheter tip.

Learning points: Inadequate air inflation during colonoscopy is a warning sign of colon perforation.

References:

Learning point: Inadequate air inflation during colonoscopy is a warning sign of colon perforation.

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Postoperative ST depression caused by secondary hypokalemia to salbutamol overdose

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Background: Salbutamol is a frequently used bronchodilator drug not without adverse effects. We present a case of postoperative ST depression secondary to moderate hypokalemia due to salbutamol.

Case Report: 39-year-old obese male presents billous vomiting and bronchoaspiration with severe bronchospasm and secondary hypoxemia after anesthetic induction for drainage of a perianal abscess. Hydrocortisone and 100 mcg of intravenous salbutamol are administered during surgery associated with multiple administrations of inhaled salbutamol through the endotracheal tube. Once the intervention finished, is transferred to Anesthesics Intensive Care Unit for progressive withdrawal of mechanical ventilation. Upon arrival at the unit, presents sinus tachycardia, generalized ST depression and QT prolongation. Arterial gasometry shows mixed acidosis and moderate hypokalemia (2.7mEq/L). Potassium chloride is slowly administered with correction of potassium levels and progressive correction of EKG abnormalities. There was no significant elevation of troponins and the echocardiogram performed did not show signs of myocardial dysfunction. The patient was discharged to ward at 48 hours.

Discussion: Salbutamol has an important bronchodilator effect due to β2 adrenergic stimulation. Also activates the Na-K-ATPase pump that catalyzes the entry of potassium into the cell, decreasing plasma levels. Each dosage of inhaled salbutamol contains up to 0.1mg of drug. Repeated administration associated with intravenous infusion can produce toxic plasma concentrations and increase the risk of side effects2,3.

References:

5705

Peri-cardiac arrest during endoscopic retrograde cholangiopancreatography – deep sedation or general anesthesia?

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Background: ERCP has evolved from being a simple diagnostic procedure to a therapeutic one where the anesthesiologist has become a vital member of the team. Many of the patients are unfit for surgery and at high risk for sedation-related adverse events. Sedation or general anesthesia is generally indicated for the increasingly complex, long and painful procedures being performed.

Case Report: A 83 year-old male of ASA physical status class 3, with controlled hypertension, obesity and dementia was posted for ERCP due to acute cholangitis caused by gallstones. A target controlled infusion (TCI) was initiated with 300 mg of propofol and 25 mg of ketamine and a effect-targeting model was used and adjusted according to the patient’s haemodinamic state and painful stimulus of the procedure. Approximately 50 minutes later, oxygen desaturation to SpO2 50% developed, the procedure was interrupted and the patient moved to a dorsal decubitus position. Face mask ventilation was tempted without any improvement so tracheal intubation was performed and succinylcholine administration. Concomitant bradycardia issued and a total of atropine 4.5mg, ephedrine 10mg and adrenaline 0.4mg i.v. were administered. Perfusion of noradrenaline initiated. Patient’s vital signs were restored. The patient was transferred intubated to the PACU where he stayed for 10 hours under ventilatory support. He was successfully extubated after 3 hours. Myocardial infarction type 2 was diagnose with the elevation of troponin from 39.5 to 1156 pg/mL. No complications occurred during the post-sedation period and the patient was discharged 4 days after ERCP.

Discussion: Anesthesia in a nonoperating room has always been risky. Some advocate that in patients at high risk for sedation-related adverse events undergoing ERCP, endotracheal anesthesia is associated with significantly lower incidence of adverse events, without impacting procedure duration, success, recovery or in-room time2.

References:

Case report: Could the notion of allergic contact dermatitis caused by newspaper ink have foreseen a double cardio-pulmonary arrest following the induction of anesthesia?

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Background: The occurrence of an anaphylactic reaction is a great concern, because it may be potential life threatening 1.

Case report: A 75 year old male, ASA II patient was scheduled for an operation under general anesthesia (GA). She has had two uneventful interventions under GA in the past. Anesthesia was induced with sufentanil, lidocaine and a TCI of propofol. Within 30 sec after administration of rocuronium the patient developed severe bronchospasm with cardiovascular collapse and a generalized erythema. Tracheal intubation was performed. Bolus doses of epinephrine up to 50 µg, promethazine 50 mg IM, methylprednisolone 1000 mg IV, ranitidine 50 mg IV and fluid resuscitation were administered. As the patient developed an asystole, CRP was initiated. After 30 min CRP and a total dose of 3 mg epinephrine the patient regained ROSC. An echocardiography showed a Takotsubo syndrome. Plasma tryptase levels were positive. Skin tests, performed 4 weeks later showed a + Return of Spontaneous Circulation (ROSC). A continue infusion of norepinephrine was started, ipratroprium bromide and salbutamol aerosols were given, Suggamadex of Spontaneous Circulation” (ROSC). A continue infusion of norepinephrine was started, ipratroprium bromide and salbutamol aerosols were given, Suggamadex was administered as antitode and surgery was postponed. For transfer to ICU, 5 mg midazolam IV and 10 mg cis-atracurium IV were given followed by a second episode astyole requiring CRP during 10 min and administration of 2 mg epinephrine before patient regained ROSC. An echocardiography showed a Takotsubo syndrome. Plasma tryptase levels were positive. Skin tests, performed 4 weeks later showed a positive response to rocuronium and cis-atracurium. Afterwards the patient mentioned a contact dermatitis for newspaper ink and difficulties with detergents. 6 weeks later patient was operated under locoregional anesthesia.

Discussion: Quadratyem ammogous groups are ubiquitous epitopes contained in many drugs and chemicals.3 Many patients with allergic disorders have elevated levels of total IgE. Recognition of these ubiquitous epitopes may account for the extensive cross-reactivity between NMBAs even other chemical structures.


Learning points: Dismissing a possible allergy is an error that cannot be made, an extensive allergy anamnesis is primordial for good clinical practice.

Case report of an anaphylactic cardiac arrest in perioperative period caused by ceftriaxone – a challenging diagnosis and an ineffective allergy notification

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Background: The diagnosis of perioperative anaphylaxis is a difficult challenge, since the patient is often under general anesthesia, with anesthetics that can mask anaphylaxis cardiovascular effects, covered by surgical drapes that hide mucosal and cutaneous signs. After anaphylaxis, notification of the event, is extremely important to prevent recurrence.

Case Report: We report an intraoperative anaphylaxis caused by ceftriaxone in a 65 year old male, ASA IV, with elevated cardiovascular risk (risk class IV in the RCRI of Lee2), recently referred for implantation of CRT-D. The patient was submitted to combined anesthesia for a nephrectomy due to severe kidney cyst bleeding refractory to conservative measures, with history of previous uneventful general anesthesia. After induction and ceftriaxone administration, patient presented with sudden low etCO2, followed by rapid onset hypertension, tachycardia, desaturation, with 2th cardiorespiratory arrest within minutes with PEA. Immediate removal of surgical drape unveiled discrete erythematous papules in the upper limbs. The patient recovered after immediate and successful approach in the OR, comprising a total of 3mg of adrenaline and 4 cycles of ALS, and was discharged after 27 days in good health with CRT-D. Unfortunately, and despite the application of several alert strategies after the event, the patient died nearly two months after discharge, due to cardiac arrest after re-administration of ceftriaxone in the same hospital in the emergency department.

Discussion: The undesirable outcome of this case should lead to improvements in the drug allergy alert system. This case could also raise the discussion about the prescription management system itself, proposing that it should alert and prevent the prescription of drugs to patients that are being studied for possible allergic reactions.


Learning points: This case report exposes the difficulties of predicting and diagnosing peroperative anaphylaxis during intraoperative period, but it also shows that it is necessary to rethink notification and alert strategies for suspected allergies.
Opioid-induced respiratory depression in patients monitored by capnography and pulse oximetry during fentanyl-based intravenous patient-controlled analgesia

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Background and Goal of Study: Opioid induced respiratory depression (OIRD) is one of the common adverse effects of opioid in the surgical patients during the postoperative period. Some reports have shown that continuous capnography and pulse oximetry monitoring reveals frequent desaturation and bradypnea during intravenous patient controlled analgesia (IVPCA). One of the risk factors for postoperative OIRD is background opioid infusion. The aim of this observational cohort study was to assess the incidence of respiratory depression (RD) using continuous capnography and pulse oximetry monitoring during fentanyl-based IVPCA.

Materials and Methods: After IRB approval and written informed consent, 122 subjects were enrolled in the study in a prospective cohort study. They received fentanyl-based IVPCA with background infusion after surgery. We monitored noninvasive end-tidal CO2, RR and SpO2 with Capnostream™ respiratory monitor (Medtronic) after operation until next morning. Each subject was clinically monitored per standard of care. The monitor was blinded and alarms silenced. We investigated RD episodes during respiratory monitoring and its total time. Data suggestive of RD episodes included any of following: etCO2 ≥ 60 mmHg for ≥3 minutes, or RR ≤ 5 breaths for ≥3 minutes, or SpO2 ≤ 90% for ≥3 minutes, or Apnea episode lasting >30 seconds. Data comparison between patients with and without ≥1 OIRD episode was performed. Variables collected included gender, height, weight, operating time, and STOP-BANG score.

Results and Discussion: Discussion: 93 of the 122 patients (76%) were included in the study. The incidence of OIRD was 25.8% (24/93). The average age for the RD group (69 ± 9) was significantly higher than the average age for the non-RD group (58 ± 16) (P=0.004). There was no difference in BMI, operating time, STOP-BANG score between the two groups. Of the 24 patients who had RD, 18 patients were undergoing cancer surgical procedures and only 6 patients were undergoing surgery for non-cancer procedures. The patient who required clinical interventions for suspected RD, OIRD occurred not only within 2 hours after discharge from the recovery room but also frequently within 2 hours following surgery. There were more episodes of hypoxemia (88 episodes) than hypoxia (13 episodes). The fall in SpO2 only occurs after a few minutes when respiratory stops. With capnography, CO2 waveform ceases as soon as apnea occurs. CO2 monitoring provides early detection of airway obstruction.

Conclusion: Continuous capnography and pulse oximetry can aid in patient management and safety for fentanyl-based IVPCA.

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Nasogastric tube placement - are we doing it wrong?

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Background: The placement of a nasogastric tube is a very common procedure in the anesthesiologist's clinical practice. However, even though there are several series of anesthesiologists described in the literature, the common practice continues to be placing it using blindly and not monitor its final position with proven tests. Moreover, most tubes are placed in the anesthetized patient, making impossible an early warning sign that something might be wrong.

Case Report: A 45-year-old man, ASA III, underwent partial glossectomy for 93 of the 122 patients (76%) were included in the study. Brain - Derived Neurotrophic Factor (BDNF) is described 1. It’s well established that final positioning of the nasogastric tube must be confirmed. The current gold-standard for its verification is radiography. However, along with interventions, such as endotracheal intubation, orotracheal intubation, or pharyngolaryngoscopy, 1. This case report focuses on the anesthetic implications of a patient with cold-induced urticaria with systemic reactions who had been advised to carry an adrenaline autoinjector.

Discussion: Cold urticaria poses underestimated challenge for anesthesiologists. Proper preoperative assessment is crucial to prevent life-threatening events, as angioedema or anaphylaxis 2. This case highlights that many procedures which may not typically be considered harmful to patients, may have serious and potentially life-threatening implications for a patient with cold urticaria.

References:

4925
Chronic pain therapy with opioids in non-cancer patients may be associated with cognitive impairment

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Background and Goal of Study: Brain - Derived Neurotrophic Factor (BDNF) is one of the newest markers of regenerative abilities and neurodegenerative disease of human brain, which can be also used as biomarker in clinical practice. Its reduced one of the newest markers of regenerative abilities and neurodegenerative disease.

Methods and Materials: The project was approved by Ethical Committee of Medical University in Białystok (Poland). Group of 36 patients suffering from chronic low back pain and treated with opioid therapy (study group) and group of 14 healthy volunteers (control group) were included in our study. Both groups had anthropometrical parameters taken, as well as information about duration of opioid therapy, type of opioid, total dose and form of application were registered from study group. In both groups measurement of BDNF were performed using Enzyme-Linked Immunosorbent Assay (ELISA) test for BDNF (immunodiagnostik, Germany). Data were analyzed using non-parametric tests.

Results and Discussion: The median BDNF value in study group was 9.56 – 14.73 ng/mL and compared to control group with median BDNF value 23.89 – 29.61 ng/mL. In patients with oxycodone, BDNF levels were significantly lower than in patients with fentanyl-based IVPCA.

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Anaesthetic implications of a patient with cold urticaria – a case report

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Background: Cold urticaria consists of an allergic immune response after cold exposure with symptoms ranging from pruritic wheals to life-threatening angioedema, bronchospasm, or anaphylactic shock 1. 1. This case report focuses on the anesthetic implications of a patient with cold-induced urticaria with systemic reactions who had been advised to carry an adrenaline autoinjector.

Case Report: A 16-year-old male was scheduled for a pilonidal cystectomy. He gave a clear history of cold-induced urticaria, including labial edema after eating ice-cream and generalized urticaria, facial angioedema and syncope after submersion on summer water. Following a immunoallergology evaluation, a ice cube test was performed and revealed positive. He was also being investigated for Alport syndrome due to gross hematuria and sensorineural hearing loss. His home medication included enalapril, methylprednisolone aceponate and bilatine SOS. No previous history of surgical or anaesthetic procedures. The team was informed of his condition and a subarachnoid block was performed with 8 mg of hyperbaric bupivacaine. For skin preparation prior to the neuraxial block, povidone-iodine solution was used as an alternative to alcohol containing solutions, and light touch instead of ethyl chloride spray was used to assess the level of the sensory block. Normothemia was maintained with forced air warming blankets and careful monitoring of core and ambient temperature in the operating room. The surgical procedure progressed without complications and the patient went home the following day.

Discussion: Cold urticaria poses underestimated challenge for anesthesiologists. Proper preoperative assessment is crucial to prevent life-threatening events, as angioedema or anaphylaxis 2. This case highlights that many procedures which may not typically be considered harmful to patients, may have serious and potentially life-threatening implications for a patient with cold urticaria.

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Nasogastric tube placement - are we doing it wrong?

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Results and Discussion: The median BDNF value in study group was 9.56 – 14.73 ng/mL and compared to control group with median BDNF value 23.89 – 29.61 ng/mL. In patients with oxycodone, BDNF levels were significantly lower than in patients with fentanyl-based IVPCA.
with buprenorphine or tramadol, (p<0.005). Levels of BDNF serum concentration were positively correlated with age and daily dose of opioid. Opioid use may result in decrease of cognitive function, addiction and increasing opioid tolerance. Correlation between different opioid analgetics used in non-cancer patients and the gradual narrowing of the carotid artery cannot be completely limited. This paper aims to establish a model of bilateral carotid stenosis with mild cognitive dysfunction and mild white matter changes to simulate patients with vascular dementia.

Materials and Methods: Aged (18months) Wistar rats underwent bilateral common carotid artery stenosis (BCAS) or occlusion (BCAO) surgery or were sham-operated (control group). Cerebral blood flow (CBF) in the frontal cortices was measured using Doppler flowmetry. Cognitive function impairments were detected with the Morris water maze test on day 30 after surgery. Cerebral magnetic resonance imaging (MRI) detected changes in fractional anisotropy (FA) to assess the white matter injury in rats on day 30 after surgery. Additionally, histological studies were performed at 30 days after surgery.

Results and Discussion: The mortality was 11% (30/34) in the BCAS group. At 2 h, the CBF values (ratio to preoperative values) were significantly decreased to 77.3 ± 13.4% in the BCAS group but to 37.3 ± 12.5% in the BCAO group. In the BCAS group, the microscopic structure of the hippocampal CA1 region changed slightly after 30 days. The difference between the escape latencies in the BCAS model and control groups was significant less than that in the model group (P < 0.05). The hnRNPA2 and GABAAR-α1 expression levels were significantly decreased in the BCAO group. In MRIs, the FA values in the hippocampus was filled by Astrocytes in the brain of BCAS rats, and this phenomenon was even more pronounced in the BCAO group. Cerebral blood flow (CBF) in the frontal cortices was measured using Doppler flowmetry. Cognitive function impairments were detected with the Morris water maze test on day 30 after surgery. Cerebral magnetic resonance imaging (MRI) detected changes in fractional anisotropy (FA) to assess the white matter injury in rats on day 30 after surgery. Additionally, histological studies were performed at 30 days after surgery.

Severe bilateral carotid stenosis induced mild cognitive dysfunction and slight structural changes in the brain of aged rats. This study established successfully a chronic cerebral hypoperfusion model.

Effect of the administration of Hydroxyethyl starch on the recovery of renal function in laparoscopic living donor nephrectomy

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Background and Goal of Study: Currently, the use of hydroxyethyl starch (HES) solutions has been restricted due to their potential association with the development of renal failure in certain clinical settings. In this sense, its administration as a perioperative strategy to avoid hemodynamic compromise during laparoscopic living donor nephrectomy (LLDN) is questioned. The main objective of this study is to compare the recovery of renal function in patients undergoing LLDN with and without perioperative administration of HES.

Materials and Methods: Retrospective single-center observational study (January 2010 – December 2017) of patients undergoing LLDN. Two groups were defined: group H includes patients who received 6% HES 130 / 0.4 within 24 hours of the perioperative period and in group N those who did not receive it. The main variable is the recovery of renal function by compensating the remaining kidney one year after the nephrectomy. We evaluated this compensation using the renal compensation rate [RCR = (eGFR per year of nephrectomy / eGFR predonation) * 100], with eGFR being the estimated glomerular filtration rate. Other variables collected: demographic data, amount of HES administered (ml / kg weight) and eGFR using the CKD-EPI equation at different times (predonation, discharge, 1 month, 3 months 6 months and one year). Quantitative variables are expressed as mean and standard deviation; categorical variables as a percentage. Comparisons were established between the groups described by Student's t-Test for continuous variables.

Results and Discussion: A total of 89 donors were included (group H = 65 / group N = 24). Demographic characteristics were similar in both groups. In group H, the amount of HES administered was 17.24 ± 5.6 ml / kg, in any case exceeding the maximum recommended dose (30 ml / kg). No statistically significant differences were found between both groups in the eGFR measured at the different time intervals (p> 0.05). The RCR (%) in group H was 67.7 ± 8.72 vs. 65.1 ± 7.3 in group N (p=0.72).

Conclusion: Perioperative administration of HES in patients undergoing LLDN does not appear to compromise the recovery of renal function one year after surgery.
Use of oxygen therapy in the Postanaesthesia Care Unit and neuromuscular blocking agents monitoring and reversal in the OR in a tertiary hospital

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Background/Goal of Study: Transitory arterial hypoxemia is one of the most common postanesthetic complications. This study reports the incidence of hypoxemia that is usually treated with oxygen therapy (OT). Incomplete recovery of neuromuscular function may impair pulmonary and upper airway function and contribute to adverse respiratory events in the postanaesthesia care unit (PACU). Aim of the study was to analyse the use of OT in the PACU and neuromuscular blocking agents (NMBAs) and reversal in the OR in a tertiary hospital.

Materials/Methods: This was a prospective, descriptive, observational study. After obtaining institutional Ethics Committee approval and written informed consent, all consecutive adult patients scheduled for any type of surgery under general anaesthesia (GA) or sedation were included during 3 months (August-October 2019). Data recorded were: demographics, comorbidities and variables according to the ARISCAT criteria, type of surgery and anaesthesia, use of NMBAs monitoring/reversal, SO2 at different times and postoperative use of OT, reversal and signs. Student’s t-test and Chi-square test were used for analysis using SPSS®. Data are presented as absolute numbers and/or percentages. A p-value<0.05 was considered to be statistically significant.

Results/Discussion: A total of 101 patients were included (57.4% women, mean age was 63.6±14 years, ASA16%, II62%, III23%, GA 69.3%, smokers 23.8%, respiratory comorbidities 24.8%), 64.4% underwent thoracic or abdominal surgery (mean duration 2 h in 48.5%). Mean preoperative baseline SO2 was 96.1±6.9%, mean OT at arrival to PACU was 95.1±3.1%. In the PACU OT was given in 51.4% of the cases using nasal cannula; it was maintained 1 h in 53% and in 24.8% when discharge to ward. We observed that in 34% of the patients coming from OR arrived to PACU with a SO2<96% and oxygen therapy was not given, while in 56.3% of the patients presenting SO2>96% oxygen therapy was administered. On the other hand, NMBAs were used in the OR in 63.4% of the GA; neuromuscular reversal with sugammadex was performed in 61.4% of the patients while only in 32.7% of the GA a neuromuscular blockade monitoring was performed intraoperatively.

Conclusions: In our setting, an inappropriate use of OT in PACU and an inadequate use of NMBAs monitoring and reversal in OR were observed. It is crucial to design specific protocols of oxygen therapy administration in our PACU and neuromuscular monitoring and reversal in the OR in order to improve patients outcome.

5808
Postoperative coagulation disorder in major hepatectomies in major hepatectomies: safety of epidural catheter for perioperative analgesia

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Introduction: Coagulation disorders can appear after liver surgery. In major resections, these disorders appear more frequently. Accidental withdrawal of an epidural catheter in these conditions could increase spinal haematoma incidence.1 The aim of our study is the evaluation of epidural catheter safety, having into account the evolution of coagulation parameters in major and minor hepatectomies.

Material and methods: We performed a retrospective review of a prospective, unicenter, observational database including all patients who get hepatic surgery from January 2015 to November 2019. Patients were classified into major hepatectomy or minor hepatectomy groups. Demographic preoperative data, bleeding and transfusion requirements, fluids administration and evolution of coagulation parameters (prothrombin time [PT], partial thromboplastin time [aPTT] and platelets count [PC]) were analysed. For safety analysis, we considered the institutional laboratory thresholds and the accepted in some hepatic surgery groups.1 The differences between esophageal and iThermonitor temperature within ±0.5°C and ±0.3°C and correlation between the two temperatures were 0.842 (P<0.001). The proportion of difference value less than 0.5°C between the two temperatures is 84.71%, and the accuracy is ±0.5°C. In subgroup analysis, group A (operative time<120min, n=23), group B (operative time:120-180min, n=38) and group C (operative time>180min, n=18), the correlation coefficient between esophagus and iThermonitor were 0.70 (P<0.001), 0.85 (P<0.001), and 0.85 (P<0.001), respectively. The differences between esophageal and iThermonitor temperature within ±0.5°C is 80.86%, 87.75% and 87.47%, and Bland-Altman analysis shows accuracy are ±0.66°C, ±0.59°C and ±0.54°C for the above three groups, respectively. This result may suggested that iThermonitor need a measurement stabilization process.

Conclusions: When temperature sensor is covered by the external heating blanket iThermonitor was not affected. The accuracy is significantly lower when operative time less than 120min. iThermonitor were stable and well consistent with esophageal temperature when operative time is longer than 2 hours.

Acknowledgements: We thank the Chinese Evidence-based Medicine Center West China Hospital, Sichuan University for providing statistical consultation.

5695
Comparison between open source and trained neural network model in face detection for critical ill patients

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Background and Goal of Study: Rapid response system is one of the strategies to prevent in-hospital emergency. This early intervention is known to improve patient’s prognosis, but medical staffs required to triage to activate the system. For triage, early warning score (EWS) with vital signs and patient’s consciousness are often used. Although vital signs are automatically collected from biological monitoring system, consciousness level are difficult to obtain automatically. The aim of this study is to consider the usage and possibility of face detection system by camera monitoring to evaluate patient’s consciousness automatically.

Materials and Methods: We prospectively collected data of patients who were admitted to ICU in Yokohama City University Hospital from July 2018 to March 2019. 2000 images were randomly extracted from recorded video clips of ICU patients who agreed to this study. We used three types of face detection models: haar cascade, Multi-task Cascaded Convolutional Networks (MTCNN), Single Shot MultiBox Detector (SSD), former two models are open-sourced model, and latter model is based on convolutional neural network (CNN) of ICU images. We calculate the success rate of detecting the patients face or eyes with these models.
Results and Discussion: Randomly selected 25 images of 25 patients were used for comparison. Accuracy of face detections were 16% with haar cascade, 40% with MTCNN, and 84% with SSD. In addition, accuracy of eye detections were 4% with haar cascade, 36% with MTCNN, and 48% with SSD. These results indicate the efficacy of trained CNN, especially based on IUC. ICU patients are often in quite unique situation, like oxygen therapy, intubated patients, extracorporeal circulation, and more. When it comes to face detection, devices around the face can be obstacle. Thus, it makes sense that SSD, a trained CNN based on IUC, can be more clinically accurate. More detailed training about, for example, face direction, illumination, and types of oxygen therapy devices, will be required for higher accuracy.

Conclusion: The trained neural network model based on IUC images was able to detect patient's face with higher success rate than other detecting models. In the face detection model become able to recognize patient's eye opening too, it can lead to possibility of automatic system to calculate EWS and be a continuous monitoring, warning system not only for patients, but also for medical staffs.

Geriatric Anaesthesiology

Incidence and risk factors of postoperative delirium after orthopaedic surgery in the Irish population: a cross-sectional study
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Background and Goal of Study: Postoperative delirium is associated with increased risk for morbidity, cognitive deterioration and delayed rehabilitation. The incidence of postoperative delirium after orthopaedic surgery and to identify preoperative and perioperative characteristics in older adult patients undergoing elective or emergency orthopaedic surgery that predisposes them to developing postoperative delirium.

Materials and Methods: Design: This single-centred prospective observational study was conducted at the preoperative and post-anaesthesia care unit at Cork University Hospital. Patients: 43 participants were included in the study. Inclusion criteria: (1) Sixty years and older; (2) Scheduled for elective or emergency orthopaedic surgery; (3) Possessed the ability to provide informed consent; and (4) Proficient in English. Exclusion criteria: (1) Patients with a history of delirium. Primary outcome measurement: CAM-ICU was used pre- and postoperatively to assess for delirium.

Results: The incidence of immediate postoperative delirium in the study population was 7%. Risk factors for the development of postoperative delirium included an increase in the patient's previous psychiatric history (p = 0.003), whether inotropic support or reversal of neuromuscular blockade was required intraoperatively (p = 0.018 and p= 0.019, respectively).

Conclusions: Elderly patients undergoing orthopaedic surgery are at considerable risk of developing postoperative delirium. Risk factors included individuals with a previous psychiatric diagnosis or diagnoses, the requirement of intraoperative inotropes, and general anaesthesia. In order to prevent the development of postoperative delirium, it is critical for older patients to be assessed regularly for psychiatric conditions and cognitive status prior to orthopaedic surgery. Care should be taken to minimise blood pressure fluctuations and periods of hypotension intraoperatively.

References:

Establishment of Preoperative Predictive Model for Postoperative Delirium in Elderly Patients Enduring Non-cardiac Surgery
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Background and Goal of Study: In order to identify high-risk patients early and improve the prognosis of patients with POD, this study aims to establish preoperative predictive model of POD in elderly patients enduring non-cardiac surgery.

Materials and Methods: Delphi method and literature analysis were used to design a POD risk prediction model. For establishing the model, the POD risk index of patients was evaluated according to the score, and prospective cohort study was conducted. A total of 545 patients aged over 65 underwent the non-cardiac surgery were recruited. Demographic data, clinical history and risk factors of delirium were collected within 48 hours before operation. Patients were followed up daily from 1-3 days after operation to evaluate the occurrence of POD and record other important clinical outcomes. And then, the patients were followed up by telephone at 7 days, 1 and 3 months after operation to evaluate the long-term cognitive function and prognosis. The discrimination of the model was tested by drawing the receiver ROC and calculating the AUC. The calibration of the model was evaluated by Hosmer-Lemeshow goodness-of-fit test.

Results and Discussion: The model consisted of 9 item and was expressed by POD risk index with 11 points. In the validated study, 489 patients were included in the model and the overall incidence of POD was 6.13%, including 2.75% in orthopaedists, 2.44% in gastrointestinal surgery, 10.48% in hepatobiliary and...
The Prospective observational parallel group study was associated with low preoperative cognitive function score and a history of delirium (P<0.05). The POD risk index was significantly correlated with TICS-m score on the 7th and 1st month after surgery, ICU admission, length of stay and hospitalization expenses (P<0.05).

**Conclusion:** Postoperative delirium risk predictive model established in this study can effectively predict the occurrence of delirium in elderly patients enduring non-cardiac surgery, and high POD risk index is associated with lower postoperative cognitive function score, higher ICU admission, longer length of stay and increased hospitalization costs.

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**Results and Discussion:** The incidence of delirium at PACU of group D was lower than that of group C (20% vs 46.7%, P = 0.028). The incidence of delayed delirium on postoperative day in group D was lower than in group C (6.7% vs 26.7%, P = 0.038). During surgery, the relative band power of delta wave of group D was lower than that of group C (40.45 ± 2.00% vs. 47.42 ± 2.89%, P = 0.006). At PACU, the relative band power of beta activity of group D was lower than that of group C (14.08 ± 2.512% vs. 20.73 ± 3.652%, P = 0.039). Group D patients stayed in the hospital during a shorter time than in the group C (12.63 ± 1.59 days vs. 16.20 ± 1.50 days, P = 0.036). Pain score, rescue analgesic amount and adverse events including hypotension and bradycardia were not significantly different between the two groups.

**Conclusion:** The dexmedetomidine infusion during surgery and PCA administration reduced POD in PACU, the incidence of delayed delirium in ward and the length of hospital stay. Dexmedetomidine also lessens the relative band power of delta wave of EEG during surgery.

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**Background:** Postoperative cognitive dysfunction (POCD) in elderly adults occurs frequently and has been related to both postoperative morbidity and mortality.1 Extensive and time consuming neuropsychological assessment (NPA) of patients is still the gold standard for diagnosing POCD. This requires time consuming face-to-face administration, which is not always feasible. The Telephone Interview for Cognitive status (TICS) and The Montreal Cognitive Assessment (MoCA) have not been validated in this context. We aim to validate the TICS and MoCA questionnaires with NPA as gold standard.

**Materials and Methods:** This is a single centre prospective cohort study. 120 patients will be included. The study population consists of patients of 65 years and older without previously diagnosed cognitive impairment, undergoing elective surgery in the Amsterdam UMC, location AMC. Main study endpoints are clinimetric and pre- and postoperative relation for the TICS, MoCA and NPA. The area under the curve, sensitivity and specificity will be determined.

**Results and Discussion:** Up until now 48 patients are included. At time of the conference we will present our data on the entire cohort of 120 patients.

**Conclusion:** The results of this validation study will potentially lead to the availability of two additional validated POCD screening tools. These screens can be used in the preoperative evaluation of older adult patients to screen for both pre-existing and postoperative cognitive dysfunction.

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**Conclusion:** Change in biomarkers of postoperative cognitive decline in elderly under general anaesthesia using isoflurane or desflurane


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**Background:** POCD was attributed to the inflammatory stress response which can lead to synthesis of multiple cytokines mainly interleukin – 1 (IL-1), interleukin - 6 (IL-6) and tumor necrosis factor – α (TNF –α) from the activated fibroblasts and endothelial cells. The amyloid β (Aβ) concentrations in the hippocampus and amygdala were found to be associated with memory and learning disturbances and isoflurane was shown to increase the concentration of amyloid β by altering Amyloid Precursor Protein. Hypothesis: Due to different pharmacokinetic profiles, there might be a difference in POCD in elderly under GA with Isoflurane and Desflurane.

**Goal:** The objectives of this pilot study were to assess change in biomarkers of POCD in elderly patients receiving isoflurane and desflurane like IL-1, IL-6, TNF alpha, amyloid β and S100.

**Materials and Methods:** The Prospective observational parallel group study was carried out in 40 patients of age between 60 to 80 years without any previous psychiatric illness undergoing open abdominal surgery under general anaesthesia and epidural of anticipated duration of more than 2 hours were included in the study.

**Results and Discussion:** Data from 35 patients, 18 in isoflurane group and 17 in desflurane group were analysed. Changes in the biomarkers of POCD in patients who received isoflurane or desflurane is tabulated (1&2).

**Conclusion:** We cannot substantially conclude that Isoflurane nor Desflurane is a better inhalational agent. We recommends future studies with more sample size.

**References:**

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**5057**

**Effect of perioperative dexmedetomidine and added to postoperative patient controlled analgesia on processed electroencephalogram and delirium in elderly patients undergoing hip surgery**

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**Background and Goal of Study:** Postoperative delirium (POD) is associated with adverse clinical outcomes in elderly patients. Monitoring of processed electroencephalogram may prevent POD, probably optimization of anesthetic depth. Dexmedetomidine could reduce POD. The objective of this study is to assess processed EEG during the perioperative period including postoperative recovery and to investigate whether the dexmedetomidine infusion during surgery, recovery period and up to postoperative 48 hours, added in intravenous patient-controlled analgesia (PCA) could reduce POD in elderly patients undergoing hip surgery.

**Materials and Methods:** Sixty patients older than 65 years undergoing hip surgery were randomized to dexmedetomidine group (Group D; n=30) and control saline group (Group C; n=30). Patients in each group received dexmedetomidine 0.2-0.5 μg/kg/hr or 0.9% normal saline from anesthesia induction until recovery period at post anesthesia care unit (PACU). Postoperatively, the PCA (fentanyl 20 μg/kg with [Group D] or without [Group C] dexmedetomidine 10 μg/kg with a total volume of 50 ml) was programmed to deliver a background infusion rate of 0.5 ml/hr and a 0.5 ml bolus on-demand, with a lockout interval of 15 min. The incidence of POD, relative EEG band powers, pain scores, rescue analgesic amount, and adverse events were assessed.

**Results and Discussion:** The incidence of delirium at PACU of group D was lower than that of group C (20% vs 46.7%, P = 0.028). The incidence of delayed delirium on postoperative day in group D was lower than in group C (6.7% vs 26.7%, P = 0.038). During surgery, the relative band power of delta wave of group D was lower than that of group C (40.45 ± 2.00% vs. 47.42 ± 2.89%, P = 0.006). At PACU, the relative band power of beta activity of group D was lower than that of group C (14.08 ± 2.512% vs. 20.73 ± 3.652%, P = 0.039). Group D patients stayed in the hospital during a shorter time than in the group C (12.63 ± 1.59 days vs. 16.20 ± 1.50 days, P = 0.036). Pain score, rescue analgesic amount and adverse events including hypotension and bradycardia were not significantly different between the two groups.

**Conclusion:** The dexmedetomidine infusion during surgery and PCA administration reduced POD in PACU, the incidence of delayed delirium in ward and the length of hospital stay. Dexmedetomidine also lessens the relative band power of delta wave of EEG during surgery.
Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is considered as a severe postoperative complication among elderly patients. Here, we probed differentially expressed circRNAs using microarray assay in POCD patients, aiming to find potential key circRNAs related to the occurrence of POCD.

Materials and Methods: Patients over 65 years of age scheduled to undergo cardiac surgery under general anesthesia and cardiopulmonary bypass were enrolled. By neurocognitive evaluation, they were divided into two groups, non-POCD (NPOCD) and POCD group. The patients’ blood sample was obtained 3 days after surgery. Neuropsychological tests were conducted on the day before and 3 days after surgery. The protocol consisted of the MMSE, Digit Span Test, Trail Making Test, Word Memory Test, Brief Visuospatial Memory Test-Revision, Symbol-Digit Modalities Test and Verbal Fluency Test. The incidence of POCD was defined by a deterioration of one standard deviation of baseline score in at least two tests. For circRNA microarray analysis, 3 POCD and NPOCD serum samples were randomly selected. CircRNAs having fold changes >2 and p-values <0.05 are selected as the significantly differentially expressed.

Results and Discussion: The expression profile of circRNAs in POCD was determined using unpaired t-test. The Volcano plot was performed to visualize the significant circRNA expression profiling, indicating circRNAs have a different expression pattern in POCD (Fig. 1B-C). The Volcano plot was performed to visualize the significant differences between POCD and NPOCD group (Fig. 1D). Besides, the distributions of log2 ratios were similar in the tested two groups. The microarray data showed 210 circRNAs were differentially expressed in POCD (Fig. 1B-C). The Volcano plot was performed to visualize the significant circRNA expression profiling, indicating circRNAs have a different expression pattern in POCD (Fig. 1B-C). The Volcano plot was performed to visualize the significant differences between POCD and NPOCD group (Fig. 1D). Besides, the distributions of log2 ratios were similar in the tested two groups.

Conclusion: Our study revealed the expression profile of circRNAs in POCD, suggesting their potential involvements in POCD pathogenesis and use as biomarkers for POCD diagnosis.
lower values in MMT (r = −0.41 p=0.002) and lower BI (r = −0.52 p<0.0001). However, we did not find any significant association between postoperative complications and CI (p=0.09). A higher value in ES was statistically associated to delirium (p<0.0001), respiratory failure (p=0.004) and postoperative infection (p=0.011) in patients suffering from postoperative delirium. We observed that compared to normal mortality or unplanned admission to ICU and different geriatric assessment scales no significant association was found.

Conclusion: Preoperative frailty is associated to a higher number of complications and hospital length of stay. The use of frailty scales like ES is more appropriate than morbidity scales in these patients to predict complications.

6106
Continuous spinal anaesthesia – A suitable technique for the frail and uncooperative patient
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Background: Elderly frail patients are a growing population often presenting for surgery and constituting a challenge for the anaesthesiologist. We report a case in which continuous spinal was safely used in an uncooperative patient due to dementia.

Case Report: An 84-year-old woman, ASA IV, was admitted for urgent reduction of a femoral diaphysis fracture. The patient was bedridden, dependent and unable to communicate due to late stage dementia. Conservative treatment was discussed but the femur fragment was at the point of perforating the skin. Because of her frailty, we considered general anaesthesia to be a less than ideal option and were worried about the hemodynamic effects of a full-dose single-shot spinal anaesthesia. Thus, a continuous spinal was performed and small doses of bupivacaine (up to 4mg bolus) were administered throughout the procedure (total 9mg). The challenge was assessing the onset and efficacy of the block. We used facial expression, vocalizations and upper limb movement as indicators of pain, along with vital signs. Additional boluses were administered when small behavioural changes were noted. Nonetheless, she did not become agitated or visibly uncomfortable at any point and did not require sedation. The patient was discharged home 4 days later with no complications and apparently adequate pain control.

Discussion: Continuous spinal anaesthesia is a safe technique in elderly patients with multiple comorbidities, such as dementia. However there are no recommendations on how to monitor block onset and quality. Several scores for pain assessment in non-communicative patients have been described, the behavioural pain scale in non-intubated patients (BPS-NI) is easily applied and has been used in patients with delirium. The evaluation of facial expression, upper limb movement and vocalizations allows pain assessment in these patients. In conclusion, this scale could be useful to monitor pain in frail patients with dementia under spinal anaesthesia.

References:

Learning points:
Continuous spinal anaesthesia is a safe and effective technique for lower limb surgery in frail uncooperative patients. BPS-NI could be useful to assess pain in patients with dementia under spinal anaesthesia.

5943
How to reduce geriatric patients colon surgery mortality in 4 times
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Background and Goal of Study: Indications and contraindication to laparoscopic approach in geriatric patients with high comorbidity are controversial. Low abdominal pressure (7-8 mm Hg) during laparoscopic colon resection allows for good hemodynamic and ventilation changes and reduce number of complication. Goal. To compare an immediate and distant outcomes of surgical treatment in conditions of low intraabdominal pressure by colon cancer geriatric high risk group patients.

Materials and Methods: 400 colon cancer geriatric patients were include and divided on control (n=184) and investigation (n = 216) groups. Median age 75 (69; 80) years. 219 patients (54,8 %) older than 75 years. All cases were high risk group: ASA III – 284(71,0 %), ASA IV – 16(29,0%) and operated laparoscopically. Cardiovascular complications risk were high in 301(75,25 %) and very high in 99(24,75 %) cases. Median Charlson comorbidity index was 8(7; 9). Median CR-POSSUM was 17(15; 21). Operations in investigation group have been made in low intraabdominal pressure (less than 8 mm Hg), in condition of deep neuro-muscular block (NMB) by rocuronium (PTC 1-2). In the end of operation before NMB-reversion performed by Sugammadex (4 mg/kg) in this group. In control group intraabdominal pressure was not less than 12 mm Hg, in condition of moderate neuro-muscular block (TOF 1-2) and reversion by Neostigmine. Patients in perioperative period exposed to ERAS protocol.

Results and Discussion: In investigation group were less complications by Clavien-Dindo classification (n=42 – 19,4%), than in control group (n=79 – 42,9%) (p<0,001). HR 0,32(95 % CI 0,21– 0,50). The Clavien–Dindo severity class of complications was significantly lower in investigation group too (p = 0,019). Clavien-Dindo V (death) in investigation group was in 3 (2,3%), in control – 15
Emergency Abdominal Surgery and Older Patients.

How Can We Improve Care for this Cohort of Patients?

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Background and Goal of Study: Emergency laparotomy (non traumatic) has a mortality rate of 11% in the UK and higher in the US and the rest of Europe. Patients over the age of 70 have a mortality rate of 20% but in some centres is as high as 50%. How do we improve this? Lessons from orthogeriatric care, looking at preoperative frailty scores, nutritional status and planning discharges early can all help with improving care. Improving care form emergency laparotomy and implementing a very successful and proven care bundle approach is also discussed. The first cost effectiveness study examining the benefits of a gerontologist sharing care with the surgeon for emergency abdominal surgery patients is also discussed.

Materials and Methods: Baseline data was collected all patients undergoing emergency abdominal surgery (non-traumatic) over the age of 70 in four general hospitals in the UK, identifying patient demographics, cognitive function, frailty index and nutritional score and level of pre and post operative social needs. A gerontologist was then introduced into the care of the next cohort of patients, where they introduced a comprehensive geriatric assessment plan in these four hospitals. Ongoing interventions (drug review, multi-disciplinary team reviews and social needs assessment) were recorded together with post-operative outcomes. In addition an assessment on the quality of life in the post-operative period has been recorded using EQ-5D-5L up to six months following discharge from hospital. This is mapped to healthcare costs and can be related to Quality of Adjusted Life Years and cost-effectiveness of the intervention.

Results and Discussion: The results showed that the introduction of a gerontologist reduced length of stay statistically significantly. In addition, post operative complications were reduced. The health status study showed that patients reported a better health state with the intervention than without. Quality of Adjusted Life years (QALY) was improved so the intervention was shown to be cost-effective.

Conclusion: In an ageing world, it is vital we ensure older patients return to their baseline functional state as quickly as possible after surgery. Patients undergoing emergency abdominal surgery over the age of 70 should have shared care with both gerontologists and surgeons to decrease length of stay and improve quality of life post discharge from hospital.

6147

Peri operative troponin levels in hip fracture patients

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Background: Hip fracture is a common injury in the elderly with high peri-operative morbidity and mortality. The common practice to operate within 24-48 hours after the injury reduces mortality. Increased peri-operative troponin levels are associated with mortality regardless of the presence of ischemic signs or symptoms. We aimed to test for possible association between increased pre-operative troponin levels and postoperative complications in adults undergoing hip fracture repair.

Methods: Medical records of patients undergoing surgical repair of hip fractures in the Tel-Aviv Medical Center between 04/2018-03/2019 were reviewed. High-sensitivity troponin T concentrations were routinely measured during anesthesia induction. The associations between patients’ troponin level and mortality and intensive care unit (ICU) admission were assessed using Pearson correlations. Association between time from hospital admission to surgery and troponin levels was also assessed. P<0.05 was considered statistically significant.

Results: The medical charts of 360 eligible patients were reviewed (52.1% American Society of Anaesthesiologists Physical Status [ASA-PS] 3, 71% female, mean [SD] age 82 [8] years). Median [IQR] time from hospital admission to surgery was 28 [21, 45] hours. Overall in-hospital mortality was 4.4% (n=16) and 30-day mortality was 3.6% (n=13). Mean (SD) troponin level was 63.2±10.8 ng/L, with 52 patients (14.4%) having abnormally high troponin levels (>50 ng/L). No association between the time from hospital admission to surgery and troponin level was found. Increase in troponin levels was associated with 30-day mortality (pearson 0.12, p= 0.014), but not with the risk for ICU admission.

Conclusion: Most of the hip fracture patients have normal troponin levels when arriving the operating room, regardless of the time from hospital admission to surgery. Nevertheless, preoperative increased troponin levels are associated with 30-day mortality. The correlation we found was not very strong and of questionable clinical significance, but our study was presumably not well-powered to correctly estimate the magnitude of the association, and should be followed by larger studies.

5210

Mortality rate one year after hip fracture surgery

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Background and Goal of Study: Hip fracture is the most common fracture in the elderly, being an important cause of morbidity and mortality in this population with multiple comorbidities. Median [IQR] time from hospital admission to surgery was 4–14%. Most of these fractures need urgent surgical treatment, requiring an accurate anesthetic management. The aim of this study is to evaluate survival and postoperative evolution of patients who had undergone surgery for hip fracture and its association to perioperative management.

Materials and Methods: After obtaining the approval from the Ethics Committee of our hospital, we conducted a retrospective study including all patients undergone surgery for hip fracture from January 1st 2018 to October 30th 2018.

(8,1 %) patients (p < 0.001). Chemotherapy realized in 44 (20.4%) (95% CI (15.5-26.2 %) investigation group patients, that are significantly more than in control – 8 (4.3%) (p<0.001). Distant outcomes show that 5-year OS and DFS were higher in investigation group (p> 0.001).

Conclusion: Implementation new method of laparoscopic operation realization allow to reduce number and severity of complications, mortality rate, expand indications to miniminvasive treatment, chemotherapy and improve distant outcomes in high risk geriatric patients.
Following data were collected: age, gender, duration of surgery, anesthetic management, perioperative variables, postoperative evolution and mortality. Statistical analysis was performed using SPSS 25.0.

Results and Discussion: During this period, 181 patients (74% women) were collected, with an average age 79 ± 11 years. Average waiting time from arrival at the emergency room to surgery was 45 ± 37 hours. The average duration of surgery was 75 ± 27 min, being performed 50.3% under spinal anesthesia and the rest with general anesthesia. Intraoperatively, 40% had a TAS <100 mmHg during an average time of 29 ± 22 min. Intraoperative bleeding was 132 ± 101 ml, requiring blood transfusion during the perioperative period 54.7% of the patients. The mean Red Blood Cell package transfusion was 1.2 ± 0.1. The length of stay in PACU was 445 ± 60 min and in-hospital stay 7.7 ± 1.2 days. Mortality rate at 30 days and one year after surgery was 4.4% and 16.6% respectively. We found a significant association between hospital and PACU stay and mortality at one year (p <0.005). However, we did not find a statistically significant association between mortality at one year and other studied variables, such as preoperative haemoglobin, ASA physical status, waiting time prior to the intervention or length of surgery.

Conclusion: Hip fracture is increasing in last years, associated with a high preoperative waiting time and a high mortality rate. Early optimization of these patients could reduce the length of hospital stay and postoperative mortality.

5987

Ultrasound-guided neuraxial anesthesia in elderly: A systematic review
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Background and Goal of Study: Neuraxial ultrasonography is a recent development in the field of regional anesthesia, which allows the successful insertion of a spinal or epidural needle; this technique is called neuraxial blockage guided by ultrasound. Subarachnoid anesthesia is the technique of choice in elderly patients, 60% of the severe and long-lasting neurological complications after central neuraxial blockage, involve patients over 50 years old, among which are anatomical anomalies, including stenosis of the lumbar canal and spinal arachnoid cysts. The purpose of this study was to describe whether the neuraxial approach guided by ultrasound allows to perform successful needle insertion.

Materials and Methods: A systematic and comprehensive search will be performed using MEDLINE, OVID, EMBASE, LilACS and the Cochrane central registers of controlled trial databases through November 2019, without restriction of time or language. The protocol for this review has been registered in the PROSPERO's registration number: CRD42019112382. The primary outcome was successful lumbar puncture in the first attempt of needle insertion and the accuracy of the lumbar puncture site.

Results and Discussion: Six articles were included, for a total of 530 patients, age ranges between 61 and 85 years. The subarachnoid anesthesia was the most common type and only one study included epidural anesthesia. A randomized controlled trial, in the US group compared to the control group the difference was statistically significant for successful lumbar puncture in the first attempt of needle insertion for subarachnoid anesthesia. The most frequent lumbar puncture site was the L3-4 space in neuraxial approach guided by ultrasound. In the studies where an ultrasound approach is performed, it was important to measure the depth to determine the size of the needle in the puncture, this is important to perform fewer punctures in the patients. The depth of ultrasound measurement of the intrathecal space was related to the depth of the needle insertion. Failure to measure the depth may lead to needle changes and a higher number of punctures.

Conclusion: The ultrasound guide for the lumbar puncture it improves the identification of the puncture site and the success rate at the first attempt, however the time required is longer compared to the anatomical approach.

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Ultrasound-guided dynamic needle tip positioning technique versus palpation technique for radial artery cannulation in elderly patients
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Background and Goal of Study: The radial artery cannulation is often challenging in elderly patients who have age-related arterial wall changes and tortuous arteries with various underlying diseases. In addition to palpation method, the use of ultrasound-guided method has been studied as the first-choice method for radial artery cannulation. Recently, the dynamic needle tip positioning (DNTP) technique was introduced to facilitate ultrasound-guided vascular catheterization. We aimed to compare ultrasound-guided DNTP technique with conventional palpation method for the radial artery cannulation in elderly patients.

Materials and Methods: In this prospective, randomized controlled trial, we enrolled patients aged 65 years or older who required arterial cannulation for intraoperative monitoring. Patients were allocated to ultrasound-guided DNTP technique group (DNTP group) or palpation method group (palpation group) with 1:1 ratio. The radial artery cannulation was achieved with either method by second-year anesthesiology residents. The primary outcome was the first-attempt success rate. The secondary outcomes were the overall success rate, the number of attempts and redirections, cannulation time and the incidence of complications (hematoma, thrombosis, spasm and ischemia).

Results and Discussion: We enrolled 256 patients in this study and each group had 128 patients. The first-attempt success rate was 85.9% in DNTP group and 72.3% in palpation group (relative risk [RR], 1.47; 95% confidence interval [CI] 1.25-1.72; P <0.001). The overall success rate was 99.2% in DNTP group and 93.0% in palpation group (RR, 1.07; 95% CI 1.02-1.12; P = 0.010). The number of attempts was 1.2 ± 0.6 in DNTP group and 1.9 ± 1.3 in palpation group (P <0.001) and the number of redirections for successful attempts was 0.6 ± 0.8 and 2.4 ± 2.0, respectively (P <0.001). The cannulation time at successful attempts in each group was 49.0 ± 25.0 seconds and 67.2 ± 42.6 seconds (P <0.001). The incidence of hematoma was 7% in DNTP group and 24.2% in palpation group (RR, 0.29; 95% CI, 0.14-0.59, P <0.001). Thrombosis occurred in one patient in palpation group and there was no spasm or ischemia.

Conclusion: Ultrasound-guided radial artery cannulation with DNTP technique improved the first-attempt and overall success rates and reduced the number of attempts and redirections, cannulation time and complications, compared to conventional palpation method in elderly patients.

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Intra-Operative Hypothermia in non-elderly, elderly and super-elderly populations; Where can we still improve?
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Background: Hypothermia is a common peri-operative condition known to be associated with numerous complications. Although several risk factors for peri-operative hypothermia were identified, the association between age and hypothermia is not well-described in the peri-operative period. We therefore aimed to assess the impact of aging on the risk of peri-operative hypothermia by comparing the incidence of hypothermia in non-elderly (40-65), elderly (65-80) and super-elderly (>80) patients.

Methods: In this single-center retrospective cohort study, demographic, clinical, and surgical data were collected for surgical patients >40 years old who underwent surgery in 2017 and spent ≥2 hours in the operating room (OR). Several key temperatures were assessed: 1 Baseline (before arriving the OR); 2. First temperature recorded after anesthesia induction; 3. Lowest temperature measured in the OR; 4. First temperature in the post-anesthesia care unit (PACU); 5. Calculated area under the curve (AUC) for temperature<36°C during surgery.

Results: Data of 3647 eligible patients were analyzed, of whom 1891 (52%) were 40-64 years old [mean(SD) age 54(7) years], 355 (10%) were 65-80 [mean(SD) age 72(4) years] and 401 (11%) were >80 years old [mean(SD) age 86(4) years]. The super-elderly and elderly groups had significantly more co-morbidities than the non-elderly group [median (IQR) sum of active co-morbidities; 1 (0-2), 2 (1-3) and 0 (0-1), respectively, p<0.001]. Hypothermia (<36°C for ≥5 minutes) rates were not different between the groups (78%, 80% and 75% for non-elderly, elderly and super elderly, respectively, p=0.12). Similarly, the incidence of severe hypothermia (<35.5°C, ≥5 minutes) was also comparable (48%, 50%, and 50%, respectively, p=0.62). The AUC of temperature<36°C was significantly higher in the elderly group than that of non-elderly and super-elderly groups [3.1(5.7), 2.7(4.9) and 2.4(4.1), p=0.036].

Conclusion: While intra-operative hypothermia remains a common surgical complication in all age groups, our data suggest that the scope of hypothermia...
is more profound in the elderly group compared with the non-elderly and super-
elderly groups. The direct implications of this are still to be investigated. A possible explanation for our findings could be that while we rely on natural stamina of the non-elderly and meticulously care for the super-elderly, our care of the elderly group can still improve.

The hemodynamic effects of low-dose dexmedetomidine on anti-hypertensive medication at endotracheal intubation in elderly patients

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Background and Goal of Study: Dexmedetomidine is highly selective alpha 2 adrenergic agonist and preoperative administration of dexmedetomidine reduce sympathetic well maintain hemodynamic stability. Especially hemodynamic instability is more risky in elderly patients and then in elderly, preanesthetic 0.5 μg/kg single dose of dexmedetomidine effectively suppress humodynamic responses to endotracheal intubation. This study was investigated for the effect of a single low dose preoperative dexmedetomidine(0.5μg/kg) on antihypertensive drug (b-blocker, ca-channel blocker) at endotracheal intubation(retrospective data collection).

Materials and Methods: Total 42 patients aged from 65 to 85, American Society of Anesthesiologists physical status II, either sex, undergoing elective noncardiac surgery were enrolled in the study. G-group had been treated with anti-hypertensive medications and N-group was normotensive patient with no medication. Patients who attempted endotracheal intubation more than 2 times were excluded. Morbidly obese patients who had BMI over 35 kg/m2 also excluded. All patients were not premedicated. Anti-hypertensive medications were maintained until the day of surgery. At the arrival of the patients at the operating room, patient were attached to a ECG, pulse oxymeter, and NIBP monitor. All patients were received 0.5 μg/kg of dexmedetomidine (Precedex; 200 μg/two ml; Hospira Inc., Lake Forest, IL, USA) for 10 min. After completion of precedex injection, pocilf 1.5mg/kg, rocuronium 0.6 mg/kg was administered. After two minutes endotracheal intubation was performed with a laryngoscope, and all intubation was performed within 30 seconds by one anesthesiologist. Anesthesia was maintained with sevoflurane in nitrous oxide/ oxygen 50:50 mixture. vital signs (MBP, Pulse) were recorded at ward (baseline value), immediately after drug administration (after drug), 1, 3 and 5 minutes after endotracheal intubation.

Results and Discussion: The demographic data of the two groups showed in Fig. 1. There were no significant differences in demographic characteristics between groups. The MBP and Pulse changes of 2 groups were recorded in Fig.2. There were no significant differences in cardiovascular changes between two groups.

Conclusion: The low-dose Dexmedetomidine was not showed the synergistic effects on cardiovascular depressive changes of anti-hypertensive drug at intubation.

Airway Management in Geriatric Patient with Airway Obstruction

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Background: Tumors located in the facial region, especially around the mouth and nose, and previous radiotherapy and surgical procedures in this region make mask ventilation and airway management difficult. We report a case of tracheostomy in a geriatric patient who needed airway patency and proved difficult to be ventilated through mask due to lower alveolar arch cancer involving the mandible.

Case Report: An 85-year-old, 153 cm, 45 kg, ASA 4E geriatric female patient underwent surgery for tracheostomy under emergency conditions because of airway obstruction. She had chemotherapy 7 months ago and radiotherapy 1 year ago and underwent total hip replacement surgery with epidural anesthesia 20 days ago. Mallampatti score being 4, pronounced macroglossia was present and there was no area to place the mask on the face due to spreading cancer. Difficulty with mask ventilation was foreseen in the preoperative examination where intubation would prove difficult. For this reason, C-MAC videolaryngoscope, tracheostomy set, intubation tubes and stylets of different sizes were prepared beforehand. After standard anesthesia monitoring (HR: 110 / min TA: 170 / 120mmHg SpO2: 92), preoxygenation was performed. During induction, 1 mg kg-1 2% lidocaine hydrochloride, 2 mg kg-1 propofol and 1 mcg kg-1 remifentanil were administered, and the patient was quickly and serially intubated with C-MAC videolaryngoscope with endotracheal tube no 5. Anesthesia was maintained with 6% MAC desflurane, 50% oxygen and 50% air mixture. The operation lasted for 30 minutes. 5 minutes after the surgery, the patient's spontaneous respiration returned and sufficient tidal volume was reached in 10 minutes.

Discussion: Neoplastic tumors are often fragile and tend to bleed. Mask ventilation and tracheal intubation may cause marked edema and hemorrhage, leading to increased airway obstruction. In this case report, we emphasize the importance of rapid serial intubation with videolaryngoscopy without the use of nondetachable muscle relaxant in the provision of airway patency in a geriatric patient whose mask ventilation is quite difficult.

Learning points: Geriatric patient , airway management, videolaryngoscopy
A case of an elderly developed pulseless electrical activity intraoperatively after a short course of low-dose steroid

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Background: Anaesthesiologists encounter the complexity of multiple comorbidities in geriatric anesthesia. We present a case with no prior diabetes mellitus history developed catastrophic hyperglycemic hyperosmolar nonketotic coma after 3 weeks of low-dose steroid supplement.

Case Report: An 82-year-old male, weighing 74kg was diagnosed with hypertension, paroxysmal AF, congestive heart failure NYHA III and prostate cancer status post CCRT. He had ever undergone T9-T10 Laminctomy due to Tuberculous spondylitis with cord edema 3 weeks ago, and then received further anti-TB therapy and low-dose steroid supplement. However, low-grade fever and pus formation developed so he was scheduled for debridement surgery. Initial vital sign in OR were as followed, BP:139/65mmHg, HR:120bpm, SpO2:97%. After induction agents with fentanyl 50mcg, lidocaine 60mg, etomidate 10mg and Rocuronium 30mg were administrated intravenously, the patient had refractory bradycardia along with PEA. Resuscitation was performed for 1 minute and then ROSC. ABG revealed hyperosmolar hyperglycemic state (HHS) with blood sugar: 970mg/dL. The surgery was held and we transferred the patient to ICU after stabilizing vital signs.

Discussion: The patient had no prior history of diabetes and blood sugar was within normal range about 3 weeks ago. However, he received low-dose steroid without blood sugar surveillance since then. He got steroid induced hyperglycemia and it emerged into HHHNKC insidiously 1. According to his past medical history, initial diagnosis for circulation failure included septic shock, spinal shock, adrenal insufficiency and cardiogenic shock. However, the patient responded to steroid, inotropes and vasopressor poorly but restored hemodynamic stability after fluid resuscitation. Further treatment for HHHNKC was given accordingly.

References:
1. World journal of diabetes, 2015.6(8).

Learning points: The outcome of hyperglycemic crisis relies on early diagnosis and management. However, high mortality rate was still reported. 2 Very few cases were ever reported that HHS was induced after receiving steroid supplement without previous DM history. 3-4 Anesthesiologist should remain high index of suspicious of hyperglycemic hyperosmolar nonketotic coma occurrence on short term usage of low-dose steroid supplement in the elderly.

Continuing professional development in airway management: Identifying anaesthesiologists’ knowledge gaps

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Background and Goal of Study: Anaesthesiologists must maintain their expert level airway management skills throughout their career. Currently, continuing professional development is mostly determined by the individual. However, self-assessment is unreliable in identifying personal learning needs 1. Therefore, the goal of this study was to combine objective and subjective assessment to identify the knowledge gaps in airway management.

Materials and Methods: We included anaesthesiologists from the departments of anaesthesiology in the Capital Region of Denmark. An adaptive E-learning programme was developed to test the core curriculum in airway management. It consisted of 103 questions covering preoperative airway assessment, basic airway techniques, and advanced airway techniques (objective assessment). Confidence in each given answer was assessed (subjective assessment), and answers that were not correct and had a confidence rating of “I know it” were classified “incorrect and unaware”.

Results and Discussion: Twelve departments participated and the response rate was 67% (N=191/285). The percentages of anaesthesiologists being “incorrect and unaware” were highest for advanced procedures (9/15 questions) followed by preoperative airway assessment (5/15 questions) (table 1). The procedures with the highest proportion of “incorrect and unaware” were emergency cricothyrotomy, video laryngoscopy, and use of airway exchange catheter and bougie. The identified areas with high proportions of “incorrect and unaware” represent knowledge gaps in areas that anaesthesiologists are not aware of. These areas are of particular interest for a continuous educational focus.

Conclusion: Anaesthesiologists were “incorrect and unaware” most commonly in relation to advanced airway management procedures followed by preoperative airway assessment.


Acknowledgements: The authors would like to thank the twelve advisory board members from the involved departments for their great support in conducting the study.
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Introducing crisis resource management in trauma team: the Human Factors Attitude Survey results

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Background and Goal of Study: The current management of trauma patients in a level 1 hospital requires the TraumaTeam (TT) coordinated work. Although specific courses like ATLS or ETC to teach physicians how to resuscitate these patients are necessary, Crisis Resource Management (CRM) training programs are highly necessary to train all the team in non-technical skills for an optimal management of these patients. Despite this, the perception of non-technical skills importance among professionals is unknown.

Materials and Methods: During three CRM in trauma care editions performed in our institution Simulation Center and conducted by Anesthesiology Department between January and November 2018, an education survey before and after the training of all TT members was conducted. We developed a modified Human Factors Attitude Survey (HFAS), a 23 question survey regarding trauma resuscitation teamwork and communication. HFAS has been used to evaluate CRM in medical setting and is based on similar work by the NASA and the aviation industry. The surveys were formulated in a standard 5-point Likert scale ranging from strongly agree to strongly disagree. Statistical analyses by Chi-square and Fishers exact test were conducted.

Results and Discussion: 80 students answered the surveys between January and December 2018. Significant improvement was noted in 18 of 23 questions in the post-CRM survey. Improvement was noted in five main areas: exchange of information from pre-hospital providers to TT, role of the team leader, the role of briefing, comfort of staff with communication in the trauma bay and importance of situation awareness during attention to severe trauma.

Conclusion: The CRM training has been utilized in high risk hospital environments, enhancing team dynamics, communication and ostensibly impacts patient safety. Philosophy and culture of CRM should be compulsory components in organization of trauma programs and in resuscitation of injured patients. Non-technical skills should be trained through clinical simulation to increase team cohesion and patient safety. Trauma team members improve the perception of this training after experiencing it. Institutional involvement in supporting the development of this type of training is necessary.

References:

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Eye dominance and tracheal intubation - a manikin study

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Background and Goal of Study: To verify if there is a difference in the time for intubation, using the non-dominant eye, the dominant eye, and both eyes.

Materials and Methods: We included twenty-four eight-semester-graduation medical students in the study. All the students agreed to participate, with written consent. They first determined what was the dominant eye, using a hole-in-card method and spotting a mark eight meters away. Then, all the students were asked to intubate a normal-airway manikin, first with the non-dominant eye (dominant eye closed), then with the dominant eye (non-dominant eye shut), and lastly, with both the eyes opened. Examiners recorded the time for the perfect intubation (until the cannula passed what they supposed to be the vocal cords, as well as if they accomplished correct intubation. We relied on the t-test for the continuous variables, as well as on the chi-squared test for categorical variables. The Wilk-Shapiro test checked the data, and non-parametric criteria were applied if the test failed to achieve Gaussian distribution.

Results and Discussion: Time for intubation was 17.9 ± 9.1 seconds, 17 ± 11.7 seconds, and 12.1 ± 6.6 seconds using the non-dominant eye, the dominant eye, and both eyes, respectively. Time was shorter when the students used both the eyes, compared to the non-dominant eye (p=0.0061), and compared to the dominant eye (p=0.025), fig. 1. There was no difference in the time when the students used the non-dominant eye versus the dominant eye (p=0.38). The success rate did not differ between the groups.

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Ukrainian Trauma Life Support Course - what can we change in systems that are not set to act?

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Background and Goal of Study: Traumatic injury in Ukraine accounts for more than 40 thousand deaths annually and remains the leading cause of mortality. In spite of War, in Ukraine, the fatality rate in motor vehicle collisions is 2 times higher than the combat mortality (WHO, 2018). NGO Patriot Defence changes the current management of trauma patients in a level 1 hospital requires the TraumaTeam (TT) coordinated work. Although specific courses like ATLS or ETC to teach physicians how to resuscitate these patients are necessary, Crisis Resource Management (CRM) training programs are highly necessary to train all the team in non-technical skills for an optimal management of these patients. Despite this, the perception of non-technical skills importance among professionals is unknown.

Materials and Methods: UTLS course has been developed and standardized for the Ukrainian emergency medical system. This has been achieved by a faculty of medical specialists from the Ukrainian and international community. The results of End exams show progress in theoretical and practical skills above 40% average. Also at the end of the course doctors had practical exam - final simulation with mass casualty incidences, which also were.

Conclusion: There was no difference in the success rate when the students intubated the manikin using the non-dominant eye, the dominant eye, or both the eyes. However, the students spent the shortest time for intubation when they relied on both the eyes. It is a crucial finding since some people may believe the dominant eye is superior in performing visual tasks such as tracheal intubation.
Interactive algorithms AKUTNE.CZ: Open access database of more than 100 virtual patients focused on acute medicine

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Background and Goal of Study: The educational platform AKUTNE.CZ (meaning Emergent), is a unique project in Czechia implementing virtual patient (VP) based learning in the 4th to 6th-year medical students curriculum. This world's biggest free access Czech-English database of VP cases focused on emergency, intensive care medicine and anesthesiology, was created by students under clinician supervision. The aim was to 1) engage students in creating VP cases themselves to enhance their learning 2) implement new teaching methodology.

Materials and Methods: Authors teams of students, supervised by a senior clinician, are responsible for literature overview, case description, VP creation and production of original audio-visual multimedia. VP cases are reviewed by a content expert and published on https://www.akute.cz/index-en.php?pg=education–interactive-algorithms in the form of interactive multimedia algorithms. They are used for self-study and the problem-based learning/team-based learning (PBL/TBL) sessions in clinical subjects First Aid and Intensive Care Medicine.

Results and Discussion: Since 2010, 109 VPs were created by 218 people (177 students and 41 mentors); 11 current mentors were recruited from formal students working at the creation of VPs). Out of all students 163 (90.5%) had already graduated and from those 55 (33.7%) work in the Anaesthesia and Intensive Care Medicine. The interactive algorithms are covering topics in Anaesthesia, Intensive care, Emergency Medicine, First Aid, Gynaecology and Obstetrics, Internal Medicine, Traumatology, Paediatrics, Surgery, Neurology and Stomatology.

Conclusion: Both creating and using the bilingual VP algorithms as teaching material was successfully implemented in the curriculum. It represents not only study material for medical students, but also highly motivational in developing students’ interpersonal skills. The project also enables them to explore acute medicine and other specialties as their possible career choices.

Acknowledgement: Supported by a Specific University Research provided by MSMT (MUNI/A/0966/2019).

An innovative course that increased participants self-perceived confidence in difficult airway management

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Background and Goal of Study: Difficult airway (DA) is a clinical situation where an experienced anesthesiology faces difficulties in face mask and/or supraglottic airway device ventilation, tracheal intubation or front of neck access (FOANA). Residents and consultants need experience and training to become confident. For that reason, we decide to develop an innovative course with advanced techniques for airway management.

Materials and Methods: A 3 days course designed for medical professionals was conducted. It was completely hands-on and participants were able to get expertise in managing airway devices, including training in simulators and animal models as well as development of non-technical skills in high fidelity simulation scenarios. Translation for the clinics occurred at the operating theatre. Participants were surveyed before (T1) and after the course (T2), for collecting data regarding self-perceived levels of confidence in their airway skills. Results and Discussion: The course had 30 participants (37% residents and 63% consultants), the majority were from anesthesiology (83%). Participants were asked to score from 1 (low) to 5 (high), their self-perceived confidence to use airway devices at T1 and T2. At the end, participants were asked to evaluate the course from extremely useful to not useful, considering relevance and value of each practical session. The response rate was 100% and the survey was anonymous. Considering the self-perceived confidence evaluation, the results showed a significant increase in participants’ confidence in T2, even with the techniques that they were more unconfident in the beginning. The techniques that had the most significant increase in self-perceived confidence were fibroscopy and cricothyroidotomy (p<0.0001). 94% of the participants considered these practical sessions extremely useful. The practice in the animal and in clinics was classified as very useful in 90% and 77% of the analysed. To the question if the event affects clinical practice, 84% answered “very much”. The participant with better self-perception confidence can be more competent with skills when compared to a low self-rated.

Conclusion: The traditional medical education model has flaws and other options must be available to complement clinical experience. This experience may be more important for building participant’s confidence than other encounter variables.

Novel 24/7 HybridLab® learning system for airway management

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Background and Goal of Study: Higher public and patient expectations have both encouraged the development and use of innovative educational methods. HybridLab is a distance learning and algorithm driven self-directed peer to peer medical simulation that allows learners to train 24/7 without direct presence of the instructor, while the training sessions are reviewed online by the experienced instructors. The first courses built on HybridLab platform is focused on the specific technical skills like advanced airways management. Conventional learning is a teaching and learning process that focuses on live lectures with faculty guided pre-clinical demonstration and practice. The goal of the study is to test the efficiency of a hybrid learning technique versus conventional learning technique in teaching endotracheal intubation among medical students.

Materials and Methods: The first course was randomly assigned into two study groups to be taught endotracheal intubation (EI) using conventional learning technique (Group C) and hybrid learning technique (Group H). During first week after teaching process both groups performed endotracheal intubation on real patients under supervision by trained instructors - doctors. 5 stages of EI (preparation, preoxygenation, laryngoscopy, endotracheal tube (ET) insertion, verification) were evaluated in both groups using statistical analysis. The study was described as completed when student performed all actions correctly. Data was assessed for normality and found to have a non-parametric/parametric distribution. The level of significance was defined as p<0.05.

Results and Discussion: 77 students were enrolled into study: 34 in Group C and 43 in Group H (p=0.05). There were no statistically significant differences between the patients in both groups with respect to demographic characteristics, ASA physical status and Mallampati score. Preparation was completed by 55.9% in Group C and 86% in Group H (p=0.003). Preoxygenation - 26.5% in Group C and 69.8% in Group H (p<0.001). Laryngoscopy - 73.5% in Group C and 97.7% in Group H (p=0.056). ET insertion - 64.7% in Group C and 81.4% in Group H (p=0.97). Verification - 8.8% in Group C and 58.1% Group H (p=0.001).

Conclusion: The study showed more efficient effect of HybridLab learning approach on endotracheal intubation skills than conventional learning technique. This training method can be useful model for teaching healthcare providers with limited faculty availability.

Knowledge of Resuscitation among Greek medical students

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Background and Goal of Study: Several studies report the importance of the knowledge of the life support algorithm and the optimal treatment of the intra-hospital and out-of-hospital cardiac arrest. In this study, we sought to investigate the knowledge regarding the Resuscitation among Greek medical students and the comparison of all Medical Schools of our country.

Materials and Methods: Questionnaires, including demographics, consisting of 7 questions regarding Resuscitation were distributed to the medical students who attend the 23rd Annual Congress of the Greek Medical Students.

Results and Discussion: Two hundred and ninety-seven students completed the questionnaire. Most of the students (80%) reported that they have adequate knowledge of Basic Life Support (BLS) algorithm and the use of Automatic External Defibrillator (AED), with the University of Crete and the University of Ioannina in the first place. Regarding the ABCDE approach the results are quite different based on
the Medical School, with the University of Crete in the first place, followed by the University of Patras, while the University of Ioannina is in the last place. Moreover, a big heterogeneity was observed as far as the knowledge of the Advanced Life Support algorithm is concerned. More specifically, the University of Crete was at the first place (70%), followed by the University of Thessaly (59%), while the University of Patras was at the last place (15%). Last but not least, it should be noted that 64% of our students reported that their knowledge for the BLS algorithm and the use of AED were obtained from a European Resuscitation Council course, 18% from some optional course of the Medical School and only 16% from a mandatory course/rotation of their school.

Conclusion: It seems that a large heterogeneity exists regarding the knowledge and the training of Resuscitation among the 7 Medical Schools of our country.

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Three-drug simulation of bispectral index (BIS) and modified observer’s assessment of alertness and sedation (MOAA/S) scale model during gastrointestinal endoscopy

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Background and Goal of Study: Simulation is used to familiarize physicians and trainees with new practice protocols. Commercialized simulation is available for 2 drugs, but often three drugs are used clinically. The need for multidrug simulation prompted the development of complex three-drug models. In this study, we applied a published three-drug model and a new bispectral index (BIS) model to stimulation.

Materials and Methods: We obtained a sample three-drug protocol for combined gastroscopy and colonoscopy using midazolam, alfentanil and propofol from literature search. The protocol is shown in Figure 1. Pharmacokinetic profiles were calculated with TiVAtrainer. Two models were used to simulate the protocol: The Modified observer’s assessment of alertness and sedation (MOAA/S) scale2 and bispectral index (BIS) model. The models were built with the NLMAZ model (Non-linear mixed amount with zero amount) using engineering software Matlab. For the MOAA/S model, we define loss of response (LOR) if the probability is greater than 50%.

Results and Discussion: MOAA/S model was excerpted from a published research. A new BIS model was built from 1176 data sets of the three drugs. Strongest interaction was at the propofol-alfentanil arm in the BIS model. The simulation protocol drug concentrations ranged from 0-50 mcg/mL, 0-31 ng/mL, and 0-2.63 mcg/mL for midazolam, alfentanil and propofol respectively, which were within the modeling conditions. At the end of colonoscopy the simulation had 91% chance of LOR, 45% at return of consciousness, and 8% at time of discharge (Figure 2). The results matched the clinical observation reported by the original protocol. The MOAA/S < 2 model predicted the time course of a sedation regimen reported by another group: BIS remained between 50 and 80 throughout the examination and rose above 80 during recovery. There were no BIS data in the selected report.

Conclusion: This is a demonstration of a simulated protocol for gastrointestinal endoscopy. Commercialized simulation software commonly contains two-drug regional Three-drug model adds flexibility and offers variety to simulation for users. We believe it is beneficial to training sessions.

References:
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5562

Inspiring the next generation of anaesthetists in Zambia through a novel, structured clinical skills programme for medical undergraduates

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Background and Goal of Study: Anaesthetists are well-placed to develop medical student knowledge and skills. The Zambia Anaesthesia Development Programme is an international healthcare partnership which aims to improve safe anaesthesia provision in Zambia. Final year students undertake a 2-week placement in anaesthesiology at University Teaching Hospital, Lusaka. Local education leaders identified a gap in practical experience obtained by students during their placement. We sought to understand whether a structured programme for the assessment of the critically unwell patient improved confidence, skills and satisfaction, and increased awareness of anaesthesia as a career.

Materials and Methods: A novel programme introducing students to the A-E assessment, Basic Life Support including cardiopulmonary resuscitation, and airway management from simple manoeuvres to placement of a laryngeal mask airway, was introduced. Teaching was delivered with a combination of group discussion, workshops with hands-on experience, and simulation. High and low-fidelity simulation mannikins, resuscitation equipment and bespoke simulation scenarios were used. Feedback, using Likert scales (out of 5) and free text, was collected and analysed using quantitative and qualitative methods.

Results and Discussion: Students received the programme with enthusiasm, finding it enjoyable (median score 5, [interquartile range 5-5]) and relevant to their learning (5 [5-5]). The programme improved their confidence in managing the critically ill patient (4 [3-5]), providing a structured approach to patient assessment (4 [4-5]), and improved practical skills (5 [4-5]). The programme was considered interactive and trainers approachable. Following the programme, students were inspired to pursue a career in anaesthetics. Challenges included cultural barriers to participation, lack of familiarity with simulation, and perceived low status of anaesthesia in Zambia.

Conclusion: A structured programme for the management of the critically unwell patient, run by anaesthetists for medical students, is well-received, improves confidence and practical skills. Such a course can inspire the next generation of physician anaesthetists while providing skills relevant to newly qualified doctors. Involvement of local education leaders to improve the next iteration of the course is suggested.

References:

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An Evaluation of operating room staff’s awareness of environmental sustainability and medical waste knowledge

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Background and Goal of Study: The healthcare sector contributes a big amount to carbon emissions. According to a study, the healthcare industry is accountable for 8% of the US’ total greenhouse emissions1. Hospitals annually accumulate 5.9 million tons of waste and 21% of this waste is created by operating rooms (OR)2. The aim of this study was to assess the knowledge of our OR staff on medical waste as well as their attitudes about the management of it.

Materials and Methods: We created a 20 questions survey to assess the knowledge. This survey was given to all OR staff (surgeons, anesthesiologists, nurses, cleaning staff). Pearson Chi-square/Fisher exact test with p values <0.05 are accepted as significant.

Results and Discussion: Data of 112 participants were analyzed. The median age was 28 [20-54]. From all the participants, 56.2% expressed that the OR have an important effect on global warming and 73.6% stated that they were trying to separate the wastes according to the regulations. When evaluating the anesthesia practice in a subgroup of anesthesia team, most of the anesthesia nurses (%52) falsely stated that the safest practice was low flow desflurane while 85% of the anesthesia nurses (%76) of doctors and 76.9% of nurses didn’t attend any educational course about the effects of ORs on the environment and the management of ORs related to this issue. Most of the participants reported that obstacles for a good management of OR wastes were inadequate knowledge (92%) and inept organization (44%). Overall 96.4% of all participants stated that education about waste management was necessary.

Conclusion: Nearly half of participants had no idea about environmental effects of ORs and stated that this was due to a lack of education. While most participants stated that they were separating wastes accurately, it might not always be the case. We think that a well organized education, adequate organization and follow up of the OR waste management is required for a better future.

References:
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First On-Line Assessment (OLA) Experience European Society of Anaesthesiology in Russian Federation in 2019

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Background: On-Line Assessment (OLA) is an online computer-based test similar to the first part of the European Diploma in Anaesthesiology and Intensive Care Exam (EDAI Part I) created by the Examinations Committee of the European Society of Anaesthesiology (ESA). Russian Federation (RF) offers the EDAI Part I in two centres (Moscow and St. Petersburg). However, to date OLA has never been conducted in RF. We describe our experience and the results of the first OLA in RF in 2019. Purpose: To present the analysis of the results of the first OLA in RF in 2019.

Materials and Methods: In 2019 OLA was held on April 12 in 127 centers, 113 cities, 33 countries around the world, counting 1,481 candidates who sat it in 11 languages. In the same year in Russia OLA was held for the first time at the Krasnoyarsk State Medical University named after Prof. V.F. Voino-Yasenetsky, 37 second year residents in the specialty “Anesthesiology and Intensive Care” took OLA between the hours of 16.00 and 19.00 local time simultaneously with all European countries. All examination conditions were created in accordance with the regulations set by Examinations Committee of the European Society of Anaesthesiology for OLA.

Results and Discussion: OLA results are presented in the table. The results are comparable with the results of OLA for European and non-European centers. OLA is held annually in April and, therefore, is an excellent test for all candidates who want to assess their knowledge at the end of each year of study, and those who plan to take the EDAI Part I exam in autumn.

Conclusion: The first experience of conducting an online test showed that OLA allows beginners to evaluate their knowledge gained during the residency period. It also allows individual departments, based on an analysis of the test results to identify problematic areas of knowledge gaps and make the relevant corrections to the specialist training programmes. Our future plans include organising OLA in Russia Federation again on April 17, 2020 and register Krasnoyarsk as EDAI Part I centre to start from 2020.

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The key Anaesthesia Non-Technical Skills (ANTS) necessary for anaesthesia senior residents to practise with distant supervision - a mixed methods analysis

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Background and Goal of Study: ANTS describe cognitive, social and personal resource skills that complement technical skills, contributing to safe and efficient patient care. Deficiencies increase the risk of an adverse event. ANTS system is a taxonomy and behavioural rating comprising 4 categories and 15 elements which encompass the domains of Situation Awareness, Task Management, Decision Making and Teamwork. Training with the ANTS system is part of the anaesthesia curriculum of some countries. However, little data exists relating the categories and elements in the ANTS system to the level of supervision and entrustment. In Singapore’s public healthcare institutions, anaesthesia senior residents must achieve a level of entrustment equivalent to distant supervision to be on call. A cross sectional study of Singapore’s largest anaesthesia training programme was performed utilising both a survey and focus group discussions with key-stakeholders. The goal of the study was to identify key ANTS and other skills (beyond the ANTS system) that are perceived as important for anaesthesia residents in Singapore to practise with distant supervision.

Materials and Methods: A survey was sent to key stakeholders (faculty, nurses and residents) of Singapore’s largest anaesthesia residency training programme, asking them to select the three most important elements in the ANTS system needed for distant supervision. Respondents were subsequently invited to focus group discussions. The interviews were transcribed and analysed utilising an interpretive approach and phenomenological perspective.

Results and Discussion: The survey response rate was 56.6%. The key elements identified from the ANTS system for entrusting distant supervision from both the survey and focus groups were sub-stratified into Situation Awareness (recognising, understanding, anticipating), Task Management (planning, prioritising), Decision Making (balancing risks and options) and Teamwork (coordinating activities). In addition, other skills identified were assertive leadership and stress/conflict management. Stakeholders reported that role modelling is important to imbibe these skills, the practice of which can be influenced by hierarchy and culture. Certain key elements in the ANTS system were deemed more crucial than others for the entrenchment of distant supervision by key stakeholders. Further work is required for the teaching and assessment of ANTS.
Knowledge and perceptions of Anaesthesiology among fourth-year Greek medical students after completion of the anaesthesia core rotation

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Background and Goal of Study: Several studies reported that medical students lack sufficient knowledge regarding the anaesthesiology practice. In this study, we sought to investigate the knowledge and perceptions regarding the Specialty of Anaesthesiology in fourth-year medical students of Medical School University of Thessaly.

Materials and Methods: A theoretical knowledge questionnaire was used, that surveyed the students’ knowledge and perceptions regarding the Specialty of Anaesthesiology, before and after the completion of the 14-week anaesthesia core rotation. The questionnaire was distributed to the 104 students, 65 (62.4%) male and 39 (42.2%) female during their first and their last in-class session of the mandatory 14-week anaesthesia core rotation.

Results and Discussion: Before the rotation, the students’ primary sources of information regarding Anaesthesiology were university experience (N=35, 33.6%) and television/film/media (N=27, 25.9%). Moreover, although the majority of students (90.2%) knew that the anaesthetists work in the operating room, 50 (48.9%) and 43 (41.2%) students respectively reported that they have no place in the recovery room or in the pain clinic, while 71 (88%) that they are somewhere kind of psychiatrists. After the completion of the rotation almost all students reported that their primary sources of information is university experience. Additionally, only 10 students (9.6%) stated that anaesthesiologists have no place in the recovery room or in the pain clinic, while none of them that they are some kind of psychiatrists. Last but not least, after their training 100 (96.1%) students stated that their preferred method of studying Anaesthesiology is the hands-on skills session, compared to 45 (43.2%) students before the rotation.

Conclusion: It seems that the 14-week anaesthesia core rotation of our Medical School have a positive impact on the knowledge, perception and attitudes of the undergraduate medical students, regarding our specialty.
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Attitude and knowledge of the students of the University Department for Health Studies in Split about organ donation

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Background and Goal of Study: Although brain death signifies the end of life, at the same time, it brings up the possibility to save lives with organ donation. An important step in organ donation is family consent, which is largely dependent on the family’s knowledge and attitudes towards brain death and organ donation. The goal of the study was to investigate the opinions among students of the University Department for Health Studies in Split, Croatia and their knowledge about the organ donation process.

Materials and Methods: 210 students from nursing, radiology, physiotherapy, laboratory and midwifery studies filled out a newly constructed Questionnaire with 11 questions about student knowledge, and 13 questions exploring student opinions on organ donation. Examinees scored their attitude or knowledge on a Likert scale from 1 (completely disagree) to 5 (completely agree).

Results and Discussion: No difference in knowledge or attitudes were noted between genders or different study groups. Older examinees showed more knowledge about brain death and organ donation (≥30 y, p=0.042). Almost all students (96.2 %) have a positive attitude towards organ donation, 77.6% are willing to donate their organs. However, 35.7% have doubts or disagree with brain death as the death of a person. In addition, 37.0% are inconclusive or agree with the fact that brain death is very difficult to detect. Moreover, 48.1% of all students are concerned about possible manipulation in brain death confirmation. The very high percentage of students (82.8%) disagree with the fact that donation contributes to the recipient’s life quality. More than half of all students (54.7%) are inconclusive or agree that organ donation is against religious beliefs. Fortunately, 70.5% of all students agree with the need for additional education.

Conclusion: Although Croatia is a very successful member of Eurotransplant, further improvements need to be made regarding the knowledge about organ donation from both, civilian and religious authorities. Although student attitudes towards organ donation are positive, additional education about this subject is required to clear the doubts about brain death confirmation, organ donation allocation and life quality of the recipients.

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If you want peace, prepare for war. Theoretical, practical and technical requirements in military anaesthesiology to be displaced in combat.

The spanish model

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Background and Goal of Study: One of the main medical lessons identified after the conflict in Afghanistan is the need for military surgical teams to be trained, cohesive and led during periods between wars, in order to complete the mission in the future. The objective is to describe theoretical, practical and technical requirements that a Spanish military anaesthesiologist must learn in order to be deployed in an international mission.

Materials and Methods: An analysis 2/2017 technical instruction of Health of the Defense General Inspection of the Kingdom of Spain which specifies the requirements that a Spanish military anaesthesiologist must overcome in 4 years in order to be deployed abroad. As a secondary objective, these requirements are compared to those employed in other allied medical military corps.

Results and Discussion: Over a period of four years, the Spanish military anaesthesiologist must meet military, practical and theoretical requirements. Within the military level we highlight the military exercises in national territory, rotations in some military unit and international mission days. Regarding the practical requirements, 24-hour (5 / year) guards, anaesthesia in general and digestive surgery (20 / year), in orthopedic surgery and traumatology (20 / year), in neurosurgery (2 / year) should be performed, in thoracic surgery (2 / year), in vascular surgery (1 / year), in obstetric surgery (5 / year) and locoregional techniques (5 / year). Finally, it is necessary a theoretical training in a unit of polytraumatized (2 months), burned (1 month), critical care (2 months), pediatric critical care (1 month), ATLS course, Ecofast course, DATC course, mechanical ventilation course, ultrasound course in locoregional anesthesia, difficult airway control management course, congresses of interest, English language course and approved physical tests. Other military armies have a program similar to that carried out by the anaesthesiologists of the Spanish Military Health Corps.

Conclusion: From the point of view of the authors, the requirements at the military, practical and theoretical level demanded in the Spanish Military Health Corps are necessary although partially scarce in the practical requirements. This preparation resembles that made in other allied countries.

Acknowledgements: Spanish Medical Corps.

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Comparison of and factors affecting publication rates of abstracts presented at ASA 2016 and ESA 2016

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Background: An understanding of publication rate should be informative to academic conference attendees, since the findings of abstracts are based on preliminary data and have not gone through the rigorous peer-review process of published studies. Determining factors that influence publication rate can also help illuminate bias in the review process. This study seeks to ascertain the publication rate of abstracts presented at Anesthesiology 2016, the annual meeting of the American Society of Anesthesiologists (ASA), and Euroanaesthesia 2016, the annual meeting of the European Society of Anaesthesiology (ESA). The objectives of this study are to examine differences in publication rate across clinical track and country of origin within and between both academic conferences. These factors are analyzed in correlation to destination journals and their impact factor.

Methods: A total of 1128 presented abstracts from ASA 2016 and 1388 presented abstracts from ESA 2016 were examined. Their authors, qualifications (M.D., D.O., Ph.D etc.) and country of origin were extracted. Google search, ResearchGate and PubMed were then used to learn if the research presented in the abstracts was published in medical journals in the next 2 years (until November 2018). If the abstract was published in an indexable journal, the journal impact factor and the date of publication were recorded.

Results: Of the 1128 abstracts presented at ASA 2016 and 1362 abstracts presented at ESA 2016, 369 (32.7%) and 335 (24.6%) were published respectively within the studied timeframe. By clinical track, Anesthetic Action and Biochemistry had the highest publication rate of 56.7% at ASA 2016, while Cardio, Thoracic and Vascular Anaesthesia had the highest publication rate of 33.3% at ESA 2016. By country (with 10 or more presented abstracts), Taiwan had the highest publication rate of 72.7% at ASA 2016, while Turkey had the highest publication rate of 69.2% at ESA 2016. The most popular journal of publication was Anesthesiology & Analgesia for both meetings, with 42 publications coming out of ASA 2016 and 20 publications coming out of ESA 2016. 183 abstracts (49.6% of total) were published within a year of ASA 2016 and 128 abstracts (38.2% of total) were published within a year of ESA 2016.

Conclusions: Publication rates of abstracts presented at ASA 2016 and ESA 2016 vary across clinical track and country of origin. Further research is needed into the underlying drivers of these biases.
Impact of simulation based CPR training for multidisciplinary OR teams

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Background and Goal of Study: Emergency situations such as a cardiac arrest present a challenge for the operating room (OR) team [1]. Team training using high-fidelity simulation is the gold standard in health care education but there are few studies of full professional OR teams. [2,3] This study was performed at the Center of Advanced Medical Simulation and Training (CAMST) and included 17 full days of training focusing on collaboration and communication during OR emergencies. Each team consisted of the 5 professions commonly working in an OR. The aim was to evaluate the impact of training on team members’ self-reported level of non-technical skills and knowledge regarding European CPR guidelines.

Materials and Methods: All participants (n=138) gave written informed consent. Data on self-reported performance was collected using questionnaires consisting of seven-level Likert-type scales and knowledge of CPR guidelines using single correct answer questions. Scores before and after training were analyzed using the Wilcoxon matched-pairs signed rank test (significantly different P value < 0.001).

Results and Discussion: Scores improved significantly after training regarding the questions: ‘I know how to act in my role in an emergency situation; b. I will communicate clearly in an emergency situation; c. I will call for help when I need support while working in the OR; d. I will act correctly in case of a CPR situation in the OR. Regarding CPR guidelines scores improved significantly, nurses and doctors scoring 91% respectively 93% after training. Interestingly, 7.7 % of licensed personal did not answer correctly regarding when to administer epinephrine.

Conclusion: Self-assessment concerning non-technical skills improved significantly after training. Interestingly, theoretical knowledge regarding CPR guidelines was equally among nurses and doctors but still not 100% correct after training. The results will guide further improvements of the ongoing training intervention.

References:

High-fidelity simulation to assess task load index and performance: a prospective observational study

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Background and Goal of Study: Measuring task load by NASA Task Load Index (NASA-TLX) in high-fidelity simulation is a tool widely used in aviation to assess pilots. This index might be an interesting asset for optimising the quality of training. NASA-TLX is a tool widely used in aviation to assess pilots. This index might be an interesting asset for optimising the quality of training. This should be considered when planning normative simulation.

Results and Discussion: Scores improved significantly after training regarding the questions: ‘I know how to act in my role in an emergency situation; b. I will communicate clearly in an emergency situation; c. I will call for help when I need support while working in the OR; d. I will act correctly in case of a CPR situation in the OR. Regarding CPR guidelines scores improved significantly, nurses and doctors scoring 91% respectively 93% after training. Interestingly, theory knowledge regarding CPR guidelines was equally among nurses and doctors but still not 100% correct after training. The results will guide further improvements of the ongoing training intervention.

Materials and Methods: An 44-question survey was distributed to anaesthesiology residency program directors in the 88 universities, academies, research centers.

Results and Discussion: 65 of 88 (73,9%) residency program directors responded to the survey. All of respondents utilized any type of simulation for anesthesia education. 52 (60%) included official simulation course in curriculum. Most of respondents (60; 92,3%) reported using part-task trainers for training anesthesiologists. Using phantoms for training central venous access reported by 50 (77%) respondent and 25 (38,4%) use special phantoms for US-guided central venous access. Simple manikins for training BLS used in 65 (95,4%) centers and computerized manikins for training ALS – in 57 (87,7%). 42 centers utilized manikins for training neuraxial anesthesia. 27 (41,5%) directors reported using manikins and check-lists for assessment of resident’s manual skills during exam. 52 (95,4%) courses equipped with high-fidelity patients simulators. Simulation sessions (at least 1 full day in month with each group) provided in 42 (64,6%) centers, in 51 (78,4%) centers debriefing is essential part of training. The most often used scenarios include basic of anesthesia (46%), airway management (80%), intraoperative anesthesia crises (44,6%), cardiac emergencies (70,7%). 43 (66,1%) centers use high-fidelity patients simulators for resident’s performance assessment during OSCE with check-lists. Inter-professional command training provided in 43% centers. The respondents called the lack of qualified teachers (66%), lack of motivation among teachers (66%) as most common limitations for introducing simulation into the educational process. 63 (97,9%) respondents agree with the need to develop a national simulation program in anesthesia residency.

Conclusion: The results from this survey highlight that there are currently large variations in simulation-based training and assessment among training programs. Most directors consider it necessary to develop a standard curriculum.
Prevalence of sleep disturbance of residents the night before high-fidelity simulation: results from a prospective one-year national survey

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Background: The stress level of participants of high-fidelity simulation (HFS) stems from various factors but may result in anticipatory anxiety causing sleep disturbances during the night prior to HFS. The objective of this survey was to determine the prevalence of sleep disturbances of residents during the night prior to HFS.

Methods: The survey was sent to all residents at the beginning of the HFS during one year, in ten simulation centres. The questionnaire combined demographics and protective time for teaching.

Results: Among respondents, 66% [95%CI, 63 to 69] of residents had more than 10 mm and 27% [95%CI, 24 to 30] had more than 25 mm of sleep disturbance (Figure 1). Residents with a sleep disturbance of more than 10 mm had fewer hours of sleep (6.4 [SD 1.8] vs. 7.3 [SD 1.3], difference: -0.9 [95%CI, -1.1 to -0.7]; P<0.0001), with a higher number of night-time awakenings (1.3 [SD 1.5] vs. 0.7 [SD 0.9], difference: 0.6 [95%CI, 0.4 to 0.8]; P<0.0001).

Conclusion: Among residents participating in HFS, a high prevalence of sleep disturbance during the night before HFS, was noted. Strategies to help residents achieve better sleep prior to HFS should be explored.

Reference:
Adapting a low-cost high-fidelity phantom for teaching emergent cricothyrotomy in a virtual multidisciplinary scenario

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Conclusion: The adaptations made to the Real Cric Trainer model allowed the integration of this phantom in multidisciplinary simulation scenario. The model was evaluated as high-fidelity by the participants and the satisfaction and usefulness of the workshop. The workshop was considered a valuable tool for teaching the technique and usefulness of integration the phantom in a clinical scenario.

Materials and Methods: This observational study included 30 volunteer participants - third to sixth year medical students with varying experience in high-fidelity CPR training. The volunteers were randomized in two groups with predefined simulation outcomes - either patient death (PD) or return of spontaneous circulation (ROSC). After simulation and debriefing the volunteers completed a self-assessment survey stating their initial emotional response and self-confidence.

Results and Discussion: No significant self-confidence evaluation difference was found among the compared volunteer groups. A wide range of emotional response was recognized among the volunteers. From the 30 volunteers that completed the self-assessment survey 11 students stated that their confidence has increased (5 PD vs 6 ROSC) and 11 students stated that there was no change in their confidence (6 PD vs 5 ROSC) and in 8 cases the volunteers noted a decrease in their confidence (4 PD vs 4 ROSC). Overall impression based on volunteer self-assessment ranking tended to show more signs of reflective thinking in the negative outcome group.

Conclusion: Patient death as a teaching tool has no negative effect on medical student self-confidence. Patient death in high-fidelity simulation tends to promote beneficial reflective thinking to a greater degree compared to positive outcome scenarios.

Background and Goal of Study: Despite significant advances in airway management, difficult airway is still a challenge in anaesthesiology due to its potential serious complications. Cricothyrotomy (CT) is the technique of choice in the scenario “can’t intubate can’t ventilate” (CCIV), but CT is rarely performed in clinical practice and skill acquisition is difficult. Our goal was to adapt a low-cost high-fidelity phantom, the Real Cric Trainer1, and apply and evaluate it in a multidisciplinary simulation scenario.

Materials and Methods: We applied some modifications to the mentioned model to increase its fidelity and to adapt it into a simulation scenario. The main modifications were related to simulation of bleeding and air. We designed a CICV case and performed a multidisciplinary workshop. We evaluated: the fidelity and usefulness of the phantom, the possibility of applying ultrasound (US) to the phantom and the satisfaction of the participants.

Results and Discussion: The workshop involved 11 participants (6 doctors and 5 nurses) from an Intensive Care Unit. The initial cost for building the phantom was 220E. The price for each student at the workshop was 4E. The students scored out of 10 the following characteristics of the phantom: visual appearance 8.1±1.2; tactile sensation 8.2±1.4; fidelity when performing the technique 7.9±1.8; usefulness to teach the technique and usefulness of integration the phantom in a clinical scenario 9.6±0.7. Regarding the use of US, the images were evaluated as high-fidelity by two experts. Regarding satisfaction, students scored out of 10: usefulness of the workshop for their clinical practice, approach and the development of the scenario 9.8±0.7. The debriefing 9.9±0.3. Definition of learning objectives, expectations, acquisition of new skills and usefulness of the training 9.9±0.3. All participants would recommend the workshop to a colleague and would repeat it.

Conclusion: The adaptations made to the Real Cric Trainer model allowed the integration of this phantom in multidisciplinary simulation scenario. The model was evaluated as high-fidelity by the participants and the satisfaction and usefulness of the workshop was very high. The cost of the model was low compared with commercial ones. The phantom allows identification of anatomical structures by US and therefore might be useful for teaching this skill.

References:
Results and Discussion: The total cost was 47€, remarkably cheaper than commercial ones, whose cost ranges between 2000€ and above 40000€ what are beyond most educational budgets. When it comes to usefulness and fidelity, the low-cost manikin was used in a simulation workshop for ICU staff. A high-fidelity simulated scenario was achieved by placing the model on an actor's thorax with vital signs response monitoring. The model was then assessed by an expert thoracic surgeon and the 12 workshop participants with high scoring in fidelity (Table).

Conclusions: Authors conclude that this model is feasible, reproducible, transportable and extremely cheaper than their commercial counterparts. These characteristics make this realistic chest-tube insertion model accessible to most educational budgets.

Effects of standardized breathing and biofeedback on performance of anaesthesiologist residents during high fidelity simulation

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Background: High fidelity simulation (HFS) remains stressful for residents. This stress level negatively impacts performance not only in HFS but most likely also in clinical practice. Thus, stress management with standardized breathing and biofeedback exercise might help participants to improve performance. This study explored whether these methods can contribute to improve performance during HFS.

Methods: Residents who convened to HFS were randomized in 3 parallel-arms: standardized breathing exercise (BR), BR paired with heart rate variability biofeedback (BR+BFB), review of normal biological results (CONTROL). The 5-min intervention was performed after the scenario briefing (1 of 4 scenarios). Primary endpoint was a composite score made of technical (scenario specific grid) and non-technical (Ottawa1) performance scored by 2 blinded investigators. Secondary endpoints included physiological (heart rate, breathing rate) and psychological stress markers (visual scale, Thayer2) that were analysed at different time-points. Performance was analysed by a ANOVA-2 with GROUP and SCENARIO factors. Stress markers were analysed by repeated-measures ANOVAs with between subject variable GROUP and with within-subject factor TIME.

Results and Discussion: 34 residents were included in the analysis. Residents in the BR group had higher performance score compared to control while a similar trend was observed in the BR+BFB group (Fig 1). Residents with BR+BFB had an increase in internal relaxation from the Thayer questionnaire after intervention (Fig 2).

Conclusion: A 5-min session of standardized breathing before scenario provides higher performance, hence offering promising application for stress management during HFS. Biofeedback association shall be further explored for its potential additional interests.

References:
1. CCM 2006; 34: 2167-74.
2. **Internal relaxation (Thayer)**

Evolution of internal relaxation during treatment. Grey, blue and green thick lines represent CONTROL, BR, BR + BFB groups respectively. Points represent effects of the models with confidence intervals.
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Munich, Germany

Euroanaesthesia 2021

THE EUROPEAN ANAESTHESIOLOGY CONGRESS

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