Abstracts and Programme

EUROANAESTHESIA 2008

The European Anaesthesiology Congress

Copenhagen, Denmark,
31 May–3 June 2008
European Journal of Anaesthesiology

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Please note that all abstracts are presented as poster presentations: abstract presenters do not make a formal presentation of their abstract in a separate room, using audiovisual aids (except for the ESA Best Abstract Prize Competition (BAPC) and the Best Abstracts – Runner-up Session 1 & 2). Instead, two chairpersons will conduct, in front of each poster, a short discussion of each abstract with the presenter and the audience, for every abstract in that session. Poster presenters have been asked to stand by their poster for 45 minutes before and 30 minutes after their session, to address further questions.

Poster Board location
All posters of regular abstract sessions will be displayed in Hall A1. Each abstract presentation session is displayed in a different poster board row. Rows are numbered, to easily locate a given session. The first board of each row contains an information board that lists the session reference, date, time and chairperson(s).

Note: All abstract session details in this Supplement are correct at the time of printing. Session data displayed on the information boards, in particular chairperson names, may be more up to date.

Note that the Best Abstract Prize Competition, with session reference ESAPC1, takes place in Room B5, as do the Best Abstracts – Runner-up Session 1 and the Best Abstracts – Runner-up Session 2. The posters of these “best” abstracts, however, will also be on display in Hall A1 for the duration of the congress.

Locating an abstract
The accepted abstract number format consists of the session reference, followed by a number denoting the order of the abstract within this session: for example, session 6AP1 would be the first (1) Abstract Presentation (AP) session for subcommittee 6). The first abstract to be presented in session 6AP1 will thus be called 6AP1-1, the second one 6AP1-2 and so on. (There may be omissions in the numbering due to withdrawn abstracts.)

To locate abstract 6AP1-2 or other abstracts for session 6AP1, look for the session reference (6AP1) in the schedule listed below, then find the appropriate page number, which always refers to the page number of the first abstract within the specified session.

The number of the poster board row is indicated for each session. To find the poster board for abstract 6AP1-2, go to the poster board row indicated for session 6AP1 (on the day of presentation), then look for the poster board with number two indicated at the top.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Reference</th>
<th>Room / Row in Hall A1</th>
<th>Page</th>
</tr>
</thead>
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<td>Esaap1</td>
<td>Room B5</td>
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<td>ROW 1A</td>
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<td>1AP4</td>
<td>ROW 2A</td>
<td>14</td>
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<td>Subcommittee 2 – Ambulatory anaesthesia</td>
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<td>ROW 4B</td>
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<td>ROW 4A</td>
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<td>ROW 2B</td>
<td>24</td>
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</table>
### Subcommittee 4 – Clinical and experimental circulation

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<td>12:15–13:45</td>
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<td>ROW 5A</td>
<td>51</td>
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<td>Sunday, June 1</td>
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<td>ROW 7A</td>
<td>53</td>
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<td>16:00–17:30</td>
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<td>ROW 10A</td>
<td>62</td>
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<tr>
<td>Monday, June 2</td>
<td>16:00–17:30</td>
<td>4AP7</td>
<td>ROW 11A</td>
<td>64</td>
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<tr>
<td>Tuesday, June 3</td>
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<td>4AP8</td>
<td>ROW 1B</td>
<td>66</td>
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### Subcommittee 5 – Respiration

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<td>ROW 9B</td>
<td>72</td>
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<td>ROW 3B</td>
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### Subcommittee 6 – Transfusion and haemostasis

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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<td>83</td>
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<tr>
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<td>ROW 8A</td>
<td>87</td>
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<td>Monday, June 2</td>
<td>16:00–17:30</td>
<td>6AP4</td>
<td>ROW 12A</td>
<td>89</td>
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</table>

### Subcommittee 7 – Neurosciences

<table>
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<th>Time</th>
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<td>94</td>
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<td>96</td>
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<td>ROW 5A</td>
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<td>ROW 10A</td>
<td>101</td>
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<td>7AP6</td>
<td>ROW 5B</td>
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</table>

### Subcommittee 8 – Local and regional anaesthesia

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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<td>ROW 11A</td>
<td>112</td>
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<td>ROW 9B</td>
<td>118</td>
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<tr>
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<td>8AP7</td>
<td>ROW 7B</td>
<td>121</td>
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</table>

### Subcommittee 9 – Pharmacology

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Session</th>
<th>Row</th>
<th>Number</th>
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<tbody>
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<td>ROW 13A</td>
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<td>127</td>
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<tr>
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<td>16:00–17:30</td>
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<td>ROW 11B</td>
<td>130</td>
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<td>ROW 13B</td>
<td>132</td>
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<tr>
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<td>ROW 7A</td>
<td>135</td>
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<td>ROW 9A</td>
<td>138</td>
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<td>ROW 14A</td>
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<td>ROW 16A</td>
<td>144</td>
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<td>9AP9</td>
<td>ROW 13B</td>
<td>147</td>
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</table>

### Subcommittee 10 – Paediatric anaesthesia and intensive care

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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<td>ROW 3B</td>
<td>151</td>
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<tr>
<td>Sunday, June 1</td>
<td>16:00–17:30</td>
<td>10AP2</td>
<td>ROW 15B</td>
<td>154</td>
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<tr>
<td>Monday, June 2</td>
<td>16:00–17:30</td>
<td>10AP3</td>
<td>ROW 18A</td>
<td>157</td>
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</table>

### Subcommittee 11 – Obstetric anaesthesia

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Session</th>
<th>Row</th>
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<tbody>
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<td>ROW 12B</td>
<td>159</td>
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<tr>
<td>Monday, June 2</td>
<td>14:00–15:30</td>
<td>11AP2</td>
<td>ROW 6B</td>
<td>161</td>
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</table>

### Subcommittee 12 – Intensive care medicine

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Session</th>
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<td>ROW 14B</td>
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<td>ROW 12B</td>
<td>167</td>
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<td>ROW 17A</td>
<td>169</td>
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<td>ROW 19A</td>
<td>172</td>
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<td>ROW 14A</td>
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<td>ROW 11B</td>
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<td>ROW 13A</td>
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<td>ROW 8B</td>
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<thead>
<tr>
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<tbody>
<tr>
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<tr>
<td>Saturday, May 31 13:15–14:45 14AP2 ROW 9B 195</td>
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<tr>
<td>Saturday, May 31 15:15–16:45 14AP3 ROW 16B 198</td>
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<tr>
<td>Sunday, June 1 10:15–11:45 14AP4 ROW 14B 202</td>
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<tr>
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<tr>
<td>Sunday, June 1 14:00–15:30 14AP7 ROW 16A 210</td>
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<tr>
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<td>Monday, June 2 10:30–12:00 14AP9 ROW 15A 215</td>
</tr>
<tr>
<td>Monday, June 2 10:30–12:00 14AP10 ROW 17A 216</td>
</tr>
<tr>
<td>Monday, June 2 14:00–15:30 14AP11 ROW 14B 219</td>
</tr>
<tr>
<td>Monday, June 2 14:00–15:30 14AP12 ROW 16B 221</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Subcommittee 15 – Education, research and presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday, June 1 14:00–15:30 15AP1 ROW 18A 223</td>
</tr>
<tr>
<td>Monday, June 2 10:30–12:00 15AP2 ROW 19A 226</td>
</tr>
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<table>
<thead>
<tr>
<th>Subcommittee 17 – Patient safety</th>
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<tr>
<td>Sunday, June 1 10:15–11:45 17AP1 ROW 18B 228</td>
</tr>
<tr>
<td>Monday, June 2 10:30–12:00 17AP2 ROW 21A 231</td>
</tr>
<tr>
<td>Monday, June 2 14:00–15:30 17AP3 ROW 18B 233</td>
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<table>
<thead>
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<th>Subcommittee 19 – Airway management</th>
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<td>Saturday, May 31 15:15–16:45 19AP1 ROW 18B 236</td>
</tr>
<tr>
<td>Saturday, May 31 15:15–16:45 19AP2 ROW 20B 238</td>
</tr>
<tr>
<td>Sunday, June 1 12:15–13:45 19AP3 ROW 22B 241</td>
</tr>
<tr>
<td>Sunday, June 1 16:00–17:30 19AP4 ROW 19B 243</td>
</tr>
<tr>
<td>Sunday, June 1 16:00–17:30 19AP5 ROW 21B 246</td>
</tr>
<tr>
<td>Monday, June 2 16:00–17:30 19AP6 ROW 20A 249</td>
</tr>
<tr>
<td>Monday, June 2 16:00–17:30 19AP7 ROW 22B 253</td>
</tr>
<tr>
<td>Tuesday, June 3 10:30–12:00 19AP8 ROW 17B 255</td>
</tr>
</tbody>
</table>

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Call for abstracts

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Milan, Italy
6-9 June 2009

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The submission module will be available to submitters from November 1st to December 15th 2008

Submission Conditions

When submitting your abstract, you will be prompted to accept the submission conditions that will be made available on the ESA website at least one month before the submission starts.
The goal of the study was to evaluate the neuronal mechanisms of the anesthetic gas Xenon (Xe) and to investigate the antinociceptive effect of siRNA targeting Nav1.8 in dorsal root ganglia (DRG) by intrathecal administration. The mechanisms of Xe action can thereby be explained by a postsynaptic mechanism. Xe exerts its effect at neither of these subunits. The hypothesis that especially pneumonia that requires mechanical ventilation responds favourably to treatment with rhDNase should be investigated.

Conclusion(s): rhDNase is able to reduce the duration of ventilation in adult non-surgical intensive care patients.

Disclosure: Travel expenses are paid by Roche, the manufacturer of Pulzyme.

References:

ESAPC1-4
An non-O2 consuming inotrope drug improves survival in an animal model of cardiac arrest
E. Koudouna, K. Anthonios, E. Dassiakou, D. Pereira, L. Papadimitriou
Experimental Surgery and Surgical Research, University of Athens, Athens, Greece

Background and Goal of Study: Cardiac arrest remains the leading cause of death in Europe. The role of adrenaline remains controversial, due to its beta-adrenergic effects, which are known to induce post-resuscitation myocardial dysfunction. The goal of this study was to determine whether a non-O2 consuming inotrope drug, such as levosimendan, which is an intravenous, Ca2+-sensitizing drug, during resuscitation, would improve survival.

Materials and Methods: Thirty two healthy Landrace/Large White pigslets 20±1.7kg aged 16-18 weeks, were randomized into 2 groups (16 animals each). Coronary perfusion pressure was monitored during the resuscitation and no effect on the baseline threshold of nociception. The antinociceptive effect of M-siRNA continued to 72h after the last RNA injection.

Conclusion(s): We conclude that silencing of Nav1.8 channel using a siRNA approach is capable of producing allodynia and hyperalgesia relief in the bone cancer model.
iod. Using a pacing wire through the internal jugular vein, ventricular fibrillation was induced to all animals and left untreated for 6 minutes. Animals in Group A received saline as placebo (10ml dilution, bolus) + adrenaline (0.02mg/kg) and animals in Group B received levosimendan (12mg/kg/10ml dilution, bolus) + adrenaline (0.02mg/kg) during cardiopulmonary resuscitation (precordial compressions and mechanical ventilation). Electrical fibrillation was attempted after 8 minutes of cardiac arrest (6 min of untreated ventricular fibrillation and 2min of cardiopulmonary resuscitation). Coronary perfusion pressure (CPP) was monitored during resuscitation period. Animals with return of spontaneous circulation (ROSC) were placed back to their cages for 48 hours, in order to record survival.

Results and Discussion: Seven animals in Group A restored spontaneous circulation and 4 survived for 48 hours after ROSC, in comparison to 16 animals which restored spontaneous circulation (p<0.05) and 14, which survived (p<0.05) in Group B. CPP was significantly higher (p<0.05) during resuscitation in Group B. In conclusion, a non-O2 consuming inotrope, when administered during cardiopulmonary resuscitation, significantly improves survival and increases coronary perfusion pressure during resuscitation. Levosimendan is an inotropic drug, which is known not to increase oxygen consumption by the myocordium or induce arrhythmias. In addition, levosimendan is known to decrease right atrium systolic and diastolic pressures. It was therefore logical that levosimendan would increase CPP, which is the only predicting factor of ROSC, and improve survival, as the animals would not be expected to have life-threatening post-resuscitation myocardial dysfunction.

Conclusion(s): Levosimendan, co-administered with adrenaline before defibrillation, improves survival in this animal model of cardiac arrest and cardiopulmonary resuscitation.

ESAPC1-5
The CB1-receptor antagonist rimonabant reduces central sensitisation in a human pain model
J. Filtz, A. Neiberle, H. Zeilhofer, W. Kopper
Department of Anaesthesiology, University Hospital, Erlangen, Germany

Background and Goal of Study: Reduced glycergeric and GABAergic inhibition is thought to underlie secondary hyperalgesia elicited by intense painful stimulation. Spinal endocannabinoids produced in response to painful stimulation are suspected to serve this function. Aim of this study was to examine the analgesic and antihyperalgesic properties of the CB1-receptor antagonist rimonabant in an experimental pain model in humans.

Materials and Methods: After approval of the local ethics committee, 16 healthy volunteers were enrolled in this double-blind and placebo-controlled study and were randomized into two sex- and age-matched groups of 8 persons each. Transcutaneous electrical stimulation at high current densities induced spontaneous acute pain (NRS = 6 of 10) and stable areas of pinprick-hyperalgesia and allodynia. Pain intensities as well as the areas of hyperalgesia were assessed before and after a 10 days lasting intake of either rimonabant at an oral dose of 20 mg once per day (sufficient to reach > 90% of the steady state plasma level) or placebo. Each session was performed over a period of 100 min while acute ongoing pain as well as areas of allodynia and hyperalgesia were assessed at regular intervals. Statistical analysis was performed on the integral of pain ratings and hyperalgesic and allodynic area sizes (cm²) over time (min).

Results and Discussion: Rimonabant treatment had no effect on the ratings of acute pain induced by electrical stimulation (NRS decrease: -2.0±0.5%, n = 8 volunteers each, P = 0.75, paired Student t-test). However, the sizes of hyperalgesic and allodynic skin areas were significantly decreased in the rimonabant-treated group (hyperalgesia: 46.3±5.2%, P < 0.001; allodynia: 42.6±5.0%, P = 0.0074).

Conclusion(s): Our results provide first data about reduction of central sensitisation in a human pain model caused by a CB1 receptor antagonist. These findings attribute to endocannabinoids a novel pronociceptive function in dorsal horn neuronal circuits which may limit the analgesic efficacy of systemic cannabinoid agonists.

References:

ESAPC1-6
Sevoflurane induced preconditioning in the isolated mouse heart: A role for caveolin-1
M. Damm, A. Heintz, P. Panousis, T. Koch, S. Stehr
Department of Anaesthesiology and Intensive Care Medicine, Medical Faculty Carl Gustav Carus, University Hospital Dresden, Dresden, Saxony, Germany

Background and Goal of Study: Caveolae, small invaginations in the plasma membrane and their main scaffolding protein Caveolin-1 are essential proteins for signal transduction and transportation process inside the cell. There is evidence that caveolae have a potential role in cardiac protection through ischemia and reperfusion. We tested the hypothesis that caveolae are also involved in sevoflurane induced preconditioning in the isolated mouse heart.

Materials and Methods: Twelve 6 wk-old male C57BL/6 (WT) and C57BL/6 (CAV-1 KO) knock out mice were anaesthetised with pentobarbital sodium (70 mg/kg/h). Hearts were rapidly removed during continuous cooling and mounted via aorta on a perfusion cannula. Hearts were allowed to equilibrate for 20 min and were subjected to carbonation in the control group (WT control, n=6; CAV-1 KO control, n=6) or 2.8% sevoflurane in the sevoflurane group (WT sevo, n=6; CAV-1 KO sevo, n=6) for 15 min. After a 10 min period of washout all hearts underwent 60 min ischemia through ligation of the left coronary artery (LCA). A 30 min reperfusion period followed. Ventricular pressure (LVP), dP/dtmax, heart rate, coronary flow and coronary perfusion pressure were continuously measured. Arterial and venous perfusate samples were collected. The normal perfused area, the area perfused by the LCA (area at risk, AAR) and the size of the infarct itself were determined by using a staining technique with microspheres and propidium iodide. Infract size was calculated as the percentage of myocardial infarction compared with the AAR. Data analysis was performed using One-Way ANOVA and post-hoc analysis by Bonferroni.

Results and Discussion: In the isolated perfused mouse heart 60 min of left coronary occlusion and 30 min of reperfusion caused myocardial infarction of 67.3±2.3% in WT-group and of 67.0±2.8% in respectively CAV-1 KO group. Sevoflurane reduced infarction by 50.1% to 33.6±2.1% (p < 0.01) in the WT hearts and by only 18.5% to 54.7±3.4% in the CAV-1 KO hearts (p < 0.01).

Conclusion(s): Sevoflurane induced preconditioning in the isolated perfused mouse heart as infarct sizes were significantly decreased. This effect was present in WT and CAV-1 KO mouse. Sevoflurane induced preconditioning is interestingly limited in the Caveolin-1 knockout hearts. Therefore, caveolin-1 is likely to be of major importance for sevoflurane induced preconditioning.

Best Abstracts – Runner-up Session 1

ESAAP1-1
Colour coding: A way to prevent syringe swap errors (sse)
P. GAMEIN, D. TOISOCHREA, P. CHOPARD, T. PENGER, P. BONNABY
Anaesthesiology Service, Geneva University Hospitals, Geneva, Switzerland

Background and Goal of Study: To prevent ssE, it has been suggested to resort to colour coding of drugs. As evidence in favour of this proposal was poor, we conducted a randomized controlled experiment aiming at measuring the impact of colour labels on ssE, keeping in mind that a ssE always results from both a syringe selection error (Esel) and either a check not performed (Ochk) or a check performed but failed (Fchk).

Materials and Methods: Via a computer screen, participants were asked to pick-up a syringe of a fictive drug from a tray containing 1, 2, 4, 5 or 6 items and decide whether they would inject it, by inserting the syringe in either the
Blood in Catheter 21 (18.3%) 14 (11.6%) 5 (4.8%) 0.001
±
Blood in Needle 5 (3.3%) 3 (2.0%) 1 (0.6%) NS
Sample Size 150 150 150
Blood in Needle 6 (2.0%) 4 (1.3%) 1 (0.3%) NS
Blood in Catheter 32 (10.7%) 18 (6.0%) 6 (2.0%) 0.001
recumbent head-down position it significantly decreased.

2 Bahar M, Chanimov M, Cohen ML, et al. The lateral recumbent head-down posture for epidural anesthesia for labor at term significantly reduces the risk of blood vessel puncture (1-3).

Conclusion(s): The lateral recumbent head-down position for epidural analgesia for labor at term significantly reduces the risk of blood vessel puncture (1-3).

References:

ESAAP1-2
Does the lateral recumbent head-down position decrease the number of epidural venous punctures during catheter insertion?

M. Chanimov, M. Friedland, M. Cohen, M. Bahar, Z. Haltov
Department of Anesthesiology, Assaf Haroeh Medical Center, Affiliated to the Sacker Faculty of Medicine, Tel Aviv University, Zenîf, Israel

Background and Goal of Study: An inadvertent and unrecognized epidural vein cannulation is a potential complication of epidural anesthesia. We evaluated the effect of body posture during epidural catheter insertion on the risk of blood vessel puncture.

Materials and Methods: The study sample consisted of 900 obstetric patients with a body mass index (BMI) less than 35, 450 patients with a BMI of 35 – 40 who were undergoing epidural analgesia, and 347 morbid class III patients. Patients were randomized to have epidural catheterization in one of the following postures: sitting, lateral recumbent horizontal and lateral recumbent head down position. Blood vessel puncture was evidenced by blood aspiration.

Results and Discussion: Our results showed that as BMI increased, the incidence of inadvertent epidural vein cannulation also increased, but in the lateral recumbent head-down position it significantly decreased.

Prevalence of Secondary Outcomes

<table>
<thead>
<tr>
<th>Prevalence of Secondary Outcomes</th>
<th>Sitting position</th>
<th>Lateral recumbent horizontal position</th>
<th>Lateral recumbent head-down position</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>&lt;35</td>
<td>&lt;35</td>
<td>&lt;35</td>
<td></td>
</tr>
<tr>
<td>Blood in Catheter</td>
<td>32 (10.7%)</td>
<td>19 (6.3%)</td>
<td>6 (2.0%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Blood in Needle</td>
<td>6 (2.0%)</td>
<td>4 (1.3%)</td>
<td>1 (0.3%)</td>
<td>NS</td>
</tr>
<tr>
<td>&gt; 1 Attempt</td>
<td>4.1</td>
<td>3.8</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Sample Size</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>&gt;35&lt;40</td>
<td>&gt;35&lt;40</td>
<td>&gt;35&lt;40</td>
<td></td>
</tr>
<tr>
<td>Blood in Catheter</td>
<td>20 (12.0%)</td>
<td>11 (7.3%)</td>
<td>3 (2.0%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Blood in Needle</td>
<td>5 (3.3%)</td>
<td>3 (2.0%)</td>
<td>1 (0.6%)</td>
<td>NS</td>
</tr>
<tr>
<td>&gt; 1 Attempt</td>
<td>16.6</td>
<td>15.5</td>
<td>16.0</td>
<td></td>
</tr>
<tr>
<td>Sample Size</td>
<td>115</td>
<td>112</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>43.2&lt;6.5</td>
<td>42.9&lt;6.3</td>
<td>44.6&lt;6.4</td>
<td></td>
</tr>
<tr>
<td>Blood in Catheter</td>
<td>21 (16.3%)</td>
<td>14 (11.6%)</td>
<td>5 (4.8%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Blood in Needle</td>
<td>7 (6.8%)</td>
<td>5 (5.3%)</td>
<td>4 (3.3%)</td>
<td>NS</td>
</tr>
<tr>
<td>&gt; 1 Attempt</td>
<td>20.1</td>
<td>22.0</td>
<td>20.4</td>
<td>NS</td>
</tr>
</tbody>
</table>

ESAAP1-3
Cough test, abdominal surgery and the combination of both as predictive factors of postoperative pulmonary complications and mortality

A. Rajo, R. Armand-Ugini, Z. Biones, J. Valles, L. Gallart
Anesthesiology, Hospital del Mar-Esperança (IMAS), IMIM, UAB, Barcelona, Catalonia, Spain

Background and Goal of Study: Postoperative pulmonary complications (PPC) are associated with substantial morbidity and mortality (1). Abdominal surgery and positive cough test (CT) are relevant risk factors of PPC (1,2). The relevance of cough test could be greater in patients undergoing abdominal surgery, and the aim of this study was to evaluate this hypothesis.

Materials and Methods: We analyzed data from a prospective multicenter cohort study (ARISCAT) performed in 59 hospitals. For the present partial study cardiac and thoracic surgery were excluded. Cough test was performed by having the patient take a deep inspiration and cough once, and a positive test was defined as recurrent coughing after the first cough (2). PPC registered were respiratory infection, atelectasis, pleural effusion and bronchospasm. Three-month mortality was assessed by telephone. Patients were distributed in 4 groups considering abdominal surgery (yes/no) and cough test (+/-). Chi-square was and multivariable analyses were used. The control group was established from non abdominal surgery and negative CT. Gender and age were also considered.

Results and Discussion: Table 1 shows the risk of PPC (2378 patients). CT+ represents an increased risk of PPC, greatly increased in patients undergoing abdominal surgery.

Table 1. Risk factors of PPC

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal surgery no, CT -</td>
<td>3.6 (1.8-7.4)</td>
</tr>
<tr>
<td>Abdominal surgery no, CT +</td>
<td>2.2 (1.9-4.9)</td>
</tr>
<tr>
<td>Abdominal surgery yes, CT -</td>
<td>1.0 (0.3-3.4)</td>
</tr>
<tr>
<td>Abdominal surgery yes, CT +</td>
<td>9.6 (5.3-17.4)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.1 (0.6-1.9)</td>
</tr>
<tr>
<td>Male</td>
<td>1.0 (1.0-1.0)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>&lt;66 years</td>
<td>2.2 (1.3-3.7)</td>
</tr>
<tr>
<td>≥66 years</td>
<td>1.0 (1.0-1.0)</td>
</tr>
</tbody>
</table>

PPC = Postoperative pulmonary complications; CT = cough test; OR = Odds ratio.

Table 2 shows postoperative mortality risk (2431 patients). A similar pattern of risk when abdominal surgery and cough test are associated can be observed.

Table 1. Risk factors of Mortality

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal surgery no, CT -</td>
<td>1.0 (1.0-1.0)</td>
</tr>
<tr>
<td>Abdominal surgery no, CT +</td>
<td>1.0 (1.0-1.0)</td>
</tr>
<tr>
<td>Abdominal surgery yes, CT -</td>
<td>3.6 (1.0-11.0)</td>
</tr>
<tr>
<td>Abdominal surgery yes, CT +</td>
<td>1.7 (0.8-3.7)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.1 (0.6-1.1)</td>
</tr>
<tr>
<td>Male</td>
<td>1.0 (1.0-1.0)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>&lt;66 years</td>
<td>2.2 (1.3-3.7)</td>
</tr>
<tr>
<td>≥66 years</td>
<td>1.0 (1.0-1.0)</td>
</tr>
</tbody>
</table>

PPC = Postoperative pulmonary complications; CT = cough test; OR = Odds ratio.

Age and gender also are independent and relevant factors which have to be considered.

Conclusion(s): Positive cough test, abdominal surgery and mainly the combination of both variables are relevant risk factors of postoperative pulmonary complications and mortality, mainly in aged and male patients.

Acknowledgements: Granted from Marató de TV3 041610 (2003).

References:

ESAAP1-4
Noise in pressure support improves the performance of pressure support ventilation

M. Gana de Abreu, P. Spieth, P. Pelosi, A. Carvalho, T. Koch
Clinic of Anesthesiology, University Clinic Carl Gustav Carus, Dresden, Germany

Background and Goal of Study: Biological systems may benefit from noise. In the present study, we aimed at describing and evaluating the effects of the new noisy pressure support ventilation (noisy PSV) on lung physiological param-
ers in experimental lung injury. We hypothesized that the performance of PSV can be improved by extrinsic noise.

Materials and Methods: Twelve pigs weighing 25.0 to 36.5 kg were anesthetized, had the trachea intubated and lungs ventilated with a mechanical ventilator (volume-controlled mode). Acute lung injury was then induced by surfactant depletion. Biphasic intermittent airway pressure/airway pressure release ventilation (BIPAP/APRV) was initiated and anesthesia depth was decreased to allow spontaneous breathing. After that, each animal was ventilated with four different modes of assisted mechanical ventilation (1 hour each, Latin squares sequence): 1) PSV; 2) PSV combined with intermittent sighs (PSV+Sighs); 3) BIPAP/APRV + spontaneous breathing; 4) noisy PSV with random variation of pressure support (normal distribution, coefficient of variation of 30%). The mean level of pressure support was set identical in all PSV forms. Lung aeration was assessed by computed tomography and the distribution of pulmonary blood flow with intravenously administered color microspheres.

Results and Discussion: We found that noisy PSV increased tidal volume variability compared to PSV and PSV+Sighs (19% vs. 5% and 7%, respectively, p < 0.05) independently from the inspiratory effort; improved oxygenation and reduced venous admixture, but did not affect the amount of non-aerated lung tissue as compared to other assisted ventilation modes; reduced mean airway pressure at comparable minute ventilation; redirected pulmonary blood flow towards non-dependent lung regions similar to other PSV forms, whereas BIPAP/APRV + spontaneous breathing; reduced mean airway pressure at comparable minute ventilation; redistributed pulmonary blood flow towards non-dependent lung regions similar to other PSV forms, whereas BIPAP/APRV + spontaneous breathing did not; reduced the inspiratory effort and cardiac output in comparison with BIPAP/APRV + spontaneous breathing.

Conclusion(s): In the surfactant depletion model of acute lung injury, the new noisy PSV increased the variability of the respiratory pattern and improved oxygenation by a redistribution of perfusion towards the ventilated non-dependent lung regions with simultaneous lower mean airway pressure, comparable minute ventilation and no increase in the inspiratory effort or cardiac output.

Disclosure: Drs. Gama de Abreu, Spieth and Koch were granted a patent on the new noisy PSV. Dr. Gama de Abreu received a research grant from ESA to perform this study.


ESAAP1-5
F. XIII substitution in patients at high risk for intraoperative bleeding significantly reduces loss of clot firmness, consumption of fibrinogen and blood loss
W. Korte, K. Gali, V. Filipin, A. Gähler, T. Schrinder
Institute f. Clin. Chemistry & Haematology and Dept. of Anaesthesiology, Kantonsspital, St. Gallen, Switzerland

Background and Goal of Study: Excessive intraoperative bleeding is associated with significant morbidity and mortality. We and others have shown that fibrin monomer (FM) allows preparative risk stratification for intraoperative blood loss due to an imbalance between available F. XIII and prothrombin consumption. We hypothesized that F. XIII improves maximum clot firmness (MCF) and reduces blood loss in high risk patients.

Materials and Methods: We tested our hypothesis in a prospective, randomized, double blind, placebo controlled trial in elective abdominal cancer surgery. Patients were randomized to receive F. XIII (30 U/kg) or placebo in addition to routine perioperative coagulation monitoring in MCF while patients receiving placebo lost 38% (p = 0.016) during surgery, with a 30% difference between groups (p = 0.04). Despite similar prothrombin conversion, patients in the F. XIII vs. the placebo group had significantly reduced fibrinogen consumption (-28%, p = 0.01). Also, blood loss was significantly reduced (-29%, p = 0.041). Three patients experienced adverse events, which seemed not related to F. XIII substitution. The trial was stopped early after a planned interim analysis with the primary end point reached.

Conclusion(s): These results confirm our hypothesis that patients at high risk for intraoperative blood loss benefit from early F. XIII application.

Disclosure: W. Korte has received research support and speaker fees from CSL Behring.

ESAAP1-6
Foreign cells and substances drag into the subarachnoid space during spinal anesthesia in humans: Incidence related to needle type and approach
F. Rocha, E. Ferreira, P. Amorim, J. Barbot
Anestesia, Hospital da Prelada, Porto, Portugal, Portugal

Background and Goal of Study: Tissue coring occurs in spinal anesthesia as the needle drags foreign cells when going from the skin to the subarachnoid space. Tissue coring by epithelial cells has been associated to the development of intraspinal tumors. We studied the presence of epithelial cells in the CSF when performing spinal anesthesia, factors related to it and if rejecting the first drop of CSF reduces the presence of epithelial cells. The presence of talcum and other cells was also evaluated.

Materials and Methods: Prospective study in patients with spinal anesthesia for orthopedic surgery, randomized to 27G or 29G Quincke needles and median or paramedian approach. The first CSF drop (the second in 50 cases) was collected on a microscope slide and left to dry in the open air, stained with hemacolor solution and analyzed with a microscope by an anatomopathologist who had no prior knowledge of the origin of the samples. Presence of epithelial cells and other cells or substances was analyzed. Data are mean±SD. Statistics used t-test and Chi-square significance for P<0.05.

Results and Discussion: There were 110 patients studied. Spinals were 55 with each needle, half of each by median and half by paramedian approach. We observed epithelial cells with nucleus in 5 cases: 4 were paramedian with 27G and 1 paramedian with 29G. Type of needle was not related to tissue coring (P=0.2), but the paramedian approach was (P<0.05). Scamous cells appeared in 65%, meningeal cells in 45% and red blood cells in 41%. In 4 of the 5 cases where epithelial cells were present we also analyzed the second drop and did not find epithelial cells. In 75 cases we detected the presence of talcum powder; due to this, we conducted 10 cases using talcum free gloves (samples were dried in a closed box) and no traces of talcum were found.

Conclusion(s): In our hands, epithelial cells were present in the first drop of CSF in 5% of cases of spinal anesthesia. This suggests that tissue coring may have that incidence, which is of concern due to possible relation with intraspinal tumors. Rejecting the first drop of CSF and using the median approach might reduce the incidence of tissue coring, although this remains to be proven. Also, as talcum presence in the CSF was reduced to 0 from 75% when powdered gloves were abandoned, it seems advisable to use talcum-free gloves when doing spinal anesthesia. More studies in this field are justified.


Materials and Methods: Male adult Wistar rats were used. Focal cerebral ischemia was performed during 1 hour followed by 24h of repertusion (IR). Preconditioning consisted of 15 min exposure to sevoflurane at 1 MAC (2.6%) 72h before ischemia (SPRE). Postconditioning was obtained by exposure to sevoflurane immediately at the onset of repertusion (SPPOST) or after 1+5 min (delayed SPOST). Implication of mitoKATP channel was assessed by intraperitoneal injection of the selective blocker 5-hydroxydecanoate (SHD) or its selective opener diazoxide (CDO). Infarct was assessed by histomorphometric quantification after 24h of repertusion. Volumes are means ± SEM. ANOVA with LSD post hoc test for statistical analysis; significant for p<0.05 (*) or p<0.01 (**) vs IR.

Conclusion(s): Preconditioning and immediate postconditioning with sevoflurane significantly reduced total cerebral infarct by 35% and 45%. Cortex and striatum both benefited of the protection.

Disclosures: W. Korte has received research support and speaker fees from CSL Behring.
Materials and Methods: was evaluated. Patients were assigned to one of 11 anaesthetic combinations. Parameters involving 263 adult patients undergoing surgery under general anaesthesia were calculated., i.e. signal components above the classical EEG band bounded by 30 Hz. For the parameters Weighted Spectral Median Frequency (WSMF) [1], Approximate Entropy (ApEn) [2] and Permutation Entropy (PeEn) [3] the influence of f₀ on a parameter’s ability to separate consciousness from unconsciousness was evaluated.

Materials and Methods: EEG data from a study performed in 6 European centres involving 263 adult patients undergoing surgery under general anaesthesia was used. Patients were assigned to one of 11 anaesthetic combinations. Parameter values were calculated immediately before and after loss and return of consciousness from EEG signals of 10s length using low pass filters at 30, 49 and 90 Hz (f₀). WSMF, ApEn and PeEn were assessed with prediction probability (Pc). 95% Bootstrap confidence intervals (Bonferroni) were used to compare Pc at the different values of f₀.

Results and Discussion: Pc of ApEn depend significantly on f₀, where the inclusion of frequencies above 30 Hz improves the parameter performance (Table 1). Pc of WSMF and PeEn remain unaffected from f₀, i.e. the classical EEG band provides sufficient information to separate consciousness from unconsciousness.

Conclusion(s): Detection of consciousness and unconsciousness can be reached with the classical EEG band. This may be beneficial because the inclusion of high frequencies may provoke that not only the activity of cortical neurons is reflected, but also EMG which compromise the detection of potential awareness. As a consequence, a patient who is awake under neuromuscular blockade may be classified as unconscious. Such parameters may also be surrogate measures of the hypnotic component of anaesthesia.


ESAAP2-3

Preconditioning by desflurane reduces renal reperfusion injury in rabbits M. Guye, B. McGregor, F. Arsl, V. Pirou Departement d’Anesthesie-Reanimation, Centre Hospitalier Universitaire Lyon Sud, Pierre-Benite, France

Background and Goal of Study: Anaesthetic preconditioning, i.e. administration of volatile agents before ischaemia, is known to have protective effects on several organs, it is mainly studied on the heart. Concerning the kidney, their preconditioning effects remain unclear [1,2]. We examined renal morphology after preconditioning by desflurane upon 3 histological criteria.

Materials and Methods: The animal protocol was approved by the local ethics committee. 40 male rabbits were anaesthetized by parenteral titrated administration of xylazine-ketamine, monitored and randomly assigned to 4 groups: group Ischaemia (I), group Ischaemic Preconditioning (IPC), group Desflurane Preconditioning (DPC), group SHAM (S). Groups I, IPC and DPC were subjected to 45 minutes of bilateral renal ischaemia followed by 3 hours reperfusion. Group IPC was subjected to 3 x 3 min ischaemia, 5 min before the 45 min clamping period. Group DPC was administered 1 MAC desflurane (8.9%) for 30 min, before a 30 min wash-out period. Cortical areas of both kidneys were double blindly examined. Tubular Cell damage was graded from 1 (no lesion) to 4 (50% necrosis) [3]. Pycnomic nuclei were counted on each section as well as intratubular hyaline casts. Kruskal-Wallis tests were used to compare the 4 groups. Results are displayed with median (Q1-Q3).

Results and Discussion: DPC, 1 (1-2), and S, 1 (1-1), groups displayed lower histological grades than group I, 4 (3-4) (p=0.01). I and IPC groups had higher scores of pycnomic nuclei and intratubular hyaline casts than DPC and S.

Conclusion(s): Desflurane preconditioning is associated to a diminution of tubular cell damage. Ischaemic preconditioning did not show a significant renal protective effect. These findings may have clinical implications in anaesthetic strategy choice for patients subjected to perioperative renal ischaemia, and corroborate recent results on organ protection by volatile anaesthetics. Histological features show strong results enabling our team to go further and unravel the signalling pathways of this protection.


ESAAP2-4

Early post resuscitation myocardial dysfunction in the rat is improved by Sevoflurane when administered during cardio pulmonary resuscitation N. Russ, B. Boetigler, E. Popp, A. Schneider, P. Teschendorf Department of Anesthesiology, University Hospital of Heidelberg, Heidelberg, Baden-Wurttemberg, Germany

Background and Goal of Study: Post resuscitation myocardial dysfunction is an important reason for death on the intensive care unit after initially suc-
cessel cardiopulmonary resuscitation (CPR) of prehospital cardiac arrest (CA). It is well known, that volatile anesthetics reduce ischemia-reperfusion injury in regional ischemia in beating hearts. This effect, called anaesthetic induced pre- or postconditioning, could be shown when the volatile anaesthetic is either given before ischemia or in the reperfusion phase. However, no data exists for volatile anaesthetics after global ischemia instead. Goal of this study was to clarify whether Sevoflurane improves post resuscitation myocardial dysfunction in the first three hours in a rat model of CA.

Materials and Methods: After institutional approval by the Governmental Animal Care Committee was obtained, 29 male Wistar rats (350-400g) were randomized either to a group receiving Sevoflurane (2.5Vol% et) for five minutes starting at the beginning of CPR (Sevo) or to the control group without Sevoflurane (control). Ventricular fibrillation (VF) was electrically induced in anesthetized animals. After 6 min of VF, CPR started with mechanical chest compression, administration of adrenaline (20μg/kg), ventilation with 100% O2 and defibrillation. Myocardial function was measured with a pressure-volume conductance catheter which was positioned via the right carotid artery in the left ventricle. The animal was continuously monitored for three hours.

Results and Discussion: Within the first three hours after ROSC, ejection fraction increased in the Sevo group from 28% (SEM=3.2%) after ROSC to 36% (SEM=3.1%), while animals in the control group showed no increase: 24% (SEM=2.1%) after ROSC and 23.6% (SEM=2.5%) after 3h; Sevo vs. control, p<0.01. Endothelial volume (EDV) before VF was 229μl (SEM=11μl) in the Sevo group and 220μl (SEM=12μl) in the control group and did not increase in the Sevo group 293μl (SEM=26μl) whereas EDV increased in the control group to 410μl (SEM=19μl) p<0.01. All data are presented as median with SEM and analyzed with the t-test.

Conclusion(s): In this animal model of CA and resuscitation, administration of Sevoflurane improved two crucial parameters of myocardial function. Increased EF and lowered enddiastolic volume due to the application of Sevoflurane might be a good base for new therapeutic approach after CA.

Disclosure: This study was funded by: Manfred Lautenschlaeger Foundation; Ernst-Jung Foundation; Foundation Surgery of Heidelberg; Draeger Medical; Klaus Tschira Foundation.

References:

ESAAP2-5
Bacterial virulence factors differentially activate the innate immune system in the lung
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Background and Goal of Study: Acute lung injury (ALI) is a frequent complication of sepsis. Bacterial virulence factors like lipopolysaccharides (LPS), lipoteichoic acid (LTA) and bacterial DNA (CpG motifs) are ligands of different TLR-like receptors (TLR) and known as stimuli for pulmonary inflammation. The involvement of the innate immune system is well investigated for sepsis. However, the regulation of inflammation as well as the molecular mechanisms is still unclear during sepsis. Therefore, this study evaluated the expression of TLR and the synthesis of relevant cytokines in lungs after systemic administration of various bacterial products.

Materials and Methods: After pre-treatment with 200μl D-Galactosamin G578/B6 mice (n=4) were stimulated intraperitoneal with LPS (25μg/g/d.w.), LTA (15μg/g/d.w.) or CpG (20nmol 1668 hioal/animal). Lungs were harvested after 0, 2, 4 and 6h. Gene expression of TLR-4, IL-1β, IL-6 and IL-10 was measured by ribonuclease protection assay. NFκB activation was determined with EMSA, and protein expression of TNF-α was analyzed with ELISA. Results are presented as mean ± SEM. P-values smaller than 5% were considered to be significant. One-way ANOVA was used to determine significant differences between the stimulation groups.

Results and Discussion: LPS induced a significant increase of the mRNA expression of TLR-4 (12.09±0.58), IL-1β (192.90±36.09) and IL-6 (9.29±2.62) whereas CpG only enhanced TNF-α (2.43±0.44) mRNA expression. TLR-2 mRNA expression was significantly higher after LPS stimulation (32.87±4.43). IL-10 expression was not significantly increased after ligand stimulation compared to controls but reached the level of significance after LPS compared to LPS treated lungs (LPS: 9.54±0.29, LTA: 4.45±0.16, CpG: 5.74±0.07, control: 4.93±0.04). TLR-9 expression of CpG was not significantly upregulated by LTA or LPS. CpG groups displayed a higher activation than LTA treated animals. TNF-α protein expression was significantly enhanced by all bacterial ligands after 2h of stimulation (LTA: 16.05±7.89, LPS: 24.36±5.30, CpG: 12.81±1.55). However, 4 and 6h stimulation values were still increased in LPS (4h: 12.35±2.74, 6h: 9.78±0.41) and CpG (4h: 2.70±0.48, 6h: 3.84±2.92) group and in LTA treated animals TNF-α protein returned to control level (0.00±0.00).

Conclusion(s): Bacterial virulence factors differentially activate the production of proinflammatory cytokines in lung tissue via the innate immune system.

ESAAP2-6
Electrophysiological parameters specifically mediating neuropathic pain behavior after spinal nerve ligation in the rat
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Background and Goal of Study: The spinal nerve ligation (SNI) rat model [1] generates behavioral patterns of pain [2], analogous to that in humans with nerve injury. Because not all rats respond with hyperalgesia after SNI [2], we used non-responders as a pertinent control group that, in comparison to responders, may facilitate identification of electrophysiological parameters specifically linked to the pathogenesis of neuropathic pain.

Materials and Methods: Rats were subjected to SNI or sham skin (SS) operation and subsequently tested for hyperalgesia, to distinguish non-responders from rats with pain [2]. Neurons, stratified by diameter, from excised DRG, were studied within 2-8 h using current- (CC) and voltage- (VC) whole-cell patch-clamp. We compared action potential (AP) and afterhyperpolarization (AHP) characteristics, Na+, KATP and total K+ currents between neurons from: 1) SS rats without hyperalgesia; 2) axotomized L5 DRG from rats with hyperalgesia; 3) axotomized L5 DRG from rats without hyperalgesia; and 4) adjacent L4 DRG from SS rats with hyperalgesia. Each neuron’s AP was recorded in CC, while currents were elicited by replaying APs as voltage commands in VC [3], using specific openers (diazoxide) or blockers (NNaGTX, TTX, glybenclamide, 4-AP, TEA-C). Parameters were analyzed by ANOVA and Bonferroni post-hoc tests.

Results and Discussion: Parameters specifically altered by L5 axotomy that results in pain, in comparison to controls, were: In large neurons, less KATP current and fewer neurons expressing KATP current (versus SS and non-responders) p<0.01, as well as shorter time constant for AHP decay (AHPτ) compared to all controls (p range 0.002-0.05). In medium and small neurons: Fewer neurons expressing KATP current (p<0.02), and shorter AHP compared to non-responders (p<0.06 in medium and <0.03 in small neurons).

Conclusion(s): Rats that do not develop hyperalgesia after nerve injury provide a physiologically pertinent control, that facilitate the identification of parameters specifically linked with the development of hyperalgesia. This allowed us to identify alterations in KATP current expression and AHP. While the former is a novel finding, the latter may complement findings from intracellular recordings [4] and other studies [3] and indicate specific factors mediating hyperalgesia after nerve injury.

Acknowledgements: Supported by the NIOSH 2007-07 grant (NINDS).

References:
4. Sapunar D. Anesthesiology 2005; 103: 360-76.

Evidence-Based Practice and Quality Assurance

1AP1-1
Intraoperative surgical deaths in a university tertiary center
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Background and Goal of Study: To analyze intra operative deaths in three years (2004-2006) period in a university tertiary center.

Materials and Methods: From 38815 patient who received general and/or central regional blockade, we have evaluated preoperative, anaesthetic and surgical data for 36 patients who deceased intraoperatively. That data were compared with those of patients who died in the hospital after surgery (443) during this period of three years.

Results and Discussion: No death were directly related to anaesthesia. Mean age was 67 years, 61% were men, preoperative lenght of stay was 1.7 (0.8).

Evidence-Based Practice and Quality Assurance
days, 96% of surgical procedure were on abdominal/thoracic area (62% of them Aortic surgery), 72% were emergency procedures.

Table 1. Risk factors

<table>
<thead>
<tr>
<th>Preoperative</th>
<th>Intraoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial hypertension (91%)</td>
<td>Arterial hypertension (87%)</td>
</tr>
<tr>
<td>Heart failure (39%)</td>
<td>Massive Bleeding (57%)</td>
</tr>
<tr>
<td>COPD (31%)</td>
<td>Malignant arythmia (14.4%)</td>
</tr>
<tr>
<td>Stroke (91%)</td>
<td>Sickness (14%)</td>
</tr>
<tr>
<td>Liver disease (17%)</td>
<td>Death related to:</td>
</tr>
<tr>
<td>Diabetes (11%)</td>
<td>Hemorrhagic events (96%)</td>
</tr>
<tr>
<td>Kidney disease (11%)</td>
<td>Cardiac events (56%)</td>
</tr>
</tbody>
</table>

In comparison with postoperative in hospital deaths: Intraoperative deaths were younger, the preoperative mean hospital stage was shorter, and haemorrhagic shock or death was significantly greater.

Conclusion(s): A more aggressive treatment of cardiac complications and a better control of preoperative and intraoperative haemorrhage could improve results. In vascular surgery non invasive techniques to control bleeding should be useful to reduce mortality.

1AP1-2

Neuromuscular monitoring: Are we doing it well? A survey among Portuguese anaesthesiologists

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Background and Goal of Study: Postoperative residual neuromuscular block is reported to have an incidence has high as 45%. (1). Objective neuromuscular monitoring is recommended whenever a nondepolarizing neuromuscular blocking agent is administered. (2). Nowadays is considered that a train-of-four ratio of 0,90 is needed for airway protection (1,2). Our goal was to survey the practice of neuromuscular monitoring among anaesthesiologists in our country.

Materials and Methods: A questionnaire was mailed to all anaesthesiologists. Questions were asked about their use of neuromuscular monitoring and reversal of neuromuscular blocking agents. They were also asked what method of neuromuscular monitoring they considered the most adequate.

Results and Discussion: A total 1200 questionnaires were mailed and 230 (19%,2%) replies were received. The responders worked in at least 67 from the 80 possible hospitals. Some responders didn’t mention the hospital where they work. Although our response rate was low, it might represent the actual practice in our country as the majority of hospitals (63%) were represented. Only 22,6% of responders always used a peripheral nerve stimulator. The reason not to use a monitor was the non availability of the device for 54,7% of responders and the relability of clinical test for 45,3%.

Reversal agents were rarely administred by 16,1% of the responders. 7,8% used only tongue protrusion and opening of the eyes to assess adequacy of reversal. Only 26,1% considered that a train-of-four ratio (TOF) ≥ 0,90 was needed to consider adequate reversal of neuromuscular block. The use of neuromuscular monitors was considered important by 91,7% but only 31,3% felt that their use should be mandatory.

Conclusion(s): A change of practice is needed. Guidelines must be published in our country, to implement routine use of objective neuromuscular monitoring and TOF ≥ 0.9 for adequate reversal, in order to reduce the risks of postoperative residual neuromuscular block.

References:

1AP1-3

Mortality associated with unplanned reoperations

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Background and Goal of Study: The goal of the study was to assess how often and for what reasons patients go back to operating room, and determine the factors related to mortality in this population.

Materials and Methods: We reviewed non-cardiac surgery operations in our hospital from May 2006 to October 2007. Unplanned Reoperation (UR) was defined as any secondary procedure required for a complication occurring directly or indirectly from and within 30 days of the index operation. We registered: age, gender, ASA physical status of patients, character of the index and UR procedure (selective, urgent or transplantation), time from index procedure to UR body cavity reoperated, number and causes of UR and length of stay in postoperative care unit (POCU) and in hospital. Patients were followed up until hospital discharge or 30 days (whichever is later). Mortality in the POCU and in the study period were registered. For between groups comparisons (reoperated patients vs. death or alive), we used Mann-Whitney U to assess statistical significance for continuous measures and X² test for categorical data. We used logistic regression modelling to determine factors independently associated with mortality of reoperated patients in the studied period. p<0.05 was considered significant.

Results and Discussion: Of 8788 surgical patients, 290 (3.3%) experienced an UR. 5 were excluded for being in hospital at the moment of data analysis. UR were related to bleeding (27%), infection (14%), fistulae (12%), neurological complications (9%), unplanned second look (5%), acute abdomen (18%) and other causes (15%). Mortality of reoperated patients in the POCU was 17.9% and 26.6% in the global study period. Data of death and alive group patients are shown in Table 1.

Table 1. Patient’s data in death and alive groups

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Death (76)</th>
<th>Alive (208)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male)</td>
<td>75%</td>
<td>67%</td>
</tr>
<tr>
<td>ASA 3+4</td>
<td>80%</td>
<td>40%</td>
</tr>
<tr>
<td>Length of stay in POCU (h)</td>
<td>6 [2-16]</td>
<td>3 [1-9]</td>
</tr>
<tr>
<td>Reoperations (n)</td>
<td>1 (1-2)</td>
<td>1 (1-1)</td>
</tr>
</tbody>
</table>

Values as median (IQR) or percentages. *p<0.05.

Factors significantly associated with global mortality (OR; CI 95%): age (1,04; 1,01-1,06); ASA 3-4 (3,23; 1,61-6,49); acute abdomen (4,14; 1,98-8,64); thoracic surgery [4,87; 1,81-14,69] and length of stay in POCU after UR (1,02; 1,003-1,047).

Conclusion(s): There was a high mortality rate in reoperated patients being bleeding the main cause of UR. Mortality was independently associated with age, ASA physical status, thoracic reoperations, acute abdomen as cause of UR and length of stay in POCU after reoperation.

1AP1-4

Critical incident reports concerning anaesthetic equipment: Analysis of the UK National Reporting and Learning System (NRLS) data from 2006

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Background and Goal of Study: Incident reporting is a key factor in improving patient safety in anaesthesia. The UK National Patient Safety Agency (NPSA) set up the NRLS to learn from incidents. Our aim was to analyse reports highlighting issues with anaesthetic equipment or devices.

Materials and Methods: The NPSA provided a Microsoft Excel spreadsheet of anonymised anaesthetic and surgical incidents in 2006, the first year in which all hospitals submitted data. Those relating to equipment used to provide anaesthesia or regional anaesthetics were included. Incidents involving anaesthetic equipment in other situations, such as in intensive care provision, those after transfer to recovery, and those caused by the inability of the operator, were excluded. All reports in the ‘failure of device/equipment’ or ‘lack/availability of device/equipment’ categories were searched. The free text entry for each was used to identify relevant incidents. Secondly the free text terms ‘equipment fault/failure/malfunction,’ and each individual piece of equipment, as shown in the results, were used to identify any extra incidents.

Results and Discussion: 421 of the 30 724 incidents met our criteria, and all were identified in the initial category search. 294 incidents (69.8%) related to the anaesthetic machine and associated monitoring or alarms, as shown in Tables 1 and 2.

Table 1. Incidents involving the anaesthetic machine

<table>
<thead>
<tr>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring</td>
</tr>
<tr>
<td>Ventilator</td>
</tr>
<tr>
<td>Leak in breathing system</td>
</tr>
<tr>
<td>Gas monitoring</td>
</tr>
<tr>
<td>Machine failing ‘cockpit’ check</td>
</tr>
<tr>
<td>Vapouriser</td>
</tr>
<tr>
<td>Intraoperative machine failure</td>
</tr>
<tr>
<td>Alarm failure</td>
</tr>
<tr>
<td>Gas supply</td>
</tr>
</tbody>
</table>
toxicity and anaesthetic awareness from malfunctioning pumps. There was one death, which inadequacies of intubation equipment was felt to be contributory.

Conclusion(s): The NPSA is receiving incident reports because of equipment failings in anaesthesia, involving a wide range of devices. Serious harm is rare but does occur. Relevant incidents are easily retrieved by key word searching, and greater use of free text narrative would allow closer analysis of individual cases.

Acknowledgements: We would like to thank the NPSA for their assistance.

1AP1-5
Incidence of intraoperative hypotension during anaesthesia varies greatly with the chosen definition
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Background and Goal of Study: Intraoperative hypotension (IOH) has been shown to correlate with adverse outcome [1]. Recently Bijker et al. [2] demonstrated that definitions of IOH varied considerably in the literature. In this study we investigated the incidence of IOH as a function of IOH definition in our patient population. In addition, the application of vasopressor medication was used as a proxy definition for IOH as it is perceived by the anaesthesiologists.

Materials and Methods: In this ethically approved trial we included 1273 consecutive patients and prospectively imputed blood pressure recordings as well as applications of vasopressor medication and positive inotropes from standard handwritten anaesthesia records in our anaesthetic department into a MySQL, relational database. We analyzed retrospectively minimal blood pressure recordings and vasopressor medication. The incidence for IOH were determined using the three most common definitions published [2]: systolic blood pressure (BP) <80 mmHg (def. 1), BP <20% of baseline (def. 2), BP <100 mmHg or <30% of baseline (def. 3). Statistics: t-test.

Results and Discussion: The incidence of IOH defined as systolic blood pressure (BP) <80 mmHg (def. 1) was 17.6%, for BP <20% of baseline (def. 2) 62% and for BP <100 mmHg or <30% of baseline (def. 3) 74.4%, 43% of all patients received some form of vasopressor or inotropic therapy. Patients with IOH according to def.1 received vasopressors or positive inotropes in 71.1%, according to def. 2 in 54.7% and according to def. 3 in 50.9%, respectively.

Antihypertensive Medication (AM)

<table>
<thead>
<tr>
<th>Definition of IOH</th>
<th>AM Applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;80 mmHg</td>
<td>281 (71.3%)</td>
</tr>
<tr>
<td>&lt;20% from baseline</td>
<td>761 (54.7%)</td>
</tr>
<tr>
<td>&lt;100 mmHg or &lt;30% from baseline</td>
<td>860 (60.9%)</td>
</tr>
</tbody>
</table>

Conclusion(s): Incidences of IOH vary considerably according to the underlying definition. Vasopressor or positive inotropic therapy as a proxy measure for IOH perceived by anaesthesiologists overlap best with def. 1. This implies that IOH alone is not a criterion to treat patients if IOH is not explicitly low as seen with def.

References:

1AP1-6
Oral injuries in anesthesia: A blind comparative evaluation of tracheal intubation by laryngoscopy and laryngeal mask insertion
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Background and Goal of Study: Incidence and magnitude of oral injuries during anaesthesia are usually reported based on legal claims, data of assurance companies and departmental quality programs [1]. The primary aim of this observational study was to compare the incidence of oral trauma in patients submitted to laryngoscopy and orotracheal intubation (OT) with the incidence in patients anaesthetized with laryngeal mask (LM). Secondary aim was to evaluate co-factors that increase risk of oral trauma.

Materials and Methods: With Ethics Committee approval and patient written informed consent, we studied adult patients submitted to general anaesthesia. We considered pregnancy, mental deficiency and mouth and nose surgery as exclusion criteria. Two oral examinations (pre-operative and 12 to 24 hours after anesthesia) were done in each patient by two doctors: one anaesthesiologist and one dentist. Evaluators did not know the technique choose for airway management. Teeth injuries were scored based on WHO classification modified by Andreasen [2]. After, anaesthesia records were consulted and airway technique divided patients in two groups: Group I (70 patients): OT inserted by laryngoscopy; Group II (57 patients): LM. Qui-square, Mann-Whitney test and a multivariate logistic regression model were used. Odds ratios with 95% CI.

Results and Discussion: Groups were not different concerning age, sex, BMI, and pre-operative oral health indexes. Injuries (teeth or soft tissues) were found in 84.1% of Group I and 19.6% of Group II (p <0.0001). Values for teeth injuries were respectively 38.6% and 2.0% (p <0.0001). Usually these are minor injuries, the majority microfractures in the upper incisive teeth. In soft tissues, most frequent injuries were observed in lower lip, with incidences of 55.7% in Group I and 9.8% in Group II (p <0.0001). We found as independent risk factors for oral injuries: tracheal intubation by laryngoscopy, OR 22.0 (8.6 - 56.5), p < 0.0001 and sex, OR = 2.2 (1.0 - 4.5) p = 0.049. We did not observe significance for age, obesity, number of attempts of intubation and duration of surgery.

Conclusion(s): OT produce a incidence of teeth injuries 19 times higher than LM and a incidence of oral injuries 4 times higher (any kind). In general, we found minor injuries. Further studies are needed to evaluate their long term clinical relevance.

References:

1AP1-7
Reintubation in the postanaesthesia care unit: An analysis from a database of 21,349 cases at Chiang Mai University Hospital, Thailand
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Background and Goal of Study: Reintubation is one of the major problems in postanaesthesia care unit (PACU) with the incidences ranging from 0.17%–0.45%. The objective of this study was to determine the incidence, causes, risk factors and suggestive preventive strategies of reintubation in PACU.

Materials and Methods: We conducted a retrospective analytical study of 21,349 patients extubated after general anesthesia from 2004 to 2006. Patients requiring reintubation in PACU were identified and reviewed. Descriptive statistics were used to summarize the data. Univariate and multivariate analysis were used to identify risk factors.

Results and Discussion: Fifty nine of the 21,349 patients extubated after general anesthesia were reintubated in PACU (27.6: 10,000 [95%CI: 21.9, 34.3]). Eighty four percent of reintubations occurred within 1 hour after extubation or admission to the PACU. The main causes of reintubations were airway obstruction (32%) and inadequate ventilation associated with residual effect of muscle relaxant and or excessive sedation (30%). Fifty five percent of incidents were anesthesia- related, whereas 40% were patient-related. The potential risk factors were age > 50 years, ASA physical status class 3-5, emergency status and abdominal surgery. The common contributory factors were ineptitude and inappropriate decisions of personnel. The suggestive preventive strategies included the use of neuro muscular monitoring, improvement in supervision, additional training and clinical practice guidelines.

Conclusion(s): Over half of the reintubations (55%) in PACU were related to anesthesia care and anesthetic agents. The appropriate use of muscle relaxants, increased use of neuromuscular monitoring, setting up clinical practice guidelines for extubation and improving airway care are the suggestive preventive strategies.

References:

1AP1-8
Incidence of dental injury in 25,223 general anaesthetics in a tertiary hospital and its relation to difficult intubations
S. Elrouby, H. Aloufi
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Background and Goal of Study: Trauma to teeth is one of the most common
adverse events reported in anaesthesia. It is a major cause of patient dissat-
isfaction and it is the largest reason for successful malpractice claims against
anaesthesiologists. The aim of this study was to evaluate the incidence of peri-
anaesthetic dental injury and its relation to difficult intubation.

Materials and Methods: This was a prospective study, as part of a quality im-
provement program from 1994-1999. Data from 25,223 non-cardiac anaesthet-
ics were collected. Adverse events including dental trauma (defined as any no-
table change to the patient’s dentition during the peri-ananaesthetic period, which
may or may not have required dental consultation or treatment) were recorded
intraoperatively by the attending anaesthesiologist, in the recovery unit by a re-
covery nurse, and postoperatively by another anaesthesiologist. The data was
encoded using a customized database program, and analyzed using SAS soft-
ware.

Results and Discussion: Results were reported as events per 10,000.
Twenty-eight cases of dental injury occurred with an incidence of 11.1/10,000.
Their age group varied from 5-75 years, with a mean of 43. The incidence was
higher in difficult intubation cases: 2/100 compared with 9.6/10,000 in easy
intubation cases (p value<.0001).

Conclusion(s): Difficult intubation was found to be a risk factor for anaesthesia-
related dental injury. Both direct pressure on teeth during laryngoscopy, and
emergence clenching remain important manageable causes of dental injury.
Preoperative assessment of the airway and dentition, as well as implementation of
special safeguards for challenging airway scenarios may potentially decrease the
incidence of dental injury.

References:
2 Chaswik, RL, Lindsay SM, British Dental Journal 1996; Volume 180, No. 7, pages 255–
258.

1AP2-1
Chest x-ray is not necessary to detect pneumothorax requiring therapeutic intervention after central venous cannulation
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Department of Anaesthesiology and Intensive Care Medicine, Lund University,
Malmö University Hospital, Malmö, Sweden

Background and Goal of Study: Knowledge about the radiographic catheter
tip position after central venous cannulation is normally not required for short-
term catheter use [1]. The study aim was to determine the radiographic inci-
dence of catheter-related pneumothorax and possible association with techni-
cal problems and clinical signs.

Materials and Methods: Information on patients and cannulations was
recorded prospectively over a four-year period. Chest radiographs in anterior-
posterior supine view were made in all patients.

Results and Discussion: Thirteen cases of pneumothorax (0.58%) were iden-
tified among 2230 cannulations. The incidence after subclavian (1.6%) or tech-

Clinical signs including immediate aspiration of air, decreased SpO2, hypoten-
sion, dyspnoea or reduced breathing sounds within eight hours of cannulation
were found in all seven patients with pneumothorax requiring specific treatment.

Conclusion(s): Since clinical signs were found in all patients with pneumoth-
orax requiring treatment, we consider chest x-ray to be of little value if normal
breathing sounds, no reduced SpO2 and no dyspnoea are found early after
clinically eventless central venous cannulation.

Summary of those 13 cases of cannulation-associated pneumothorax found in the present study

<table>
<thead>
<tr>
<th>Case</th>
<th>Puncture site</th>
<th>Difficult puncture</th>
<th>Clinical signs</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Right SCV</td>
<td>Yes</td>
<td>After 8 h low SpO2</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Right SCV</td>
<td>No</td>
<td>Immediate low SpO2</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Several</td>
<td>Yes</td>
<td>Immediate aspiration of air</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Several</td>
<td>No</td>
<td>Immediate low SpO2</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Right SCV</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>Right SCV</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Right UV</td>
<td>Yes</td>
<td>Within 3-6 h dyspnoea, low SpO2</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>Right UV</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Right UV</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>Right UV</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Right UV</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>Right UV</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>13</td>
<td>Right SCV</td>
<td>Yes</td>
<td>Immediate dyspnoea, low SpO2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

LJV, internal jugular vein; SCV, subclavian vein; EJV, external jugular vein.

References:

1AP2-2
Interest of a prophylactic strategy to reduce postoperative nausea and vomiting
M. Claire, R. Emmanuel, A. Gregoire, V. Benoit, L. Gilles
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Background and Goal of Study: Without any prevention, nausea and vomiting
are a common complication of surgery. This study aimed to evaluate the imple-
mentation of a strategy to prevent postoperative nausea and vomiting (PONV)
in patients undergoing general surgery.

Materials and Methods: This study was conducted over a period of one
year with two phases of implementation of an aniemtactic strategy. Every pa-

tient undergoing surgery under general anaesthesia was included. The incidence of PONV was recorded in postoperative anaesthetic care unit (PACU) and at the 24th postoperative hour (24H). The first period was observantional. During the 2nd period, a strategy to prevent PONV was based on 5 risk factors (RF), identified by multivariate analysis after the first phase: female sex, non-smoking status, history of PONV and/or motion sickness, the use of postoperative opioid or nasogastric tube. No aniemtactic treatment (tt) was given if none or one RF was present. From 2 RF, tt A was administered and could be associated with other tt according to the number of RF. For 5 RF, tt were associated.

A comparison between the 2 periods was carried out by a test of chi2 or a
Student test. P<.05 was considered significant.

Results and Discussion: We prospectively enrolled 823 patients within 395
during the first period. The overall surgical population was similar between the 2
periods. The surgery was abdominal (47.1% vs. 47.7%, not significant [NS], en-
derocrinologic (27.8% vs. 24.3%, NS), urologic (21% vs. 19.4%, NS) and vascular
(4.1% vs. 1.9%, p<.05). Implementation of a prophylactic PONV strategy was
associated with a decrease of nausea in PACU from 29.9% to 8.6% (p<0.0001)
and at 24H from 19% to 10.3% (p<0.0001). Vomiting decreased from 12.4% to
2.3% (p<0.0001) in PACU and from 5.6% to 3.7% at 24 H (NS).

Conclusion(s): Prophylaxis of PONV by the administration of aniemtactic treat-
ment according to a strategy based on a local risk score is efficient. It is as-

1AP2-3
Antiplatelet therapy, coronary artery stents and elective non-cardiac surgery: A survey of current practice
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Background and Goal of Study: Many patients are treated with antiplatelet
drugs for secondary prevention of cardiovascular disease. An increasing num-
1AP2-4
Could peri-operative point-of-care haemoglobin testing improve transfusion practice in a UK district general hospital?

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Background and Goal of Study: The National Comparative Audit of the use of blood in primary, elective, unilateral hip replacements revealed key areas for improvement in hospitals throughout England. We suggested use of point-of-care haemoglobin monitoring in our hospital could be useful in meeting goals suggested by the audit, and attempted to enhance its use with departmental education. We evaluated the accuracy of one device as compared to the gold standard laboratory method for estimation of haemoglobin concentration.

Materials and Methods: Ninety four samples of venous blood were analysed using the hospitals laboratory analyser, the HemoCue, and the blood gas machine in theatres. Results were analysed with a paired, two-sided Students T-test to determine if there was a difference in the results of the two devices. Results were also used to estimate the cost saving associated with using the HemoCue device.

Results and Discussion: Comparison of HemoCue with laboratory analyser revealed a significant difference between haemoglobin concentrations estimated by the two devices. Values obtained with the gas machine were significantly lower (p<0.001). Mean averages were 120.64g/L (laboratory), 120.63g/L (HemoCue) and 123.89g/L (gas machine). At initial questioning, 20% of anaesthetists did not know what HemoCue was or how to use it. After the presentation, to see if departmental opinion of the HemoCue analyser, and transfusion practice, had been changed with education.

Conclusion(s): Our work suggests an AT of 8.8 ml/kg/min optimally predicts post-operative medical complications within 30 days of open aortic surgery.

References:

1AP2-5
The optimal anaerobic threshold for predicting medical complications in patients undergoing open aortic surgery

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Background and Goal of Study: Poor performance on cardiopulmonary exercise testing (CPX) has been shown to be associated with an increased risk of death following aortic surgery.[sup1] Whilst CPX testing is used for preoperative assessment there are limited data to identify the anaerobic threshold that optimally predicts increased perioperative risk. Objective: We conducted a retrospective observational study to identify the optimal anaerobic threshold (AT) to identify patients at increased risk of cardiopulmonary complications after open abdominal aortic aneurysm (AAA) repair.

Materials and Methods: Twenty four patients presenting for elective AAA repair, (22 male), median (range) age 75(51-84) years, who underwent CPX testing and determination of AT prior to elective AAA repair, were studied. Data on post-operative cardiac and respiratory complications were gleaned from the vascular surgery database and confirmed from clinical records. Data were analysed using Stata 9 (College Station, TX, USA). A receiver operating characteristic (ROC) curve was generated for the association between anaerobic threshold and cardiopulmonary complications. The value of AT that correctly classified the maximum number of patients was determined.

Results and Discussion: The 30 day mortality was zero. Ten patients suffered cardiopulmonary complications. AT for the identification of increased risk was 8.8 ml/kg/min; this value correctly classified 71% of patients. This value is less than the threshold of 11 ml/kg/min reported to be associated with increased risk in colorectal surgery.7 However the ROC curve (Figure 1) did not have a clear inflexion point and a larger study is required to confirm the optimum anaerobic threshold for risk prediction in open aortic surgery.

References:
ment are few, mainly based on case series, and are revealing different points of view. However, there are no scientific data to establish a state of the art in anaesthetic care of these patients based on evidence. We designed this survey to acquire an overall view of the current management during CRS and HIPEC in the European region, and included two hospitals in the USA with broad experience in this field.

**Materials and Methods:** During September and October 2007, we asked 30 anaesthesiologists (28 in Europe, 2 in USA) who are involved in this therapeutic modality, to complete a webbased questionnaire. We received responses from 19 of them (63%). We present a summary of the most relevant results.

**Results and Discussion:**

- **Use of peroperative data base:** 65%
- **Combined general-epidural anesthesia:** 79%
- **Monitoring of cardiac output:** 78%
- **Maintenance of normothermia:** 74%
- **Restrictive fluid management:** 11%

Permitted minimum values of central temperature during peritonectomy procedures are 33°C (11%), 34°C (32%), 35°C (47%) or 36°C (11%) respectively, and accepted maximum levels during HIPEC range from 37°C (5%), 38°C (16%), 39°C (37%), 39,5°C (5%) to 40°C (32%).

Transfusion criteria for red blood cells also move in a wide range (trigger between 4 and 10 g/dl of haemoglobin), while indication for plasma (FFP) is not as liberal as suspected (89% demand coagulation tests for decision-making).

**Conclusion(s):** The results of this survey show differences in anaesthetic management between the enquired hospitals, and confirm that some recommendations expressed in the reviewed literature are in discordance with current practice. It would be helpful if anaesthesiologists had a discussion forum to exchange opinions, to evaluate the need of clinical trials and to assess optimal strategies for periparative care of patients undergoing CRS with HIPEC.

### 1AP2-7

**Preoxygenation: A comparaison of two techniques**

A. Tellier, G. Romero, M. Laffon, J. Fusciardi

**Department of Anaesthesiology and Intensive Care, University Hospital, Tours, France**

**Background and Goal of Study:** Oxygen (O2) is frequently administered by Department of Anaesthesiology and Intensive Care, University Hospital, A. Tellier, G. Romero, M. Laffon, J. Fusciardi

**Preoxygenation: A comparaison of two techniques**

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### 1AP2-8

**Preoperative hyperglycemia increases length of stay after major orthopedic surgery**

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**Department of Anesthesiology, The Artificial Pancreas Center, Thomas Jefferson University, Philadelphia, Pennsylvania, USA**

**Background and Goal of Study:** Reducing hospital length of stay (LOS) after major orthopedic surgery has gained importance with surgeons, hospital administrators and third party payers. Hyperglycemia has been reported to prolong LOS after ICU admission and CABG surgery. However, it is unknown if increased blood glucose (BG) prolongs LOS after hip and knee surgery. We investigate whether preoperative hyperglycemia (≥200 mg/dl) was associated with increased LOS after total hip and knee arthroplasty.

**Materials and Methods:** After obtaining IRB approval, we retrospectively reviewed the medical records of patients undergoing elective total hip or total knee replacement from January 2001 to April 2008. Patients with incomplete records were excluded. Patients were divided into 3 groups based on preoperative BG levels:

- Normal <110 mg/dl
- High 110-199 mg/dl
- Very High ≥200 mg/dl

Data are reported as geometric mean with 95% confidence interval in parentheses unless otherwise noted. Effects of various risk factors on long transformed LOS were evaluated using robust regression and robust ANOVA.

**Results and Discussion:** Data from 7282 patients were included in the study. The median LOS was 3 days (range 1-58). Patients with Normal BG stayed on average 3.46 days (3.43, 3.49), High BG 3.62 days (3.56, 3.67) and Very High BG 4.05 days (3.80, 4.31). LOS was 8% (4, 12; p<0.001) longer in Very High group compared with Normal group. An 8% increase from the median LOS of 3 days translates into 5.8 hours. Age increased LOS by 2% (1, 2; p<0.001) per decade of life, BMI ≥40 kg/m² by 4% (1, 6; p=0.002), duration of surgery >137 min by 19% (12, 20; p<0.001), bilateral knee surgery by 28% (27, 30; p<0.001) compared with unilateral knee surgery, knee surgery by 9% (8, 10; p<0.001) compared with hip surgery. Patients with history of congestive heart failure had 6% (2, 10; p<0.004) longer LOS on average. Diabetes increased LOS by 4% (2, 5; p=0.001). Females had shorter LOS than males by 5% (9, 5; p<0.001) on average. Analysis confirms that the intention to decrease LOS was successful in our hospital. Compared to 2001, LOS was on average 9% (7, 11) shorter in 2002, 12% (10, 13) in 2003, 15% (14, 16) in 2004 and 16% (14, 17) in 2005/2006. p<0.001.

**Conclusion(s):** Preoperative BG ≥200 mg/dl is associated with increased LOS after major orthopedic surgery. A prospective, randomized, controlled trial is required to determine whether control of preoperative glucose would decrease LOS in this clinical setting.

**Disclosure:** This research was conducted with support from the Investigator- Initiated Study Program of LifeScan, Inc.

### 1AP2-10

**Does nasogastric tube use reduce the risk of postoperative nausea and vomiting?**

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**Perioperative Clinical Research Core, University of California in San Francisco, San Francisco, California, USA**

**Background and Goal of Study:** The aim of this analysis was to investigate whether the routine use of a nasogastric tube reduces the incidence of postoperative nausea and vomiting (PONV).

**Materials and Methods:** Our work is based on a large trial of 4,055 patients primarily designed to quantify the effectiveness of antiemetic combinations for the prevention of PONV. This analysis uses propensity scores for case matchings to ensure group comparability. Patients were matched for intraoperative NG tube use or not and perioperative NG tube use or not, and further described using uni- and multivariable analyses. The primary outcome of the trial was the incidence of PONV within 24 hours after the end of anesthesia.

Evidence-based practice and quality assurance
Results and Discussion: Adequate matched-pairs were identified for 1022 patients with or without intraoperative nasogastric tube use and 176 patients with or without perioperative nasogastric tube use. The incidences of PONV in patients with and without an intraoperative nasogastric tube were 44.4% and 41.5% (P = 0.35). PONV incidences in patients with and without a perioperative nasogastric tube were 27.8% and 31.3% (P = 0.61). Multivariate analyses confirmed that use of the nasogastric tube did not reduce the incidence of PONV, and that placement was not statistically significant. The obtained data were analysed using the methods of descriptive statistics. The results are presented as absolute numbers and percentages.

Results and Discussion: During study period 70 717 procedures under general or regional anaesthesia were scheduled as elective. The cancellation rate was 0.99% (702 cases). The causes were divided into 3 main categories: Organizational reasons (77.07%), Medical reasons (19.94%), Patient refusal to undergo surgery (2.99%). Most of the organizational reasons were considered to be potentially avoidable. The percentage of the cancelled surgical procedures in our hospital is smaller in comparison with the results of other studies (4-14%), that may be explained by different study design and the size of the study group. Priority insertion of emergency surgery was the most frequent cause (28,1%), followed by the lack of theatre time due to over-run of previous surgery (22,5%). The most frequent medical reason was the sudden change of patient’s clinical status related predominantly to upper airway infection (28,%).

Conclusion(s): Organizational reasons were the most frequent cause of surgery cancellation. Despite the small number of cancelled cases, the majority of cancelled cases should be considered as probably avoidable by better organizational management.

References:

1AP3-1
Risk factors for postoperative renal insufficiency in patients with previously normal renal function
Anaesthesiology, Fundacio Puigvert, Barcelona, Spain

Background and Goal of Study: The aim of this study was to evaluate risk factors for postoperative renal insufficiency (PRI) in patients over 18 yrs old scheduled to undergo surgery in Catalonia.

Materials and Methods: We analyzed data from a multicentre cohort study (ARISCAT) performed in 59 hospitals during 2006. This study gathered pre-, intra- and postoperative information on a random sample taken on 7 different days in each hospital. The sample included patients undergoing elective and emergency surgery (except obstetrics) under general or regional anaesthesia. PRI was defined as plasmatic creatinine ≥265 μmol/l or double the baseline creatinine. Preoperative risk factors were age, gender, BMI, hypertension, diabetes, heart failure, COPD, dysrhythmia. Intraoperative risk factors were duration of anaesthesia, hypertension, hypotension, type of incision and blood loss. We compared qualitative variables with a χ² test and quantitative variables with a t test. Multivariable analyses were performed and relative risks were calculated.

Results and Discussion: Data are based on a sample of 2393 patients. Patients with preoperative kidney disease were excluded from analysis. PRI developed in 1.2% of patients.

Risk factors for postoperative renal insufficiency

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>OR, Bivariate analysis</th>
<th>OR, Multivariable analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>1.06 (1.03 - 1.09)</td>
<td>1.05 (1.02 - 1.08)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>0.97 (0.97 - 0.98)</td>
<td>0.90 (0.77 - 0.95)</td>
</tr>
<tr>
<td>Emergent surgery</td>
<td>2.4 (1.1 - 5.3)</td>
<td>3.4 (1.2 - 9.1)</td>
</tr>
<tr>
<td>Dysrhythmia</td>
<td>5.6 (2.5 - 12.6)</td>
<td>3.2 (1.3 - 7.9)</td>
</tr>
<tr>
<td>COPD</td>
<td>2.1 (1.4 - 4.9)</td>
<td>2.8 (1.1 - 7.1)</td>
</tr>
<tr>
<td>Duration of anesthesia (hours)</td>
<td>1.7 (1 - 4.2)</td>
<td>1.4 (1 - 11.9)</td>
</tr>
<tr>
<td>Incision: Upper abdominal approach</td>
<td>7.6 (3.2 - 18.2)</td>
<td>3.6 (1.4 - 9.6)</td>
</tr>
<tr>
<td>Incision: Thorac-Cardiac approach</td>
<td>15.6 (8.3 - 51.3)</td>
<td>8.7 (2.7 - 28.5)</td>
</tr>
<tr>
<td>Blood loss (mL)</td>
<td>1.002 (1.001 - 1.003)</td>
<td>1.001 (1.000 - 1.002)</td>
</tr>
</tbody>
</table>

The hospital stay was 4.1 times longer in the patients with PRI (22 vs. 5.4 days). Need for ICU care was higher in patients with PRI (71.4% vs. 9.5%) Mortality in-hospital and 90 days after were 7.1% and 50% respectively.

Conclusion(s): Age, body mass index, dysrhythmia, COPD, emergency surgery, duration of anaesthesia, blood loss and type of incision were significant risk factors for postoperative renal insufficiency. Hospital stay and mortality were higher in patients who developed renal insufficiency.

Acknowledgements: Supported by “Fundac i on La Marató TV3” Grant 041610-2003.

References:
1 Krystal SI. Anesthesiology 2007; 107(8): 890-902.

1AP3-2
The causes of elective surgery cancellations: A prospective survey
J. Shtefeka, V. Cerny, J. Schreiberova
Department of Anaesthesiology and Intensive Care, Charles University in Prague, Faculty of Medicine in Hradec Kralove, University Hospital Hradec Kralove, Hradec Kralove, Czech Republic

Background and Goal of Study: Cancellation of scheduled surgery may have negative impact on the every hospital’s economy. It leads to patient’s discomfort, prolongation of hospital stay and increasing costs. The aim of the study was to record the rate and the main causes of elective surgery and anaesthesia cancellation in tertiary care hospital.

Materials and Methods: In the period of 9/2002 - 12/2006, every case of pre-scheduled surgery cancellation was immediately recorded in the predefined form by the anaesthesiologist. The forms included the detailed description of the situation and formulation of the main cause leading to surgery cancellation.

The obtained data were analysed using the methods of descriptive statistics. The results are presented as absolute numbers and percentages.

Results and Discussion: Cancellation of scheduled surgery correlated with both quality of care and long term cardiac outcome.

References:
1 Ausset S, et al. Cardiac troponin I release after hip surgery correlates with poor long-term cardiac outcome.[p=0.01] and thus could be used as a marker of the efficiency of prevention policies against cardiac complications. The aim of this study was to assess Tric postoperative measurement as a result indicator for prevention of CC after major orthopaedic surgery.

Materials and Methods: During two years, The incidence of postoperative myocardial ischemia was measured through Tric serial measurements in patients undergoing major orthopaedic surgery in a multidisciplinary hospital and long term cardiac outcome was assessed through a one year followup. After 16 month of study, postoperative cares were improved according to failure modes, effects and critically analysis. Myocardial ischemia and long term major CC (cardiac death, myocardial infarction and cardiac failure) incidences were compared between the two phases of the study. Continuous variables were explored using the t-test and non parametric variables with Kruskall-Wallis test.

Results and Discussion: 233 patients were included. There were no statistically significant differences between the two study phases neither in population characteristics nor in type of surgery. The overall incidence of postoperative myocardial ischemia was 6.4%. Incidence of myocardial ischemia and long term CC were significantly lower after improvement of postoperative care (respectively 9.2% vs 2.9% p = 0.017 and 8.6% vs 1% p=0.001).

Conclusion(s): In this study, quality of care after major orthopaedic surgery is correlated with both long term cardiac outcome and the incidence of postoperative myocardial ischemia. Tric serial measurement could be used as a result indicator for quality of care. A larger study is necessary to assess the independance of this indicator from other variables related with postoperative myocardial ischemia and cardiac outcome.

References:
rooms (OR). Based on earlier findings we presumed that shortages are cyclical, due to opportunistic policies of hospitals. The goal of the present study was to test our hypothesis of cyclical shortages.

Materials and Methods: Over a period of 7 years (2001-2007) 4 questionnaires were send in 2-year interval to all Dutch hospitals. These questionnaires were anonymously returned. The composition of the questionnaires remained almost identical for the 4 questionnaires. Questions involved descriptors (location, type en size of the hospital), questions about percentages annual closing of OR, shortages of surgical technicians (ST), AA and recovery room nurses, causes of shortages, measures taken to mitigate the effect of these shortages on the closure of operating rooms and presence and changes in the number of trainees for OR personnel.

Results and Discussion: The response rate of the 4 sequential questionnaires rate was 50-73%. In 2003 the largest percentages of OR closure was observed (figure). After improvement in 2005, in 2007 an increase of OR closure was again observed. Increasingly temporary workers are used to keep the OR’s open. These workers are withdrawn from the labor market intensifying shortages. Another problem is the unbalanced number of trainees in the last years. The number of trainees was low, although the correlation among some subgroups of staff proved to be significant. The optimal sustainable overall OR use is 80%. It may differ and may be dependant on the manpower available, the type of the hospital (academic versus supply), the surgical disciplines and the logistics in the OR. To know the optimal capacity of an OR, it is essential to guarantee patient safety and a high level of the employee satisfaction. It is also a prerequisite for achieving optimal contribution margins. The presented method is relatively simple to realize and seems to have an acceptable grad of validity as shown by the same results of the different occupational groups.

1AP3-5
Objective and subjective workload in the OR. A survey of different occupational groups versus an objective measure of workload
T. Kaufmann, G. Schuepfer, C. Konrad
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Background and Goal of Study: A work overload may lead to burn out. To determine the perception of workload a survey may measure production pressure. A comparison between the subjective perception of workload with reproducible and more objective data helps validating such assessments. For managing and planning an OR, a correlation between subjective and objective workload is a possible advantage.

Materials and Methods: The directors of the medical (anaesthesia, surgery) and the nursing staff of the OR rated every day their perception of workload with a categorical rating system: 1 for a very low workload, 4 for an average workload and 7 for an exceptional workload. The staff of the emergency ward rated also the workload, because this department is the most important one for patient safety and a high level of the employee satisfaction. It is also a prerequisite for achieving optimal contribution margins. The presented method is relatively simple to realize and seems to have an acceptable grad of validity as shown by the same results of the different occupational groups.

Results and Discussion: The 5 directors of the different services rated over a period of 6 month their perception of the workload in the OR with 6 rooms. 287 ratings were given by the 5 leaders. The ratings were correlated with the overall OR use during the regular working period (OR capacity use). The use of the OR capacity was expressed in a percentage of the overall available production capacity.

The overall $r^{2}$ is 0.0982. The highest correlation was found between the emergency department (as an client) and the OR staff. See table and figure for the correlations.

Conclusion(s): In this study the correlation of the subjective and objective workload is low, although the correlation among some subgroups of staff proved to be significant. The optimal sustainable overall OR use is 80%. It may differ and may be dependant on the manpower available, the type of the hospital (academic versus supply), the surgical disciplines and the logistics in the OR. To know the optimal capacity of an OR, it is essential to guarantee patient safety and a high level of the employee satisfaction. It is also a prerequisite for achieving optimal contribution margins. The presented method is relatively simple to realize and seems to have an acceptable grad of validity as shown by the same results of the different occupational groups.

1AP3-6
The usefulness of the tasks employed to define post operative cognitive dysfunction (POCD) following cardiac surgery
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Background and Goal of Study: The consensus on assessment of neurobehavioral outcomes after cardiac surgery recommends five core tasks to be performed pre-operatively and postoperatively and results compared in order to define POCD [1]. However, batteries used in studies rarely include the entire core, and usually more tasks are employed, sometimes up to nine in total. Our centre employs a battery of nine tasks that includes the core tasks. In order to justify our battery, we felt it necessary to examine whether all tasks were useful in detecting deterioration in cognition scores.

Materials and Methods: Using data relating to the difference found between day five and pre-operative task results from Zamvar et al’s study which applied the decline of more than one standard deviation from baseline task score on at least 20% of the tasks method, [2] we explored which of the nine tasks performed were useful in identifying deterioration in scores.

Results and Discussion:

Figure 1. Percentage of patients with impairment in particular tasks. Data expressed as percentage, total n=59.

All nine of the tasks used were useful in detecting a drop in cognitive score in at least 28% of patients. The incidence of POCD was 28 (47%) when all nine
Day of surgery cancellation rate and reasons in a Scottish hospital

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Background and Goal of Study: Day of surgery cancellations are an important aspect of anaesthetic practice. Reasons for cancellation are associated with inconvenience for patients and may be avoidable [2]. A cancellation rate on the day of surgery of 8% has been described for the UK [3]. We decided to prospectively assess the rates and reasons for day of surgery cancellations of all elective operations in our health region.

Materials and Methods: Each day of surgery cancellation was recorded by a senior theatre staff nurse on a standardized form over a twelve months period (March 2006 to February 2007). Elective lists of all specialties at two hospitals of the NHS Forth Valley health region were considered. Data collection included surgical specialty, type of operation, hospital site and the primary cause for cancellation. Subsequently we grouped these primary causes into six categories: non-attendance by the patient, cancellation by the surgeon, cancellation by the anaesthetist, bed shortage, lack of theatre time and miscellaneous.

Results and Discussion: 11600 elective operations were booked during the twelve months, of which 1176 (10.1%) were cancelled on the day of surgery. The reasons for cancellations were: non-attendance of the patient (375/1176 (31.9%), cancellation by the surgeon 272/1176 (23.1%), lack of theatre time 165/1176 (14.0%), cancellation by the anaesthetist 147/1176 (12.5%), bed shortage 144/1176 (12.2%) and miscellaneous 73/1176 (6.2%). There was a strong seasonal variation in lack of beds: 78.5% (113/144) of bed shortages were recorded between January and March (9.6% (113/1176) of all cancellations).

Conclusion(s): Quantifying and classifying cancellation rates locally helps to improve understanding of underlying causes and addressing them. Overall pa-
sent’s non-attendance was the most frequent cause for day of surgery cancel-
lations. Increased bed provision is especially important over the winter months.

Acknowledgements: Thanks to D Keir and theatre staff as well as K Balie.

References:
sia visits (PAVs) ensures the detection of postoperative and anesthesia-related complications. Further, documentation and treatment of anesthesia-related complications have been defined a medicolegal duty by the German Society of Anesthesiology and Intensive Care Medicine (DGAI). However, no data is available concerning the current practice of this important element of postanesthesia care. Therefore, this study was designed to investigate quantity, organisation, contents, significance and problems of PAVs in Germany.

Materials and Methods: A questionnaire, consisting of 13 questions, was designed and tested for objectivity, reliability and validity. Validation was performed in the Department of Anesthesiology of the Saarland University Hospital, using a standardized model of cognitive pretesting. Retest reliability was 0.872 (Pearson correlation; p < 0.01). All DGAI members with a current e-mail address were contacted (n = 3955) via e-mail. Anonymization was established by assigning random identification numbers (ID).

Results and Discussion: Return rate was 31.4%; 958 questionnaires were included in the study. Only a minority of patients was estimated having received a PAV during the last year (mean: 31.9%; median: 20%; 25th-75th percentile: 10 – 42.5%). In hospitals with a specific PAV service, this number was significantly higher (mean: 61.4%; median: 65%; 25th-75th percentile: 30 – 90%; p < 0.001 vs. no PAV service). PAVs were reported to last typically less than 5 minutes (90%), and to be usually conducted on the day of surgery (45%), after regular working hours (55%). 38% of the respondents claim to detect perioperative complications on a regular basis during their visits. 98% of all participants believe that PAVs improve the quality of their own work, and 78% believe that the rate of anesthesia-related complications may be reduced by the regular performance of PAVs. However, 86% of the participants complain a lack of time for this task.

Conclusions: This study indicates that present working conditions do not support the regular conduction of PAVs. In view of the positive reception of PAVs by anesthesiologists, as well as accounting for the regular detection of postoperative complications during these visits, it seems desirable to implement organizational improvements for postanesthesia care.

Acknowledgements: We would like to thank Prof. Dr. med. Reinhard Larsen, as well as the German Society of Anesthesiology and Intensive Care Medicine for their kind support.

1AP4-2
A web-based preoperative assessment system for anaesthetic risk management, patient information service and a cost effective process of care
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Background and Goal of Study: Preoperative assessment by anesthesiologists in many cases is inconsistent and time-consuming. Information transmission to patients is often not standardized and frequently incomplete, as is postoperative outcome data, including follow-up and patient satisfaction. Data are therefore hard to interpret. We recently presented a preoperative information system using decision rules, standardized care and prediction models. In this study we added an interactive communication device that takes and provides personalized perioperative patient information in order to further ameliorate logistic planning and reduce health care costs.

Materials and Methods: We used our preoperative information system (Synopsis®) which consists of 49 questions to identify and score conditions that are known to be risk factors. Patients can complete the questionnaire from home, using a standard web browser. The collected answers are assessed by decision logic, resulting in a preoperative assessment that quantifies anesthetic, cardiac, and pulmonary risk. Online communication between patient and anesthesiologist for scheduling and procedure specific information is delivered by the communication device.

Results and Discussion: Since the introduction of Synopsis® in 2006 over 10,000 patients have been included. There were no significant differences between the estimated physical condition from Synopsis® and those given by the anesthesiologist (Figure 1).

Figure 2 shows an absolute annual cost reduction of 126,853 euro which reflects a calculated cost reduction of 15 euro per patient.

Conclusion(s): The Synopsis® questionnaire in combination with a web-based interactive information system is a valid and safe method for assessing patient risk, and can be used to triage patients and select patients who will need a preoperative work up. We showed that using a web-based route, healthcare costs can be largely reduced.

1AP4-3
The relationship between burnout, psychosomatic health symptoms and job satisfaction among Dutch anaesthesia assistants
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Anaesthesia Department, Catharina Hospital, Eindhoven, Netherlands

Background and Goal of Study: Job satisfaction has a protective effect against the negative consequences of work stress, overstrain, burnout, musculoskeletal and cardiovascular disorders. Decreased job satisfaction is an immediate consequence of burnout[1]. Due to the higher demands of professionals in Europe, the age limit for retirement increases. This also applies to anaesthesia assistants in the ever increasing and more demanding health care system.

Objective: To assess, the relationship between mental health and job satisfaction, as well as absenteeism of work and general health in a large group of anaesthesia assistants.

Materials and Methods: All anaesthesia assistants in The Netherlands were asked to complete an on-line questionnaire about job satisfaction, psychosomatic symptoms and burnout. We used the POLS-questionnaire (Permanent study of living conditions), for measuring psychosomatic symptoms (headache, musculoskeletal disorders, depression, anxiety, fatigue and sleepiness). Job satisfaction was evaluated by asking items about satisfaction of the organization, the department and the atmosphere in the department. For measuring psychological health we used the Maslach Burnout Inventory General Survey (MBI-GS), measuring emotional exhaustion, depersonalization and professional accomplishment. Only surveys which were completely filled in were analysed.

Results and Discussion: 882 out of 2321 anaesthesia assistants (40% response rate) returned the questionnaire. There were statistically significant (P<0.01) low levels accomplishment, and high levels of exhaustion, depersonalization, psychosomatic symptoms, sickness absence and general health prob-
lems in anaesthesia assistants characterized by low job satisfaction in contrast to anaesthesia assistants who were satisfied with their jobs.

**Conclusion(s):** The ever increasing demand on Dutch anaesthesia assistants, causing unwanted stress and perhaps less job satisfaction. High levels of job satisfaction obviously have a strong protective effect against psychosomatic symptoms and burnout. In this study, job satisfaction was related to lower levels of psychosomatic health symptoms and burnout. The higher rate of sickness absence in employees with low job satisfaction also has its economical impact and results in higher health care costs. Efforts to improve job satisfaction seem to be needed to improve psychosomatic wellbeing, and decreasing the incidence of burnout and job leave.

**References:**

### 1AP4-4

**Pre-assessment clinic thresholds are of little value in identifying elective surgical patients with poorly controlled blood pressure**

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**Background and Goal of Study:** Hypertensive patients continue to pose a dilemma to anaesthetists. Poorly controlled blood pressure (BP) may be a risk factor for major perioperative cardiovascular complications. A recent review proposed deferring elective anaesthesia and surgery in patients with a BP of 160/100 mmHg or more in the presence of target organ damage, or a BP of 180/110 mmHg or more in patients without target organ damage[1]. In practice, pre-assessment clinic (PAC) BP may not effectively identify patients above this cancellation threshold on admission.

**Materials and Methods:** Local Research Ethics Committee approval was obtained. In this prospective observational study patients aged 50 yr or over admitted to Leeds General Infirmary for elective surgery were recruited. PAC and admission BP was recorded. Evidence of target organ damage was elicited. Patients were classified according to the proposed cancellation threshold at these two times.

**Results and Discussion:** Of 120 patients studied 49% were male. Mean age was 65.9 yr (range 50–87 yr). Two (1.6%) patients were above the cancellation threshold in the PAC compared to nine (7.5%) patients on admission.

<table>
<thead>
<tr>
<th>Above cancellation threshold in PAC</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td>2 (7.6%)</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>110</td>
<td>118</td>
</tr>
<tr>
<td>Total</td>
<td>9 (7.5%)</td>
<td>111</td>
<td>120</td>
</tr>
</tbody>
</table>

PAC BP above the cancellation threshold had a sensitivity of 11% and a positive predictive value of 50% for admission BP above the cancellation threshold. Known hypertension (n=56) and target organ damage (n=28) had positive predictive values of 11% and 14% respectively for admission BP above the cancellation threshold. In this study PAC BP did not reliably identify patients above the cancellation threshold on admission. Known hypertension or target organ damage did not add useful information.

**Conclusion(s):** The variability of BP makes it difficult to recommend a PAC BP threshold which can identify patients with markedly elevated BP on admission. The recommended guidelines for deferring elective surgery were not reproducible in the same patient at different time points. It is therefore somewhat surprising that similar guidelines are still being published[2].

**References:**

### 1AP4-5

**The quality of anaesthesia related information on the internet remains uniformly poor**

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**Background and Goal of Study:** The internet has transformed healthcare-related information access and is the second most common source of medical information after the doctor. This potential may be undermined by the volume of unregulated and commercially driven information that appears on websites. There have been many attempts to evaluate the quality of information on the web but many of the tools utilised are expensive or have not been validated. We aimed to develop and statistically validate an evidence-based, rapidly performed scoring system to evaluate the retrieved websites.

**Materials and Methods:** Using the search term 'General Anaesthesia', the first 10 validated websites identified via 4 popular search engines and one meta-search engine, were analysed. Websites were assessed for technical quality (maximum 15 points) and information accuracy (maximum 31 points). We calculated a two-way mixed consistency intra-class correlation coefficient (ICC) for the scoring system, and used Kruskall-Wallis anova to compare scores across individual search engines.

**Results and Discussion:** After excluding 18 duplicates, 32 websites were evaluated. The ICCs demonstrated high reliability for individual components of the two scoring systems and the total technical (Table 1) and quality (Table 2) scores demonstrated high consistency (r=0.852, 0.774 (p<0.001, and r=0.933 respectively). The majority of websites were rated as either Poor or Fair across the two individual scores and none had a Grand Score of very good, or excellent. There was no difference between search engines.

**Table 1. ICC for technical score**

<table>
<thead>
<tr>
<th></th>
<th>ICC</th>
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</thead>
<tbody>
<tr>
<td>Background info</td>
<td>0.84</td>
<td>0.001</td>
</tr>
<tr>
<td>Anaesthesia type</td>
<td>0.81</td>
<td>0.001</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.36</td>
<td>0.139</td>
</tr>
<tr>
<td>Procedure Checklist</td>
<td>0.75</td>
<td>0.004</td>
</tr>
<tr>
<td>Total Score</td>
<td>0.85</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

**Table 2. ICC for quality score**

<table>
<thead>
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<th></th>
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<th>p</th>
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</thead>
<tbody>
<tr>
<td>Authorship</td>
<td>0.52</td>
<td>0.05</td>
</tr>
<tr>
<td>Qualification</td>
<td>0.54</td>
<td>0.05</td>
</tr>
<tr>
<td>Contact</td>
<td>0.58</td>
<td>0.03</td>
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<tr>
<td>Copyright</td>
<td>1.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Reference quantity</td>
<td>0.76</td>
<td>0.003</td>
</tr>
<tr>
<td>Reference quality</td>
<td>0.8</td>
<td>0.002</td>
</tr>
<tr>
<td>Ownership</td>
<td>0.48</td>
<td>0.074</td>
</tr>
<tr>
<td>Responsibility</td>
<td>0.43</td>
<td>0.094</td>
</tr>
<tr>
<td>Purpose</td>
<td>0.58</td>
<td>0.04</td>
</tr>
<tr>
<td>Original date</td>
<td>0.64</td>
<td>0.017</td>
</tr>
<tr>
<td>Revised updates</td>
<td>1.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Score</td>
<td>0.77</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

**Conclusion(s):** Anaesthesia related content on the most easily found websites remains uniformly poor. This has not changed for 7 years. We have validated an easily and rapidly performed scoring system for the assessment of anaesthesia related websites.

### 1AP4-6

**Validity and clinical applicability of SF-8 quality of life questionnaire in surgical patients: A population-based study**

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**Background and Goal of Study:** Health Related Quality of Life (HRQoL) has become an important outcome measure for patients undergoing surgery. Most studies evaluate small groups following specific intervention however population-base data are scarce. The aim of the study was first to validate SF-8 in surgical population from a population-based cohort and second to describe clinical characteristics of SF-8 according to demographics, baseline features, surgery and anesthesia risk.

**Materials and Methods:** Within ARISCAT study, a population-based cohort of 2,991 patients from 59 hospitals in Catalonia, Spain. HRQoL, was assessed on a random sample taken on 7 different days in each hospital during 2006. The sample included patients undergoing elective and emergency surgery (excluding obstetrics and and under 18 years). A 1-week recall version SF-8 questionnaire was administered pre-operative (pre_SF-8) and 3 months after surgery (post_SF-8). SF-8 physical (PCS-8) and mental (MCS-8). The psychometric properties of the questionnaire were evaluated in terms of feasibility, validity (content, construct and longitudinal), reliability (alpha-Cronbach).

**Results and Discussion:** Feasibility results satisfactory showing ceiling and floor effect of 5.6% and 0.2% respectively. Scaling assumptions: item-total scores correlations were high (0.57 – 0.93) and appropriate by subscale. Content Validity: factorial analysis confirmed two dimensions. Construct Validity: mild correlations between pre_SF-8 score and age, ASA and baseline SpO2 (0.14 – 0.29) were shown; pre_MCS-8 was significantly higher in men compared
to women (50.83 vs. 47.34, p < 0.05). Subjects reporting respiratory symptoms, in-patients and emergency surgery showed significantly lower SF-8 scores (p < 0.01). Longitudinal Validity: Patients undergoing non-invasive ambulatory surgery (working population back at work at 3-months) were defined as a “reliability” group, test-re-test showed no differences in SF-8 scores. In the “reliability” group after 3 months, SF-8 improved significantly (p < 0.001). Reliability: Internal consistency (Cronbach’s alpha) was 0.92.

Conclusion(s): SF-8 is a feasible, consistent and useful scale for assessing HRQoL in surgical population. Most patients undergoing surgery show SF-8 improvement 3 months after the intervention.

Acknowledgements: Supported by Fundacio La Marato TV3 #041610-2003.

1AP4-7
Musculoskeletal pain in anaesthetists. A regional survey
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Background and Goal of Study: Chronic musculoskeletal problems are thought to be common amongst anaesthetists. This study aims to evaluate the incidence and prevalence of musculoskeletal problems affecting anaesthetists in practice over 3 years. We will also discuss whether manual handling training is relevant and of benefit in decreasing morbidity.

Materials and Methods: Postal questionnaires were sent to anaesthetic consultants, registrars and non-consultant grades currently working in the West Yorkshire Region, which numbered 210 in total. There were 10 questions relating to the site of injury, duration off work, and the type of therapy required to treat the injury. The questions also ascertained whether or not manual training sessions had been offered and if so, had they been attended. A 76% questionnaire return rate was obtained.

Results and Discussion: The results can be summarised as follows: The number of musculoskeletal problem occurring directly as a result of work was 78 (67%). Of these 78 anaesthetists, 25 (32%) took time off work. Manual handling training was offered only to 42% of anaesthetists in full time employment and of these only 68% attended. Only 46% found them to be of any benefit.

Conclusion(s): All anaesthetists should be offered manual handling courses as part of their induction or as part of their job contract in the United Kingdom. Despite this we have shown that a relatively high proportion of anaesthetists have been unable to attend these or have found them to be of little practical relevance. The incidence of musculoskeletal pain in anaesthetists is unacceptable high and has led to significant morbidity in many anaesthetists. We conclude that a relevant, up-to-date, appropriate and compulsory manual handling course for all anaesthetists should be available and attended by all grades of anaesthetist. In the Yorkshire region we are now working towards this goal and this will hopefully help alleviate some of the morbidity associated with a career in anaesthesia.

1AP4-8
Patients need more time with us: A survey of 500 patients
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Department of Anaesthesia, Hatzikosta General Hospital, Ioannina, Greece

Background and Goal of Study: This survey was designed to collect data about patients’ knowledge of the anaesthesiologist’s qualifications, the anaesthesiologist’s role during the operation, and the amount of information given from the anaesthesiologists.

Materials and Methods: 500 consecutive patients (284 female, 216 male, 18-65 years old, ASA I-II) consented to preoperatively complete a questionnaire with fixed answers. All answers were evaluated in relation to age, gender and educational level.

Results and Discussion: Of the 500 patients, 29% had basic education, 51% medium, 21% higher education. Sixty-eight percent (88%) of patients were less than 50 years old. Ninety-four percent (94%) of our patients were aware that the anaesthesiologist is a specialist doctor (other answers: General doctor: 4%, Technician or Do not know: 2%) and that the anaesthesiologist’s role is very important during the operation (97% ticked the number 8, 9 or 10 in a numeric scale from 0 to 10). Eighty percent (80%) of the population survey preferred to be given anesthesia by the same anaesthesiologist who examined them before surgery probably because a patient to anaesthesiologist relationship is built during the preoperative visit. The rest of the answers are shown in Table 1 below as percentages (%) of the patients.

Our data indicate that the answers do not seem to be influenced by gender, age or educational level (p>0.05).

Conclusion(s): Patients know that the anaesthesiologists are specialized doctors with an important role during the operation, but they would like more time

with the anaesthesiologist (before and after the operation) in order their questions about anesthesia to be met and their perioperative anxiety to be reduced.

1AP4-9
Talking with patients – A very important determinant of patient satisfaction after anaesthesia
I. Cucureanu Badica, A. Bradis, L. Badica, L. Mina, I. Grintescu
Anaesthesia and Intensive Care, Emergency Hospital of Bucharest, Bucharest, Romania

Background and Goal of Study: Discussion with patients before anaesthesia is very important for anestolists and for moral support of the patients. Even if it is time consuming for anesthesiologists, filling in a questionnaire about previous pathologies and an informed consent about the possible side effects and risks is not the same for patients like taking face to face with the person in charge with anaesthesia. This study tries to emphasize the importance of the time spent by the anesthesiologist in this preoperative visit.

Materials and Methods: 300 patients over 18 years old scheduled for ambulatory surgery were included in the study. The patients answered an anesthetic questionnaire and before going to OR the anesthesiologist visit the patients and ask if there are some questions or things to be clarified. The time spent by the anesthesiologist was recorded (in minutes). Most of the time was spent for convincing the patient to accept a regional procedure and to explain the worst possible side effects of anesthesia. Three days after surgery the patients were asked to give qualifications (between 1 and 10) to anesthesia itself, to anesthesiologist and to postoperative state (maximum 30 points). The number of failures to insert a venous line or to perform a regional anesthesia, postoperative side effects like headaches, PONV and the quality of postoperative analgesia were recorded. Statistic used the Rank Correlation test and Pearson correlation coefficient.

Results and Discussion: There was a good correlation between the time spent by the anesthesiologist in the preoperative discussion and the qualifications attributed by the patients three days later. There was not such a strong correlation between types of anesthesia, failures of technical procedures, postanaesthetic side effects and the qualifications attributed by the patients.

Conclusion(s): Preanaesthetic “psychotherapy “ is very important for the patient satisfaction. If the patient is well informed and warned about possible side effects then their occurrence is much easier accepted by patient. Even if the preanaesthetic visit is time consuming in ambulatory surgery and can last longer than the anesthesia itself, a detailed discussion makes the patient to accept easier failures and side effects of anesthesia.

1AP4-10
Quality of life before carotid endarterectomy
F. Abela, S. Quevedo, S. Massada, C. Santos
Anaesthesiology, Hospital de Sao Joao, Porto, Portugal

Background and Goal of Study: Examining the quality of life (QOL) of patients before carotid endarterectomy (CE) will allow outcome variables to be compared and analyzed in relation to it. The objective of this study was to analyze QOL of patients submitted to CE before admission to a PACU and to study its relationship to outcome.

Materials and Methods: All adult patients consecutively admitted to the PACU between Mars 2006 and May 2007, who underwent CE, were enrolled in this observational and prospective study. The following patient characteristics were recorded: age, gender, body mass index, ASA physical status, type and magnitude of surgical procedure, length of stay (LOS), in PACU and in hospital, mortality. Simplified Acute Physiology Score II (SAPS), history of co-morbidities and quality of life survey score (QOLSS) [1]. The relationships between QOLSS

Table 1. Questions and answers as percentages (%) of the patients

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you like to meet your anaesthesiologist before surgery?</td>
<td>Yes 95 No 5</td>
</tr>
<tr>
<td>Would you like to be given anesthesia by the same anesthesiologist who examined you before surgery?</td>
<td>Yes 83 No 17</td>
</tr>
<tr>
<td>Would you like to contact your anaesthesiologist after surgery?</td>
<td>Yes 81 No 19</td>
</tr>
<tr>
<td>Have you asked your anaesthesiologist everything you would like to know about the anesthesia?</td>
<td>Yes 20 No 80</td>
</tr>
<tr>
<td>Has the anaesthesiologist provided you all the information required about the anesthesia?</td>
<td>Yes 60 No 40</td>
</tr>
<tr>
<td>Has your preoperative anxiety been reduced after the anaesthesiologist’s visit?</td>
<td>Yes 60 No 40</td>
</tr>
<tr>
<td>Had you enough time to discuss all your question about anesthesia with the anaesthesiologist?</td>
<td>Yes 13 No 87</td>
</tr>
</tbody>
</table>
Ambulatory Anaesthesia

2AP1-1
Quality control of outpatient thoracic sympathectomy by videothoracoscopy
E. Vilà, R. García-Guasch, J. Marisa, S. Maite, F. Teresa
Anaesthesiology, Hospital del Mar-Esperança. IMAS, Barcelona, Spain

Background and Goal of Study: Introduction: Videothoracoscopic thoracic sympathectomy is the treatment of choice for refractory hyperhidrosis; simplification of the surgical technique and a suitable analgesic protocol mean that it can be performed on outpatients. Goal of study: Post-operative monitoring and quality control of thoracic sympathectomies up to 72 hours after the operation. The following variables were considered: visual analogic scale (VAS), surgical time and time of stay in the recovery room, incidence of nausea, vomiting and complications (pneumothorax) as well as the number of admissions and readmissions.

Materials and Methods: The monitoring was carried out over a period of 14 months and included 27 patients who were operated on as outpatients for hyperhidrosis. The anaesthetic induction and maintenance was carried out with remifentanil and propofol. A prophylactic anti-emetic multitherapy was administered to those patients with ≥3 Apfel criteria. The anaesthesia at home consisted of ibuprofen 600mg alternated with a combined tablet of tramadol and paracetamol (325/37.5mg) every 6 hours and a 2g rescue dose of metamizol. The operative pain at rest with the prescribed analgesia. The main cause of admission was pneumothorax (4) and there was 1 readmission because of dyspnea. Patients were asked to fill questionnaires on days 1, 2, 3, 7 and 14 after ongoing surgery. A study nurse collected results by phone. Questions included the time to fall asleep, sleep duration, time spent in bed, number of awakenings, quality of sleep visual analog scale (QoSVAS), use of sleep aids, and the Epworth Sleepiness Scale (ESS) (2). The significance of the differences observed across repeated measures was assessed using the non parametric Friedman’s test, followed by post-hoc Wilcoxon signed rank tests (p<0.05).

Results and Discussion: No significant difference in the time to fall asleep, sleep duration and QoSVAS was found. As compared to the preoperative night, the use of sleeping aids was significantly reduced on the first postoperative night (20.8% vs 26.7%, p=0.031), but not on the following nights. Surprisingly, the ESS score was significantly reduced on days 2 (p=0.042),3 (p=0.002) and 14 (p=0.05), but not on days 1 and 7.

Conclusion(s): Our results, showing that there is an absence of subjective sleep disturbances contrast with that of previous published studies which showed that up to 23% of the patients experienced sleep disturbances. Further studies are required to understand the diminished ESS on days 2, 3 and 14.

References:

2AP1-2
Are there subjective sleep disturbances after general anaesthesia in day surgery patients?
L. Bairy, M. Gourdin, J. Jamart, S. Bouhon, E. Collard
Anaesthesiology, Cliniques Universitaires de Mont-Godinne, Yvoir, Belgium

Background and Goal of Study: Several studies have reported that day case surgery patients experience sleep disturbances (1). The aim of the present study was to assess the degree and duration of subjective sleep disturbances following general anaesthesia for day surgery.

Materials and Methods: 71 patients, 18 to 70 years old, ASA I-II, scheduled for digestive, urologic, orthopaedic, gynaecologic or ophthalmologic surgery were included. Before the surgical procedure, no psychoactive premedication was administered. Each patient filled a form about their preoperative sleeping habits. General anaesthesia was induced with sufentanil, propofol and a muscle relaxant if needed. It was maintained with titrated sevoflurane, desflurane or propofol and sufentanil. Patients were asked to fill questionnaires on days 1, 2, 3, 7 and 14 after ongoing surgery. A study nurse collected results by phone. Questions included the time to fall asleep, sleep duration, time spent in bed, number of awakenings, quality of sleep visual analog scale (QoSVAS), use of sleep aids, and the Epworth Sleepiness Scale (ESS) (2). The significance of the differences observed across repeated measures was assessed using the non parametric Friedman’s test, followed by post-hoc Wilcoxon signed rank tests (p<0.05).

Results and Discussion: The ESS score was significantly reduced on days 2, 3, 7 and 14 (p=0.05), but not on days 1 and 7.

Conclusion(s): Our results, showing that there is an absence of subjective sleep disturbances contrast with that of previous published studies which showed that up to 23% of the patients experienced sleep disturbances. Further studies are required to understand the diminished ESS on days 2, 3 and 14.

References:

2AP1-3
The effect of warmed irrigation fluid on core body temperature in arthroscopic shoulder surgery
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Background and Goal of Study: Hypothermia is a common problem during surgery. The OR temperature and irrigation fluids play a role in the development of perioperative hypothermia. The purpose of this study was to investigate the effect of warmed irrigation fluid on core body temperature change and on perioperative blood loss in patients undergoing arthroscopic shoulder surgery under general anesthesia.

Materials and Methods: Thirty four patients scheduled for arthroscopic shoul-
der surgery under general anesthesia were randomized to the warmed (Group 1, 17 patients) and room-temperature irrigation fluid groups (Group 2, 17 patients). Esophageal temperature was monitored every 15 to 30 minutes throughout the surgery and compared between the two groups. The incidence of postoperative shivering was examined in the PACU. The decrease of postoperative hemoglobin was compared between the two groups.

Results and Discussion: The decrease in core temperature at the end of surgery was 0.03° in Group 1 and 0.97° in Group 2, which was significantly different (P<0.05). The significant difference of core temperature between the two groups was at the 60, 90, 120 minutes from the induction of anesthesia (P<0.05). In Group 2, shivering patients were four, compared to no one in Group 1. There was no significant difference in postoperative hemoglobin decrease between the two groups.

Conclusion(s): The use of warmed irrigation fluid appears to be an effective way to maintain a higher core body temperature compared to those of room temperature and it doesn’t affect on the perioperative bleeding during arthroscopic shoulder surgery.

2AP1-5
Septoplasties with local anesthetic and sedation in ambulatory surgery: clinical outcomes
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Background and Goal of Study: Septoplasties can be performed under local anesthesia and sedation (LAS). Guidelines for day surgery state that unexpected admissions should be 2-3%. Audits have not achieved this figure and septoplasty is not universally considered suitable for day surgery. Epistaxis (8%) and emesis (20-30%) cause most anticipated admissions. Our goal is to show that septoplasty can be performed under LAS in outpatients with the same quality as inpatients.

Materials and Methods: We studied 108 patients, ASA I-II, aged 20-60 years undergoing elective ambulatory septoplasty under LAS. Patients with psychiatric disorders were excluded. Articaine 4% + epinephrine 1% was used for infiltration. Propofol 0.5-1 mg/kg/h and remifentanil 0.05-0.1 mg/kg/min were used as sedation in order to get a Ramsay Scale 2-3. Dihydrine was given intraoperatively and conventional analgesia with dipyridam and diclofenac p.o for a week after surgery. We measured: total operative time, surgical time, recovery time, peri/postoperative complications, analogic visual scale (VAS) before PACU discharge, verbal scale (VS) at 24-48h after surgery, rescue analgesia consumption, patients’ and surgeons’ satisfaction.

Results and Discussion:

Table 1. Results

<table>
<thead>
<tr>
<th>GENDER</th>
<th>M/F</th>
<th>Weight (kg)</th>
<th>Total operative time (min)</th>
<th>Total PPF (mg)</th>
<th>Total RMF (mg)</th>
<th>Postoperative complications</th>
<th>Readmissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>30/18</td>
<td>72.5±2.8</td>
<td>45±1</td>
<td>100±5</td>
<td>247±11</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Group NO</td>
<td>24/24</td>
<td>75±3</td>
<td>46±1</td>
<td>115±5</td>
<td>260±11</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

No one patient needed rescue analgesia. IRM was greater for Group C and statistically significant difference at the 0.001 level was found between the two groups.

Conclusion(s): The omission of opiates and the use of alternative perioperative analgesic techniques minimizes recovery at the PACU and facilitates fast tracking in pediatric ambulatory anesthesia.

References:

2AP1-7
Arthroscopic VMO advancement and lateral release as day case surgery: Prospective audit
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Background and Goal of Study: Vastus medialis obliquus (VMO) muscle is the major dynamic stabilizer of the patella. Arthroscopic repair of VMO with lateral release is done for anterior patellar stabilisation which is common in sports injuries. This surgery is associated with moderate to severe pain, many times requiring in-patient admission due to inadequate pain control. With advancement in analytic technique and home infusions it’s now being done as day case. We did a prospective audit to find out the analytic technique and post op admission rate for arthroscopic VMO advancement as ambulatory surgery.

Materials and Methods: This prospective audit was done for a period of 6 months after institute approval. All the patients fulfilled our day surgery fitness criteria. All of them had general anaesthesia. Multimodal analgesic technique included, Oxycotin 10mg as pre-emptive analgesia with either ultrasound guided single shot femoral nerve block (SFNB) or continuous femoral nerve block (CFNB). Intra-op patients received IV paracetamol, dexamethasone and parecoxib. 20 mls of 0.5% bupivacaine was given as SFNB. For CFNB, stimulating catheter was used and 2% lignocaine with epinephrine 10-20 mLs given as bolus. For maintenance 0.1% ropivacaine, 5 mls/hour as a continuous infusion delivered by anesthetic pump. Rescue opioids given as appropriate. Oral Diclofenac and Codeine were given to take home. Patients were educated regarding continuous continuous catheter. They were asked to remove the catheter after 72 hours by themselves. If not they came to the hospital. If any problems they were asked to contact the attending anaesthetists. Telephonic follow up were done at 24 and 48 hrs. Details of pain score, sleep and any problems were noted. Post op admissions were defined as AR, if not discharged within 24 hours and RAR, if admitted after 24-48 hrs. Discharge criteria were followed according to institute protocol.

Results and Discussion: 25 patients were followed during this period. Readi-
mission rate in SFNB was 40% compared to none in CNFB and home infusion patients.

**Conclusion(s):** No admission were required in patients who had multi modal analgesic technique with continuous femoral nerve block and home infusion for arthroscopic VMO advancement. Optimal technique, equipment, follow up and patient oversight to be determined by prospective, controlled trials.

**2AP2-1**

**Parental satisfaction in ambulatory anesthesia for children in suburban and rural areas in Thailand**

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**Background and Goal of Study:** Ambulatory anesthesia for children in developing countries is growing. However, we found many obstacles to improving quality especially in our hospital which serves patients from suburban and rural areas. So, we aim to study the parental satisfaction and its associated factors in our hospital.

**Materials and Methods:** This study is an observational prospective descriptive study. We included children who were scheduled for ambulatory anesthetic service between birth and 14 years of age at Srinagarind hospital, Khon Kaen, Thailand. We excluded patients who had been parents unattainable to be reached by telephones. Before anesthesia, we recorded parents’ data (sex, age, ASA physical status, operation) and parental data (sex, age, education, anxiety score). After anesthesia, we recorded type and duration of anesthesia, adequacy in information reception (pre, post anesthesia, complication). The day after anesthesia, we made phone call to same patients to record parental satisfaction score (overall, pre, post anesthesia care) and anesthesia related complications. Data were based on mean (SD), median (range), or percentage as appropriate. Associated factors were based on multiple logistic regressions. A p<0.05 was needed for statistical significance.

**Results and Discussion:** Ninety-two patients and their parents were included to our study. Overall good parental satisfaction was 96.7% (95CI 90.8-99.9%). Associated factors with dissatisfaction were poor postanesthesia care (PR 22.5 (95/CI 3.2-158)) and inadequate information about postanesthesia care at home (PR 13.3 (95/CI 1.3-136.0)). Patients’ characteristics: male (58.7%), 3.6 (0.25-14) (median (range) years old, ASA class I (73.9%); procedures: general surgery (63.0%) and MRI (19.6%); anesthetic techniques: GA inhalation (66.5%), GA balance (25%), anesthesia period < 2 hr (98.1%); and anesthesia related complication – PONV (11.9%). Parental characteristics: female (86.6%), 33.5±7.5 years old; 65.2% education below tertiary; with none to little anxiety score (90.2%); require public transportation 29.3%. Adequacy on information about pre, post anesthesia care, and complication were 61.6%, 38.1%, and 33.7%, respectively.

**Conclusion(s):** Our study showed high percentage of parental satisfaction. Disatisfaction associated factors were postanesthesia care and adequacy on information about postanesthesia care at home. We hence found that improvement could be made on information providing for patients and their parents.

**2AP2-2**

**Postoperative pain in ambulatory surgical hernia repair. Analgesia with local anesthetic single infiltration vs continuous perfusion subfascial catheter**

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**Background and Goal of Study:** Postoperative infiltration in hernia repair is an effective technique to control postoperative pain, although is not a common practice in our hospital. We wanted to compare this technique with continuous intravenous analgesia with a subfascial catheter with low pressure to improve postoperative pain control in our patients. Our study aimed to compare effectiveness of the two techniques at different time intervals.

**Materials and Methods:** 90 patients, ASA II, aged 17-87 years, scheduled for unilateral or bilateral ambulatory hernioplasty, underwent laparoscopic hernioplasty with bilateral subcutaneous infiltration with ropivacaine 0.4mg/kg. After surgery, the patients were divided into two groups: Group I (n=58) single infiltration and conventional analgesia with diclofenac-dipyrone and tramadol p.o. as rescue. Group II (n=32), a multiperforated catheter was inserted subfascially with a bolus of 5ml of ropivacaine 0.5% + ropivacaine 0.2%, 250ml, continuous perfusion with an elastomeric pump for 3 days. The following data was collected: 1. demographic data, 2. Analogic Visual Scale (AVS) on arrival in the PACU, 3. AVS on discharge PACU, 4. Verbal Scale (VS) the first night, 5. VS at 24 hours, 6. VS at 48 hours and the second day, 7. VS at 1 week, 8. VS at 1 month, 9. Rescue analgesia at 24-48 hours and 7 days. 10. Analgesic consumption 1 month after surgery. 11. Degree of satisfaction. 12. Sleep quality at 24-48 hours.

**Results and Discussion:** Both groups were similar. There were no significant differences inVAS in PACU, VAS on discharge PACU, at rest or on movement, at rest or on movement.

Analgesic consumption was not significant on the first night, nor was sleep quality (24-48h) nor degree of satisfaction. There were significant differences in: 1. VAS on 1st night: group I: x=4.46 (SD 2.39); group II: x=1.13 (SD 1.7). 2. VS at 24h: group I: x=3.01 (SD 2.3); group II: x=0.71 (SD 1.12). 3. VS on second night: group I: x=2.93 (SD 2.11); group II: x=0.67 (SD 1.09). 4. VS at 48h: group I: x=2.53 (SD 2.03); group II: x=0.58 (SD 0.9). 5. VS at 7 days: group I: x=2.6 (SD 1.7); group II: x=0.67 (SD 0.17). 6. VS at 1 month: group I: x=1.84 (SD 1.6); group II: x=0.13 (SD 0.53) with p<0.001. Rescue analgesics consumption were significant lower in group II after the first 24 hours, at 48 hours and at 7 days.

**Conclusion(s):** Subfascial catheter placed during hemiplasty, affords better control of postoperative pain after 24 hours and up to a month. Control of rescue analgesic consumption from the first night till the first week is also improved.

**Acknowledgements:** Dr. Candy Semerano.

A. van den Berg

Department of Anaesthetics, Kingsmill Hospital, Mansfield, Nottinghamshire, United Kingdom

**Background and Goal of Study:** Introduction: The traditional practice of administering opioid analgesics (with or without adjuvant antiinflammatory or anticholinergic drugs) intramuscularly or benzodiazepines (with or without prokinetic antiemetic drugs) orally only to two hours pre-operatively in order to ally anxiety prior to, and to facilitate induction of, anaesthesia has, in contemporary practice, been replaced by either omission of such pre-medication or administration of an aloct of short acting benzodiazepine (midazolam) intravenously in the pre-operative holding area or operating room subsequent to insertion of iv cannula immediately prior to induction of anaesthesia. The wishes of patients regarding the traditional practice of oral pre-operative pre-medication in the form of diazepam or alprazolam are audited.

**Materials and Methods:** British adult (>18yrs) presenting to the author for “same day” surgery under general anaesthesia were visited shortly after their admission to the Day Surgery Unit (DSU) or Surgical Ward on the morning of surgery. During this consultation, their opinion as regards their wish to receive oral anxiolytic pre-medication in the DSU or ward before being transferred to the operating suite was canvassed. Patient demographics and choice was recorded. The Chi squared test was used for analysis (p<0.05=significance).

**Results and Discussion:** Of 200 British adults (aged 18-88 years) interviewed, 175 (91%) had previous anaesthetic experience. Of the 200 patients audited, 45 (24%) requested and 152 (76%) declined pre-medication (p<0.0001).

**Conclusion(s):** Comment: The change from traditional to contemporary timing of pre-medication in anaesthetic practice is probably related to improvements in anaesthesia pharmacology and the popularisation of day stay surgery. This audit reveals that approximately 25% of British adults still choose to receive anxiolytic pre-medication some hours before surgery. Accordingly, canvassing patient opinion, where appropriate, may serve to rationalize the use of such pre-medication, thereby reducing anxiety in anxious patients pre-operatively. Such anxiety may enhance patient satisfaction with their anaesthetic care, and contribute to the concept of patient centred [1] care in anaesthetic practice.

**References:**


**2AP2-3**

**The wishes of British adults regarding pre-anaesthetic medication (“premedication”): Towards “patient centred anaesthetic practice”**

A. van den Berg

Department of Anaesthetics, Kingsmill Hospital, Mansfield, Nottinghamshire, United Kingdom

**Background and Goal of Study:** Introduction: The traditional practice of administering opioid analgesics (with or without adjuvant antiinflammatory or anticholinergic drugs) intramuscularly or benzodiazepines (with or without prokinetic antiemetic drugs) orally only to two hours pre-operatively in order to ally anxiety prior to, and to facilitate induction of, anaesthesia has, in contemporary practice, been replaced by either omission of such pre-medication or administration of an aloct of short acting benzodiazepine (midazolam) intravenously in the pre-operative holding area or operating room subsequent to insertion of iv cannula immediately prior to induction of anaesthesia. The wishes of patients regarding the traditional practice of oral pre-operative pre-medication in the form of diazepam or alprazolam are audited.

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**References:**

scores in the immediate postoperative period in this patient group, in an effort to improve the quality of care.

Materials and Methods: This was a prospective audit which had the approval of the hospital's human research ethics committee. 144 women scheduled for day case gynaecological laparoscopic procedures were recruited. During the preoperative interview, written and informed consent was obtained and an explanation of the QOR-9 questionnaire and visual analogue pain scoring were given. Patients were advised to complete VAS rest and dynamic pain scores and the QOR-9 questionnaire upon arising home and 24 hours after their procedure.

Results and Discussion: Completed questionnaires were returned for 67 patients (46.5%). The median rest and dynamic VAS pain scores were 4 and 7 respectively on return home and 3 and 5 twenty four hours after surgery. QOR scores were 13 (95% CI 12.11 - 13.65) on return home and 14 (95% CI 13.02 - 14.4) twenty four hours postoperatively. Ascertainment patients’ quality of recovery is an integral part of ensuring the highest quality postoperative care. Poor quality of recovery delays postoperative convalescence.

Conclusion(s): We found the QOR score in our unit to be lower than expected. The VAS pain scores were higher than expected. This audit will form the basis for change in the postoperative analgesia prescribing practices in our unit. We anticipate closing the audit loop once these changes are in place.

References:

2AP2-5
Severe airflow obstruction is a risk factor for unplanned admission among day surgery patients
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Anesthesia, Dalhousie University, Halifax, Nova Scotia, Canada

Background and Goal of Study: Ambulatory surgery has become increasingly popular for a variety of surgical procedures due to its earlier return to pre-operative physiological state, reduced mental and physical disability, and earlier discharge from hospital. The VAS pain scores were 4 and 7 respectively on return home and 3 and 5 twenty four hours after surgery. QOR scores were 13 (95% CI 12.11 - 13.65) on return home and 14 (95% CI 13.02 - 14.4) twenty four hours postoperatively. Ascertainment patients’ quality of recovery is an integral part of ensuring the highest quality postoperative care. Poor quality of recovery delays postoperative convalescence.

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References:

2AP2-6
A simple clinical maneuver to reduce laparoscopy induced shoulder pain: A randomized clinical trial
O. Calebekaya, P. Phelphs, C. Atpel, O. Radke, K. Kolodziej
Perioperative Clinical Research Core, Department of Anesthesia and Perioperative Care, University of California at San Francisco, UCSF Medical Center at Mount Zion, San Francisco, California, USA

Background and Goal of Study: While laparoscopic procedures, compared to laparotomies, are leading to significantly reduced postoperative pain at the surgical site, they are often associated with shoulder pain causing discomfort to the patient. The incidence of shoulder pain varies from 35% to 80%, ranges from mild to severe and can last more than 72 hours after surgery. (1) The leading hypothesis causing shoulder pain is a CO2 induced phrenic nerve irritation referring pain to C4.(2) Various techniques have been investigated to reduce shoulder pain by reducing residual peritoneal CO2. (3) Most have shown some effectiveness; however, none of these techniques are practical and effective enough for routine clinical use. We investigated a simple clinical maneuver at the end of surgery to remove residual CO2 from the peritoneal cavity to test the hypothesis that doing so would significantly reduce the frequency and intensity of shoulder pain after gynecologic laparoscopy.

Materials and Methods: 100 female ASA 1 and 2 outpatients scheduled for elective gynecologic laparoscopic surgery were randomly allocated. In the control group, CO2 deflation through the trocar. In the intervention group, CO2 was removed by means of Trendelenburg position with 5 manual pulmonary recruitment maneuvers. Postoperative shoulder pain was assessed prior to discharge and 12, 24, 36 and 48 hours later using a visual analog scale (VAS). In addition, positional characteristics of the shoulder pain and incidence of postdischarge nausea and vomiting (PDNV) were recorded 48 hours after surgery.

Results and Discussion: Pain scores in the control and intervention groups were 30.3±4.5 vs. 15.6±3.0, 25.7±4.7 vs. 10.8±2.4, and 21.7±4.3 vs. 9.1±2.5 at 12, 24 and 36 hours after discharge, respectively (p<0.05). The intervention reduced positional pain from 63% to 32% (p=0.05) and the incidence of PDNV from 56.5% to 20.4% (p=0.001).

Conclusion(s): This simple clinical pulmonary recruitment maneuver at the end of surgery reduced shoulder pain as well as PDNV after laparoscopic surgery by more than half.

References:

2AP2-7
Influence of body mass index on recovery of protective airway reflexes after anesthesia with desflurane or sevoflurane
R. McKay, R. Ragan
Anesthesia and Perioperative Care, University of California San Francisco, San Francisco, California, USA

Background and Goal of Study: Many studies show faster awakening after administration of inhalational anesthetics with lower tissue solubility. Limited data exist on recovery of airway reflexes (AWR). Whether increased body mass index (BMI) contributes to delayed AWR recovery after inhalation anesthesia, and whether such an effect is influenced by anesthetic solubility, remain subjects of controversy.

Materials and Methods: We studied patients over a wide range of BMI receiving desflurane or sevoflurane to determine whether increasing BMI correlates with delayed AWR recovery, judged by time needed for the patient to regain ability to swallow 20 mL of water after discontinuation of anesthesia. All patients received 2 mg midazolam, propofol induction, LMA placement and random assignment to sevoflurane or desflurane. Muscle relaxant was avoided. An observer blinded to volatile anesthetic assignment noted the time from discontinuation of anesthesia to first affirmative response to command and administered a swallowing test (20mL of water) at 2, 6, 14, 22 and 30 minutes thereafter. Swallowing was judged as successful if no coughing or drooling occurred. Based on previous recovery data, 60 patients per group were required for alpha = 0.05 and 80% power to detect a 13.4% difference in BMI vs. time slope between groups.

Results and Discussion: To date, patients receiving desflurane (n=36) and sevoflurane (n=49) did not differ in BMI, age, MAC hours or fentanyl. 100% of desflurane and 45% of sevoflurane patients were able to swallow 20 mL water successfully 2 minutes after following commands. BMI did not correlate with time to AWR recovery, neither in the desflurane (r2=0.015, p=0.47) nor sevoflurane (n=49) did not differ in BMI, age, MAC hours or fentanyl. 100% of desflurane and 45% of sevoflurane patients were able to swallow 20 mL water successfully 2 minutes after following commands. BMI did not correlate with time to AWR recovery, neither in the desflurane (r2=0.015, p=0.47) nor sevoflurane (n=49) groups.

*p=0.001, **p=0.05, ***p=0.154.

Among 49 patients with severe airflow obstruction, 12.24% had unplanned admission to hospital in the years 2002-2005, compared to all outpatients undergoing surgery for the years 2002-2005. Whether increased body mass index (BMI) contributes to delayed AWR recovery after inhalation anesthesia, and whether such an effect is influenced by anesthetic solubility, remain subjects of controversy.

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Among 49 patients with severe airflow obstruction, 12.24% had unplanned admission to hospital in the years 2002-2005, compared to all outpatients undergoing surgery for the years 2002-2005.
The present study evaluates the practicability, patients' acceptability and post-
for minor anorectal surgery. Most probably due to psychologic factors,

Background and Goal of Study: Various anaesthetic techniques can be per-
formed for minor anorectal surgery. Most probably due to psychologic factors,

Materials and Methods: Forty (n=40) patients, men and women of aver-
age age 66±5, ASA I-II, were included in this study. All were subjected in transurethral bladder resection of average duration 37±6 min. All were given antinemics, fentanyl 50 μg, propofol 2-3 mg kg⁻¹ and paracetamol 1g postop-
eratively for control of postoperative pain. The classical Laryngeal Mask (cLMA) was placed in all patients. In one group (n=20) desflurane was used for the maintenance of anaesthesia and in the other group sevoflurane was used. The MAC for both volatile agents was 1.0 at an oxygen-NO₂ mixture (FIO₂ – 0.5).

In all cases spontaneous breathing was achieved at the first 6±2 min. Post-
operative pain was assessed with the Visual Analogue Scale score and it was found <3±1. Spirometry took place preoperatively and at 10 min (all patients post-recovered fully), at 1 hour and at 2 hours postoperatively. We measured Forced Vital Capacity (FVC), forced expiratory volume in 1 sec (FEV₁) and peak expiratory flow (PEF). Statistically significant were considered values of p < 0.05.

Results and Discussion: Baseline spirometric values were all within the norm-
range. At 10 min we observed a significant reduction in lung capacity. In desflurane group FVC was reduced by 22±7%, FEV₁ by 28±6% and PEF by 26±5% versus 30±5%, 38±4% and 35±6% in sevoflurane group respectively. At 1 hour in desflurane group FVC was reduced by 6±2%, FEV₁ by 8±4% and PEF by 8±5% versus 10±2%, 14±5%, 12±6% in sevoflurane group respec-
tively. At 2 hours all measurements had returned to their initial values without important differences between the two groups.

Conclusion(s): Lung volumes in elderly patients are affected more by sevoflur-
ane comparing to desflurane after day case surgery, but there is no difference between the two volatile agents concerning the time needed for these volumes to return to normal.

2AP3-3

Comparison of low dose spinal anaesthesia using hyperbaric bupivacaine and total intravenous anaesthesia for minor anorectal surgery

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Background and Goal of Study: Various anaesthetic techniques can be per-
formed for minor anorectal surgery. Most probably due to psychologic factors, patients tend to prefer general anaesthesia compared to regional techniques. The present study evaluates the practicability, patients' acceptability and post-
operative analgetic need for both anaesthetic techniques in patients undergoing minor anorectal surgery.

Materials and Methods: 138 ASA I-II patients (n=7, 18-85 years) were ran-
domized to receive either spinal anaesthesia (“SPA”, n=69) using 1.0 ml, hy-
perbaric bupivacaine 0.5% or total intravenous anaesthesia (“TIVA”, n=69) with propofol and fentanyl using a laryngeal mask. In a questionnaire the patients were asked about postoperative comfort, arising problems, pain and unpleasant perceptions.

Results and Discussion: Patients receiving “SPA” had a shorter monitoring 
induction was surveyed to guide the induction technique in routine practice in

Materials and Methods: All patients presenting to the author for ambulatory 
or same day surgery under general anaesthesia during a 5 month period were 
visited either in the Surgical Ward or Day Surgery Unit before surgery. During the pre-operative consultation patients were advised of the availability of two 
methods of anaesthetic induction (IV = "a tiny injection with a small needle on 
the back of the hand," and SIA = "5 to 10 deep breaths through the mouth - 
"like a fish"- of sevoflurane, an essentially odourless anaesthetic gas, which 
is popular with children because it avoids the tiny needle") and asked to choose 
whether it was offered.

Conclusion(s): Lung volumes in elderly patients are affected more by sevoflur-
ane comparing to desflurane after day case surgery, but there is no difference between the two volatile agents concerning the time needed for these volumes to return to normal.

2AP3-3

20% of British adults choose inhalational (“mask”) rather than 
intravenous (“needle”) induction of anaesthesia: Towards 
patient centred anaesthesia practice

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Department of Anaesthetics, Kingsmill Hospital, Mansfield, Nottinghamshire, 
United Kingdom

Background and Goal of Study: Introduction: Propofol or Pentothal sodium 
inhaled intravenously (IV) are traditionally used for induction of anaesthesia in 
children, and is satisfactory for induction of anaesthesia in adults (1-2). The attitude of British adult patients to the IV versus inhalational routes of 
induction was surveyed to guide the induction technique in routine practice in 
British adults.

Materials and Methods: All patients presenting to the author for ambulatory 
or same day surgery under general anaesthesia during a 5 month period were 
visited either in the Surgical Ward or Day Surgery Unit before surgery. During the pre-operative consultation patients were advised of the availability of two 
methods of anaesthetic induction (IV = “a tiny injection with a small needle on 
the back of the hand,” and SIA= “5 to 10 deep breaths through the mouth - 
“like a fish”- of sevoflurane, an essentially odourless anaesthetic gas, which 
is popular with children because it avoids the tiny needle“) and asked to choose 
which route they preferred. Patients' demographics and choice were recorded. The Chi-squared test was used for analysis (p<0.05=significance).

Results and Discussion: 200 adults (ranging in age 18-88yrs.) were inter-
viewed, of whom 175 (91%) had previous anaesthetic experience (157 induced 
by needle, 15 by mask and 3 without recall of induction route), 108 (54%) se-
lected “needle” induction and 40 (20%) selected “mask” induction (p<0.0005).
The remaining 52 (26%) were equivocal, suggesting that the anaesthetist do 
“whatever is best”. Sevoflurane by mask was offered to 9 of the equivocal pa-
tients and proved successful for induction, without incident, in the 49 patients 
to whom it was offered.

Conclusion(s): Comment: Approximately 50% of the British adults surveyed 
appeared to have a “mask phobia” and preferred a “needle” induction, while approximately 20% appeared to have a “needle phobia” and preferred a “mask"
induction. These data suggest that, as part of the concept of a patient centred (3) practice of anaesthesia, the opinion of elective patients, where appropriate, be canvassed regarding their preferred route of anesthetic induction.

References:

2AP3-4
No supplemental neuromuscular blockers are required during propofol and remifentanil total intravenous anesthesia for laparoscopic pelvic surgery
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Background and Goal of Study: No administration of supplemental neuromuscular blockers may be beneficial to the recovery of the ambulatory laparoscopic surgery. We compared the cardiopulmonary factors during propofol and remifentanil anesthesia for laparoscopic surgery with or without supplemental neuromuscular blockers.

Materials and Methods: 56 female patients scheduled to undergo laparoscopic pelvic surgeries were randomly assigned to two groups A and B. Anesthesia was induced with propofol target organ concentration 5.0 μg/mL, remifentanil 3.0 ng/mL and rocuronium 0.6 mg/kg IV. After tracheal intubation, anesthesia was maintained with 2.0–5.0 μg/mL propofol, 1–4 ng/mL remifentanil IV. All patients’ lungs were mechanically ventilated in both groups and inotropic volume in saline solution. LM were inserted two minutes after induction. All trained users. We compared the insertion of LMA Unique with and without mini-doses of muscle relaxants.

Materials and Methods: A prospective randomized blinded study was conducted. Forty patients were studied in an Ambulatory Surgery Unit and were divided in two equal groups to receive either rocuronium (R) or equivalent volume 44 ml of normal saline (S). Bispectral Index and neuromuscular blockade were monitored. The classical laryngeal mask (c LMA) was placed in all patients. For the maintenance of anesthesia desflurane and sevoflurane were used at MAC 1.0 in oxygen/air mixture (FiO2 = 0.5). The time of spontaneous breathing were recorded after the induction in anesthesia. During recovery the following factors were assessed: 1) time of eye opening, 2) time to verbal command, 3) time of removal of the cLMA and 4) postanaesthesia recovery score (Aldrete score > 8).

Results and Discussion: The administration of desflurane in elderly patients who are sub- treatedentially bolus doses of rocuronium, 0.15 mg/kg IV, were administered in the group A, however not in the group B. Heart rate (HR) and systolic arterial pressure (SAP), diastolic arterial pressure (DAP), EtCO2, peak inspiratory pressure (PIP), expired minute ventilation (MV), intraabdominal pressure (IAP) and temperature were measured during the pneumoperitoneum.

Results and Discussion: There were no group differences in HR, SAP, DAP, EtCO2, heart rate, systolic arterial pressure (SAP), diastolic arterial pressure (DAP), EtCO2, peak inspiratory pressure (PIP), expired minute ventilation (MV), intraabdominal pressure (IAP) and temperature between group A and B.

Conclusion(s): No supplemental neuromuscular blockers are required during propofol and remifentanil total intravenous anesthesia for laparoscopic pelvic surgery.

2AP3-5
Recovery of elderly patients undergoing short duration urological procedures with desflurane or sevoflurane anesthesia
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Background and Goal of Study: It is known that the type of anesthetic agent and the duration of its use during a surgical procedures may affect the time of recovery. This acquires great interest in elderly patients who usually present delayed recovery.

The purpose of this study is to evaluate the recovery and postoperative cognitive performance of elderly patients after short duration urological procedures with the use of desflurane or sevoflurane.

Materials and Methods: Forty three patients, of average age 69±4, were included in this study. All were subjected in urological procedures of mean duration 44±15 min. The patients were divided in two groups: in one group the volatile agent of choice was desflurane and in other was sevoflurane. A standardized anesthetic protocol was used, with intravenous Fentanyl 1-1.5 μg/kg and Propofol 1.5-2 mg/kg administered to induce anesthesia. The classical laryngeal mask (c LMA) was placed in all patients. For the maintenance of anesthesia desflurane and sevoflurane were used at MAC 1.0 in oxygen/air mixture (FiO2 = 0.5). The time of spontaneous breathing were recorded after the induction in anesthesia. During recovery the following factors were assessed: 1) time of eye opening, 2) time to verbal command, 3) time of removal of the cLMA and 4) postanaesthesia recovery score (Aldrete score > 8). The evaluation of the cognitive function was done with the use of the Mini Mental State Examination test (MMSE) preoperatively, 1 and 3 h after the awakening.

Results and Discussion: Spontaneous breathing after the induction in anesthesia was accomplished at 5,9±1.6 min in desflurane group and at 8,1±0.7 min in sevoflurane group. The times of eye opening, verbal command and removal of the cLMA in desflurane group were 7,1±1.6 min, 7,8±2.2 min, 8,5±2.5 min and in sevoflurane group were 10,2±1.1 min, 11,2±1.4 min, 13,1±1.4 min respectively. The time of Aldrete score being assessed > 8 in desflurane group was at 10±2.3 min and in sevoflurane group was at 15,1±1.5 min.In both groups we observed a decline in MMSE score at 1 h after recovery, which returned to baseline after 2 h without significant difference between the two volatile anesthetics.

Conclusion(s): The administration of desflurane in elderly patients who are sub- treatedentially bolus doses of rocuronium, 0.15 mg/kg IV, were administered in the group A, however not in the group B. Heart rate (HR) and systolic arterial pressure (SAP), diastolic arterial pressure (DAP), EtCO2, peak inspiratory pressure (PIP), expired minute ventilation (MV), intraabdominal pressure (IAP) and temperature were measured during the pneumoperitoneum.

Results and Discussion: There were no group differences in HR, SAP, DAP, EtCO2, peak inspiratory pressure (PIP), expired minute ventilation (MV), intraabdominal pressure (IAP) and temperature between group A and B.

Conclusion(s): No supplemental neuromuscular blockers are required during propofol and remifentanil total intravenous anesthesia for laparoscopic pelvic surgery.

2AP3-6
Insertion of LMA Unique™ with or without neuromuscular blockade by not experienced residents
P. Bovara, A. Ojeda, A. Bueno, A. López, T. Anglada
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Background and Goal of Study: Mini-doses of muscle relaxants have been reported to improve the insertion conditions of laryngeal mask LMA Classic. New disposable devices made of PVC can be more difficult to place for non trained users. We compared the insertion of LMA Unique with and without mini-doses of neuromuscular blockade by unexperienced residents.

Materials and Methods: A prospective randomized blinded study was conducted. Forty patients were studied in an Ambulatory Surgery Unit and were divided in two equal groups to receive either rocuronium (R) or equivalent volume of normal saline (S). Bispectral Index and neuromuscular blockade were monitored. Anesthesia was induced with propofol (2.5 mg kg-1) and remifentanil (0.1 mg kg-1 min-1). Additional boluses (0.5 mg kg-1) of propofol were administered if needed for LM insertion or BIS values increased above 50. Patients in the neuromuscular blockade group (R; n=20) received 0.2 mg kg-1 of rocuronium and patients from the control group (S; n=20) received the equivalent volume in saline solution. LM were inserted two minutes after induction. All patients were instructed to open their eyes when asked, to verbal command, and when asked to open their mouth. Insertion was evaluated as easy (1) or difficult (2).
insertions were performed by five residents blinded to the use of neuromuscular blockade. Number of attempts, ease of insertion, time needed to mask placement, seal pressure of the LM, airway pressure and complications were recorded.

Results and Discussion: Main results are shown in following table. No differences were found between the groups.

<table>
<thead>
<tr>
<th></th>
<th>R group</th>
<th>S group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of insertion (s)</td>
<td>27.3 ± 14.4</td>
<td>27.7 ± 15.6</td>
</tr>
<tr>
<td>Number of attempts (1-2-3)</td>
<td>17/2</td>
<td>18/1</td>
</tr>
<tr>
<td>Seal Pressure (cm H2O)</td>
<td>21.3 ± 3.71</td>
<td>23.7 ± 6.57</td>
</tr>
<tr>
<td>Airway peak pressure (cm H2O)</td>
<td>13.8 ± 2.2</td>
<td>14.4 ± 3.6</td>
</tr>
<tr>
<td>Blood on mask (minimum/mild/severe)</td>
<td>3/0/2</td>
<td>3/1/2</td>
</tr>
<tr>
<td>Sore throat (minimum/mild/severe)</td>
<td>3/0</td>
<td>1/0</td>
</tr>
</tbody>
</table>

Conclusion(s): Insertion of the LMA Unique by non experienced residents was not improved by mini-doses of rocuronium. No differences in mask insertion, incidence of trauma in the mucosal and sore throat were found.

References:

2AP3-7
Walking spinal anesthesia in day-case inguinal herniorrhaphy: impact of different local anesthetics on discharge criteria
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Background and Goal of Study: Walking spinal is a term defining a new technique of regional anesthesia that is preferred because it gives satisfactory conditions for day-case abdominal surgery and it allows the subject to leave the operating room on foot. The purpose of our study is to evaluate comparatively the influence on discharge criteria of commonly used local anesthetics for day-case inguinal herniorrhaphy patients.

Materials and Methods: Following institutional approval and after written informed consent, 92 ASA I-II subjects, scheduled for day-case hemiorhaphy have been enrolled in our prospective observational study. The patients have been randomly allocated to receive spinal anesthesia with 5 mg bupivacaine 0.5% (group B, n=31), 5 mg levobupivacaine 0.5% (group L, n=31) and respectively 7.5 mg ropivacaine 0.75% (group R, n=30). Each study solution has been injected at L2-L3 interspaces in sitting position over 2 minutes, then the patients have been placed in dorsal decubitus. We have recorded spinal block resolution time, time to micturition, analgesia medication requirements and ability to stand and walk (ASW). Statistical analysis has used chi-square test.

Results and Discussion: Intergroup demographics were similar. All spinal anesthesia procedures were sufficient for planned surgery. Data regarding spinal block regression time, time to micturition, analgesia medication requirements and ability to stand and walk are presented in the following table and do not statistically differ among the groups.

<table>
<thead>
<tr>
<th></th>
<th>Group B</th>
<th>Group L</th>
<th>Group R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain score</td>
<td>7.6 ± 2</td>
<td>7.6 ± 2</td>
<td>7.6 ± 2</td>
</tr>
<tr>
<td>Time of resolution (min)</td>
<td>30.6 ± 5.3</td>
<td>30.6 ± 5.3</td>
<td>30.6 ± 5.3</td>
</tr>
<tr>
<td>Time to micturition (min)</td>
<td>30.6 ± 5.3</td>
<td>30.6 ± 5.3</td>
<td>30.6 ± 5.3</td>
</tr>
</tbody>
</table>

Patients have considered anesthesia conditions to be excellent in proportion of 93.87% (26/31) in group B, whereas patient satisfaction was of 90.32% (28/31) in group L, respectively 93.33% (28/30) in group R, differences that did not reach statistical significance (p > 0.028). Criteria for home discharge were fulfilled after 270 ± 74 min in group B, 235 ± 97 min in group L and 290 ± 87 min in group R (p = 0.28).

Conclusion(s): Equipotent doses of bupivacaine, levobupivacaine and ropivacaine used in walking spinal anesthesia for inguinal hernia repair have similar influences on walk-out criteria. Faster resolution of spinal block for ropivacaine might offer an advantage over levobupivacaine and bupivacaine, even though this fact was not associated with a significant acceleration of home discharge.

2AP3-8
Auricular acupuncture did not reduce intraoperative propofol during day-case arthroscopic knee surgery: A randomised controlled study with non-randomised arm
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Background and Goal of Study: Auricular acupuncture (AA) reduced anaesthetic requirement during general anaesthesia in healthy volunteers (1), however it was not tested in clinical conditions yet. The purpose of this study was to examine if AA can reduce propofol requirement compared to sham acupuncture and standard therapy in patients scheduled to arthroscopic knee surgery (AKS) under general anaesthesia.

Materials and Methods: Patients scheduled to day-case AKS were randomly assigned to receive AA or sham acupuncture according to procedure described elsewhere (2). Patients, who were not asked to participate in interventional study but who matched the inclusion criteria and agreed to use their data for research considered the "standard therapy" group. All study patients received a standardised total intravenous anaesthesia (TIVA) with propofol and remifentanil. The remifentanil infusion rate was kept constant with 0.2 mcg/kg/min, whereas propofol was titrated to keep the values of Bispectral Index (BIS) between 40 and 55, heart rate and blood pressure within 20% of baseline and avoid spontaneous movements. The primary outcome measure was the total amount of propofol administered during the surgery.

Results and Discussion: Of 161 patients included, 144 completed the study. During TIVA for AKS 54 patients from AA group received 7.4 ± 2.3 mg/kg propofol (mean ± SD), 54 patients from sham acupuncture group received 7.6 ± 2.1 mg/kg and patients from "standard therapy" group 8.0 ± 2.1 mg/kg. Although there was a trend among the patients from the latter group to require more propofol, this difference was not statistically significant (P = 0.4; ANOVA).

Conclusion(s): Both auricular and sham acupuncture did not reduce propofol requirement compared to standard therapy during general anaesthesia in patients scheduled to day-case arthroscopic knee surgery.

References:

Monitoring: Equipment and Computers

3AP1-1
The effects of metoclopramide premedication on the neuromuscular blockage of vecuronium and mivacurium
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Background and Goal of Study: In this study we compared the effect of metoclopramide premedication with vecuronium and mivacurium: neuromuscular blockage effects.

Materials and Methods: Eighty patients undergoing elective general surgery operations were enrolled to the study. The patients were grouped according to the premedication of metoclopramide and to the neuromuscular blocking agent used as Group Metoklopramide-Mivacurium (n=20), Group Mivacurium (n=20), Group Metoklopramide-Vecuronium (n=20), and Group Vecuronium (n=20). The neuromuscular blockage was measured by acceleromyography (TOF Quant). Time to maximum blockage (t12%), T25 (min.), T75 (min.), and recovery index (T25-T75) (min.) was enrolled. Student’s t test, Kr Square, repeated measures of ANOVA, posthoc Tukey-Kramer tests were used for statistical analysis. P < 0.05 values were accepted as significant.

Results and Discussion: There were no significant difference in all data we studied.
Recovery index (min) 19.15
T75 (min) 84

of maintaining core normothermia for comfortable and safe extubation but also in plastic surgery forced air warming device and a dynamic air mattress device.

References:

longlasting procedures.
med Warmcloud device is optimally suited to maintain core normothermia for temperature loss and gain during anaesthesia. In this peroperative setting, the Kan-

These observations illustrate the mechanisms involved in tem-

Figure 1. Tympanic temperature.

Conclusion(s): We suggest that neuromuscular functions of the patients med-
icated by metoclopramide and neuromuscular blocking agents should be mon-
tonized during general anesthesia.

3AP1-2
Peroperative temperature management. Comparison of a forced air warming device and a dynamic air mattress device in plastic surgery
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Background and Goal of Study: Patient temperature management repre-
sents one of the cornerstones of optimal peroperative care since the importance of maintaining core normothermia for comfortable and safe extubation but also for preventing wound infection, is well known[1]. This study explores the tem-
perature management and body re-arming capacities of two different patient body warming devices.

Materials and Methods: After institutional ethics committee approval and written informed consent, 30 patients scheduled for pedicu
duct graft reconstructive surgery were randomised to receive peroperative body temperature manage-
tment by either a new system (Kanmed Warmcloud, Kanmed AB Sweden) or the standard forced air warming device (Bair Hugger, Arizant UK). Procedures with a duration of 180 min and beyond were included. Fever, hyper- and hypo-
thesis were exclusion criteria. We compared the lower body Bair Hugger device to the full length Kanmed device. Tympanic temperature, heart rate and systolic, diastolic and mean arterial blood pressures were measured in the bed-
hold area, on arrival in the operation room and from there on every 15 minutes and finally on arrival in the post-anesthesia care unit. During anaesthesia, oes-
ophagical temperatures were also recorded. Parametric statistical analysis was performed using SPSS 14 (SPSS inc. USA).

Results and Discussion: Demographics and haemodynamics were similar be-
tween groups. Tympanic temperature measurements are shown in Figure 1. In both groups, the transferring phase from the bedhold to the operation ta-
table resulted in discrete temperature loss. Subsequently, we found a significant difference of temperature measurements during anaesthesia in the Bairhugger group compared to the Warmcloud group (p=0.05) and a markedly but not significantly lower temperatures on arrival in the PACU.

3AP1-3
Single dose ROCURONIUM as an induction agent in addition to TIVA composing an anaesthetic protocol for neurosurgical operations using MEPs and SEPs monitoring
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Background and Goal of Study: Motor (MEPs) and Somatosensory (SEPs) evoked potentials consist an essential monitoring in neurosurgical operations in order to avoid neurological complications. To achieve best potential response, it is imperative that we follow an anaesthetic protocol of TIVA with single dose neuromuscular agent, no use of nitrous oxide or inhaled agent, normovolaemia and normothermia.

Materials and Methods: We are presenting 40 cases where ROCURONIUM was used on induction in addition to Fentanyl and Propofol. Patients aged 19 to 76 years old ASA 1- 3, coming for operations in brain and spinal cord. These were 24 cases of brain tumors, (meningiomas, gliomas and one case of retinoblastoma), 6 cases of spinal tumors (meningiomas and ependy-

maxas) and 11 cases of microsurgery for prolapsed and hemiated discs. The patients were intubated and ventilated and basic monitoring such as HR, SatO2, IBP and CVP was applied. In all cases additional monitoring with MEPs and SEPs was used. All patients received 1mg/kg ROCURONIUM on induction, in ad-
dition to 2mg/kg Propofol. Anesthesia was maintained with PROPOFOL 6mg/kg/h and REMIFENTANIL 0.5μg/kg/min, AIR and O2. So-
matosensory evoked potentials were monitored right from the beginning of the operation with no difficulty. Two different time – intervals were recorded. TIME 1, was the time interval between intubation and knife to skin time. TIME 2, was the time interval between intubation and first MEPs baseline that neurophysiologist was able to record in each patient.

Results and Discussion: TIME 1 was recorded between 23 and 45 min with a mean value of 38 min. This time interval included all anaesthetic time plus positioning and surgical preparation time. TIME 2 was recorded between 41 and 58 min with a mean value of 47 min. This was the sum of TIME 1 plus the time surgeon needed to approach the lesion. By the time surgeon reached the lesion area, he asked the neurophysiologist to start recording MEPs, fact that requested that the neuromuscular agent to had been eliminated from patient’s circulation.

Conclusion(s): Rocuronium consists a neuromuscular agent that can be safely used in single dose (1mg/kg) as an induction agent in operations were SEPs and MEPS monitoring is necessary. In all cases ROCURONIUM was eliminated by the time surgeon had approached the lesion and MEPs baseline and continuous tracing was recorded.

References:
2. Somatosensory- and motor-evoked potential monitoring during spine and spinal cord surgery.

3AP1-4
A study to compare the accuracy and suitability of two methods of temperature measurement in the peri-operative setting
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Background and Goal of Study: Closer management of peri-operative temp-
erature can improve patient outcome[1] but is reliant on the accuracy of tem-
perature measurement. An ideal temperature monitor would be accurate, non-
invasive and able to produce readings throughout the peri-operative period. Oesophageal probes (OP) are widely but can produce unreliable data, such as when they are sited in the naso-pharynx. Furthermore there is a small risk of nasal trauma on insertion and they are not suitable for pre- or post-operative use. The temporal artery scanner (TAS) is a novel, non-invasive temperature monitor which can be used throughout the peri-operative period but its accu-
racy has not been tested this setting. The ‘gold standard’ comparator for any evaluation of temperature measurement devices would be the pulmonary artery catheter (PAC). However, these have high rates of associated complications so we used urinary catheters (UC) with integral temperature thermistors as their accu-
racy with respect to PAC has been demonstrated during surgery[2]. Our goal was to determine the accuracy and suitability of the two methods of temperature measurement (OP and TAS) during surgery by comparing them to temperatures obtained from the bladder.

Materials and Methods: Fifteen patients were recruited to a prospective com-
parative study. OP and UC thermistors were inserted after induction of anes-
thesia. Non-invasive TAS measurements were taken using the Exergen ther-
moscan. For each patient we recorded temperatures each of the three methods at six time-points during surgery.

Figure 1. Tympanic temperature.

Conclusion(s): These observations illustrate the mechanisms involved in tem-
perature loss and gain during anaesthesia. In this peroperative setting, the Kan-
med Warmcloud device is optimally suited to maintain core normothermia for longstanding procedures.

References:
Results and Discussion: Observed body temperatures were similar for UC [median 36.2°C (range 35.3–38.2°C)] and TAS [36.2°C (35.6–37.6 °C)] (p=0.188 by Wilcoxon test), but OP values were lower [36.1°C (35.8–38.3°C)] (p=0.05). As expected, correlations between the techniques were high (Spearman’s rho = 0.70 comparing Bladder and TAS and 0.64 comparing Bladder and OP; all p<0.001). Bland-Altman limits-of-agreement analysis showed that TAP gave similar results to Bladder whereas the OP values suggested greater bias and imprecision.

Conclusion(s): The temporal artery scanner appears to avoid the bias associated with oesophageal thermistors when measuring temperatures intraoperatively and so may be helpful during the thermal management of patients in the peri-operative period.

Disclosure: The temporal artery scanners and urinary catheters were provided by Exergen, the manufacturers of the scanners.

References:

3AP1-5
Using an endotracheal tube with integral EMG electrodes to monitor recurrent laryngeal nerve
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Anesthesiology, Montefiore Medical Center, Bronx, New York, USA

Background and Goal of Study: Injury to the recurrent Laryngeal Nerve (RLN) during Anterior Cervical Discectomy and Fusion (ACDF) is a known complication. This study is intended to investigate the normative baseline values for background electromyography (EMG) activity during different phases of the operation under total intravenous anesthesia (TIVA). The study also monitors EMG changes before and after placement and opening of self-retaining retractors and provides reliable information to surgeon to prevent RLN injury intraoperatively.

Materials and Methods: 34 patients underwent ACDF, with either cervical myelopathy or radiculopathy, their RLN EMG were recorded using the NIM™ EMG ET tube. All patients received awake fiberoptic intubations, followed with bite block placement. The anesthesia is maintained with propofol 120 to 250 (mcg/kg/min) and Fentanyl 50 to 100 (mcg/hour) intravenously. The ET tube cuff was routinely deflated after retractor placement. The activity (“alert”) was not reported to the surgeon unless there were sustained discharges for more than 10 seconds, exceeding a threshold of 50 μV amplitude, and frequency higher than 70 Hz. Patients were asked to complete a postoperative speech and swallow function questionnaire. Postoperative pharyngeal examination was performed to assess for vocal cord paresis.

Results and Discussion: In all 34 cases, transient increased EMG activity (less than 10 seconds) occurred coincidentally with placement of retractors, and manipulation of ET tube or its cuff. There were 9 cases have met the “alerts” criteria by monitoring RLN. Their responsive amplitudes remain to baseline values in 4 cases; returned upon increase of anesthesia drugs in 2 cases. Three weeks after surgery found no instances of RLN injury among all these patients. ET tube manipulation, placement of retractor, and depth of anesthesia may affect EMG activity on RLN during ACDF surgery.

Table 1. Categorical results

<table>
<thead>
<tr>
<th>Intraoperative</th>
<th>Transient activity</th>
<th>Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Exposure</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>Retractor Positioning</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Cuff de/relation</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>Closing to baseline</td>
<td>34</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>9</td>
</tr>
</tbody>
</table>

Conclusion(s): Monitoring RLN activity during ACDF surgery under TIVA can provide navigating information to surgeon to prevent RLN injury. It is worth to mention that the relationship between TVA and RLN monitoring is remained to be investigated in future.

3AP1-6
Impact of artefacts during routine ECG recording for analysis of heart rate variability
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Background and Goal of Study: Measurement of heart rate variability (HRV) based on electrocardiogram (ECG) recording is an important tool for non-invasive investigation of autonomic nervous system activity. Basically, ECG recordings from routine anaesthesia monitors (e.g. Datex A/V, Datex Ohmeda, Helsinki, Finland) are sufficient for data acquisition. A crucial factor is the reliable detection and elimination of artefacts from the raw ECG. We developed an independent software for artefact detection and elimination of standard ECG recordings.

Materials and Methods: 20 conventional ECG recordings of short term intervals of 5 minutes were collected from healthy volunteers. Data was analyzed by our software (i) without artefact detection and elimination (ART) and (ii) with implementation of automatic artefact detection and elimination (CLEAN). Subsequent HRV analysis was based on fast Fourier transformation (FFT). HRV parameters of both groups were compared with Student’s t-test.

Results and Discussion: Mean values of HRV parameters of group ART demonstrated significant differences compared to group CLEAN: Total Power: ART: 2921±2758 vs. CLEAN: 965±873 (p<0.05); Low Frequency: ART: 690±775 vs. 200±189 (p<0.05); High Frequency: ART: 1295±1733 vs. CLEAN: 163±122 (p<0.05). Two typical spectral analysis of the same ECG interval before and after automatic artefact detection and elimination are shown in Figure 1 (ART) and 2 (CLEAN).
3AP1-7
MUSTIMEG: A new device for polytopic EMG as peroperative neuromuscular monitoring
N. Van Gutsem, T. Tuna, M. De Bel, F. Cantraine, A. Vandesteen
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Background and Goal of Study: Monitoring neuromuscular transmission (NMT) during anesthesia appears to be essential when using muscles relaxants (MR). Nevertheless muscles differ in their sensitivity, onset, offset and peak effect in response to MR. Several studies show that the eyes muscles like the orbiculare oculi reflect the response of laryngeal muscles, diaphragm and more central muscles, whereas peripheral muscles are the latest ones to relax and to recover. To study the difference between the pharmacodynamics of those muscles, we developed “MUSTIMEG” a configurable device enabling us to stimulate through Mechtrix, TOF, Tetanos, etc., to provide us with the usual ratios (T1/T0, T4/T1, S1/S0, ...) and to display continuously the evoked electromyogram (EMG). By using as many devices as the number of sites investigated, we are able to collect polytopic data.

Materials and Methods: “MUSTIMEG” was used on ASA 1-2 patients under general IV anesthesia (propofol) and administration of a bolus dose of mivacurium (0.2mg/kg) during ear and nose surgery. The stimulator delivered square wave pulses lasting 0.2 msec given at supramaximal intensity (25-75 mA) at different levels of frequencies (1Hz for single twitch and 2Hz for train of four) every 12 seconds.

Results and Discussion: We obtain simultaneously the response from each site (abductor of the hand and foot, and the orbiculare oculi). Figure 1 demonstrates respective amplitudes and delays between stimulation artefacts and related EMG. From those EMGs, we derive and display the usual peak to peak amplitude ratios T1/T0 and T4/T1 and surface ratios. Figure 2 presents a typical T1/T0 ratio upon time, illustrating curarisation and recovery on our set of patients.

Figure 1

Figure 2

MUSTIMEG provides reliable and accurate measurement of the eyes, hand and foot muscular activities for polytopic NMT monitoring. Accurate control of the adequate wished level of NM block for intubation, surgical procedure and recovery will be avaiable to avoid residual neuromuscular blocks.

Conclusion(s): Availability of MUSTIMEG will enable us to compare the pharmacodynamic of many surface muscles.

Acknowledgements: We wish to thank “la Region wallonne” for its contribution to this project under convention n°516160.

3AP1-8
Acceleromyography for neuromuscular block monitoring in the postanaesthesia care unit
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Background and Goal of Study: Accelerometry is not always accurate and its reliability has never been demonstrated for neuromuscular block (NMB) monitoring in the postanaesthesia care unit (PACU). The aim of the study was to evaluate the performance of acceleromyography for neuromuscular monitoring in the PACU.

Materials and Methods: After Ethical Committee approval and informed consent, a total of 79 patients recovering from anaesthesia were prospectively enrolled in our study. Immediately after arrival in the PACU the ulnar nerve was stimulated with train-of-four (TOF) stimulation. The evoked response at the thumb was measured using acceleromyography (AMG) and electromyography (EMG). One TOF stimulation was applied using AMG on the right arm and another TOF stimulation was applied using EMG on the right arm immediately thereafter (<30s interval). The same tests were performed on the contra lateral arm but in an inverse order. The agreement between methods was tested by calculation of the bias, the precision and the limits of agreement using the Bland-Altman method. The Kappa (κ) test for clinical agreement between the measurements was calculated. The differences were considered as statistically significant when P < 0.05.

Results and Discussion: When measuring TOF ratios using EMG after AMG, the bias and the precision were 12.7±20.4% and 16.9±16.9% respectively. The limits of agreement were -12.7% to 20.4% and 15.2% to 17.8% respectively. The limits of agreement were -27.1% to 52.2%. The κ test indicated a poor agreement (κ = 0.31). When the same tests were performed on the contra lateral arm but in an inverse order, the bias and the precision were 12.7±20.4% and 16.9±16.8% respectively. The limits of agreement were -12.7% to 52.6%. The κ test indicated a poor agreement (κ = 0.18).

Conclusion(s): Due to wide limits of agreement and to a poor repeatability between paired TOF ratios acceleromyography is not an accurate representation of the neuromuscular status of the patient recovering from anaesthesia.

References:

3AP1-9
Comparison of acceleromyography and electromyography for neuromuscular block monitoring in the postanaesthesia care unit
H. Vilela, C. Barreiros, M. Esquivel, R. Fragoso, T. Egidio
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Background and Goal of Study: Acceleromyography devices are well suited for neuromuscular block monitoring in the postanaesthesia care unit (PACU), however their reliability has never been demonstrated.1 When studying neuromuscular monitoring techniques there may be a substantial variation between simultaneous recordings of neuromuscular transmission obtained in contra lateral arms.2 Previous studies also did not take into consideration the potential error introduced by using sequential ipsilateral measurements. The aim of the study was to evaluate the performance of acceleromyography compared to electromyography, when performed sequentially on the same arm.

Materials and Methods: After Ethical Committee approval and informed consent, a total of 79 patients recovering from anaesthesia were prospectively enrolled in our study, immediately after arrival in the PACU. The ulnar nerve was stimulated with train-of-four (TOF) stimulation. The evoked response at the thumb was measured using acceleromyography (AMG) and electromyography (EMG). One TOF stimulation was applied using AMG on the right arm and another TOF stimulation was applied using EMG on the same arm immediately thereafter (<30s interval). The same tests were performed on the contra lateral arm but in an inverse order. The agreement between methods was tested by calculation of the bias, the precision and the limits of agreement using the Bland-Altman method. The Kappa (κ) test for clinical agreement between the measurements was calculated. The differences were considered as statistically significant when P < 0.05.

Results and Discussion: When measuring TOF ratios using EMG after AMG, the bias and the precision were 12.6±20.2% and 15.7±17.8% respectively. The limits of agreement were -27.1% to 52.2%. The κ test indicated a poor agreement (κ = 0.31). When the same tests were performed on the contra lateral arm but in an inverse order, the bias and the precision were 12.7±20.4% and 16.9±16.9% respectively. The limits of agreement were -12.7% to 52.6%. The κ test indicated a poor agreement (κ = 0.18).

Conclusion(s): Due to wide limits of agreement acceleromyographic and electromyographic recordings of neuromuscular transmission cannot be used interchangeably. Acceleromyographic TOF values tend to underestimate the extent of electromyographic recovery.

References:

3AP2-1
SVV (stroke volume variation) elevation during aortic cross clamp is a possible indicator for the prognosis of abdominal aortic aneurysm surgery
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Background and Goal of Study: Florot, a newly developed cardiac output
Conclusion(s): Older and had higher blood pressure, which indicates that they had more severe vascular compliance and characteristics. The three patients were significantly older (83.7 yo vs 70.7 yo) and had higher blood pressure (systolic pressure 155 mmHg vs 117 mmHg) and a longer hospital stay (44.6 days vs 15.5 days) compared with the other patients. In the Frotac system, there is an algorithm factor $\chi$ based on the reference subjects including the major vascular compliance and peripheral vascular characteristics. Thus the cardiac output and SVV are affected by the vascular compliance and characteristics. The three patients were significantly older and had higher blood pressure, which indicate that they had more severe atherosclerosis. Major vascular compliance is changed considerably at the aortic cross clamp in patients with severe atherosclerosis. This is one reason for the SVV elevation during the cross clamp. Our results suggest that the SVV elevation during the cross clamp indicates the severity of the atherosclerosis and the prognosis.

Conclusion(s): SVV elevation during aortic cross clamp is a possible indicator for the severity of atherosclerosis and the prognosis.

### 3AP2-2

**Title:** Placing saline bag during cardiac positioning and stabilization enhances transesophageal echocardiographic monitoring in off-pump coronary artery bypass surgery

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**Background and Goal of Study:** During cardiac displacement for off-pump bypass (OPCAB) surgery, the presence of air between the displaced heart and the diaphragm usually compromises the transesophageal window for transesophageal echocardiography (TEE).

**Materials and Methods:** In thirteen OPCAB patients requiring anastomoses to the left circumflex coronary artery (LCX), mesoepigastric (ME) and TG TEE images of the 16-segment model to determine the left ventricular segment wall motion (SWM) were recorded during harvesting vascular grafts (T-control), during positioning and stabilization of the heart for LCX grafting (T-displaced), and during further positioning after placing a saline bag underneath the displaced heart (T-saline bag). The number of readable segments (NRS) and the incidence of inadequate SWM monitoring (ISM = NRS < 14/16) were determined by off-line analysis.

**Results and Discussion:** NRS from ME and TG views at T-saline bag (16 [16-16]) was significantly greater than those from ME views only at T-control (15 [15-16]) and at T-displaced (14 [11-15]), and those from both ME and TG views at T-control (16 [15-16]) and at T-displaced (15 [13-16]) ($p < 0.05$). ISM at T-control, T-displaced and T-saline bag from ME and TG views, were $0/13$, $3/13$ and $0/13$ respectively ($p = 0.038$, degree of freedom $= 2$, $\chi^2 = 6.5$), and ISM at T-control, T-displaced and T-saline bag From ME views only were $2/13$, $3/13$ and $0/13$ respectively. The present study shows that placing a saline bag underneath the displaced heart during LCX grafting enhances ultrasonic transmission between the heart and diaphragm and increases the number of readable segments.

### Table 1. Number of readable segments in 16-segment model

<table>
<thead>
<tr>
<th></th>
<th>ME views only</th>
<th>ME and TG views</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-control</td>
<td>15 (15-16)</td>
<td>16 (15-16)</td>
</tr>
<tr>
<td>T-displaced</td>
<td>14 (11-15)</td>
<td>15 (13-16)</td>
</tr>
<tr>
<td>T-saline bag</td>
<td>16 (13-16)</td>
<td>16 (16-16)</td>
</tr>
</tbody>
</table>

Data: median (range). $p < 0.05$ compared with ME views only at the same period. $p < 0.05$ compared with that by ME and TG views at T-control. $p < 0.05$ compared with that of by ME and TG views at T-displaced.

### 3AP2-3

**Title:** An echocardiographic evaluation of cardiac consequences during laparoscopic hysterectomy

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**Results and Discussion:** Our results showed that the stroke volume and left end-diastolic volume (LVEDV) of the left ventricle decreased significantly after CO2 insufflation in the LH group, but no reduction in cardiac output and ejection fraction was observed. The CO2 pneumoperitoneum and the head-down tilt did not affect the HR, MAP increased at the beginning of laparoscopy in comparison with the pre-laparoscopy values. In either group the diastolic filling times showed a progressive reduction of mitral A and E peak waves and a prolonged deceleration time (DT) of early ventricular filling. However, volume status, as suggested by EDA, did not change.

**Conclusion(s):** In conclusion, we found that carbon dioxide pneumoperitoneum had major effects on the stroke volume and on the left end-diastolic volume, probably due to a reduction of preload. In the Trendelenburg position we observed a significant increase of SV and LVEDV only in the COH group, as a consequence of an augmented preload. Thus we suppose that the laparoscopic procedures and the Trendelenburg position cause a slowed time of the diastolic ventricular filling without any increase of intravascular pressures.

### 3AP2-4

**Title:** Prediction of fluid responsiveness by FloTrac™ and PICCOPlus™ after elective cardiac surgery

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Trienn City Hospital, Institute of Anaesthesiology and Intensive Care Medicine, Zurich, Switzerland

**Results and Discussion:** We performed in 40 ASA III patients after elective off-pump coronary artery bypass grafting. The following variables were recorded before and after volume shift induced by 30° head-up tilt (from 30° head-up to 30° head-down): SVWVmean, SVWVCO2, pulse pressure variation (PPV), central venous pressure (CVP), global end-diastolic volume (GEDV) and stroke volume (SV). T-test, Pearson correlation, Bland-Altman Analysis were calculated and area under the curve (AUC) by plotting receiver operating characteristics curves (ROC) for SV changes (ΔAUC) compared with ME views only at the same period.

**Conclusion(s):** These results suggest that placing a saline bag underneath the displaced heart enhances TEE’s ability to monitor SWM during OPCAB surgery.
Results and Discussion: Body positioning resulted in a significant increase of SV, GEDV and CVP, whereas SWpmax, SWpccdo and PPV significantly decreased. In 23 patients (58%) SV was > 25%. Comparably strong correlations between baseline SWpmax/SWpccdo and ΔSV were observed (Table 1). Best AUC was found for SWpmax and SWpccdo, optimal threshold value given by the ROC curves was 9.6% for SWpmax and 12.1% for SWpccdo. Mean bias 2SD for SWpmax-SWpccdo was -2.5 ± 6.2%, Pearson correlation coefficient (r²) was 0.72 (p<0.001).

Table 1. ROC curves predicting ΔSV > 25% and Pearson correlations for baseline indices vs. ΔSV

<table>
<thead>
<tr>
<th>Metric</th>
<th>AUC</th>
<th>95%CI</th>
<th>p</th>
<th>r²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWpmax</td>
<td>0.824</td>
<td>0.680/0.967</td>
<td>0.001</td>
<td>0.426</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SWpccdo</td>
<td>0.856</td>
<td>0.745/0.971</td>
<td>&lt;0.001</td>
<td>0.492</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PPV</td>
<td>0.718</td>
<td>0.578/0.898</td>
<td>0.011</td>
<td>0.334</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>GEDV</td>
<td>0.509</td>
<td>0.323/0.695</td>
<td>0.924</td>
<td>0.391</td>
<td>0.580</td>
</tr>
<tr>
<td>CVP</td>
<td>0.299</td>
<td>0.134/0.465</td>
<td>0.632</td>
<td>0.110</td>
<td>0.073</td>
</tr>
</tbody>
</table>

Conclusion(s): SW assessed by FloTrac and PiCCOpus showed a comparable performance in predicting fluid responsiveness in patients after cardiac surgery. When compared to the SWpccdo a lower threshold value for SWpmax has to be considered.

Disclosure: Study grants from Edwards Lifesciences and Pulsion Medical Systems.

References:

3AP2-5
Could PulseCO™ monitor be used as cardiac output monitoring tool in major vascular surgery? Presentation of "off-line" validation method of the arterial pulse wave derived cardiac output monitor
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Background and Goal of Study: PulseCO™ monitor (manufactured by LDDC Ltd., distributed by Nipro Inc in Japan) is a hemodynamic monitor which calculates cardiac output from arterial pulse waveform. However in the situation when characteristics of vascular system changes, such as surgery of thoracic aorta, the manufacturer states that precision of cardiac output is uncertain. We sought to investigate whether PulseCO monitor could be used in aortic surgical by comparing cardiac output value to conventional thermomethod in aortic arch replacement surgery.

Materials and Methods: 20 consecutive cases of total aortic arch replacement surgery for non-dissecting aortic aneurysm were enrolled for our study. Cardiac output by thermomethod was obtained during the surgery. Pulse waveform of radial and femoral artery were also recorded by anesthesia monitoring system. We developed the system including computer software and electronic circuit with a link to PC and PulseCO monitor. This system convert recorded waveform to an electrical signal which met the input requirement of the monitor. We transferred stored arterial waveform to the monitor through the system and calculated cardiac output value was recorded. We compared the cardiac output at the period of anesthesia induction and every hour after termination from cardiopulmonary bypass (CPB).

Results and Discussion: Bland-Altman Analysis was performed. Result of Limit of agreement of before CPB, just after CPB, and after 1h and 2h was -1.61 to 1.48 l/min/m², -2.15 to 2.35 l/min/m², -1.95 to 2.35 l/min/m², -1.50 to 2.27 l/min/m² and bias is 0.12 l/min/m², 0.10 l/min/m², 0.20 l/min/m², 0.38 l/min/m² respectively.

Table 1. Result of Bland-Altman analysis

<table>
<thead>
<tr>
<th>Limit of Agreement (l/min/m²)</th>
<th>Before CPB</th>
<th>Just after CPB</th>
<th>After 1h</th>
<th>After 2h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bias (l/min/m²)</td>
<td>0.12</td>
<td>0.10</td>
<td>0.20</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Conclusion(s): Our result revealed that wide range of discrepancy between each monitor was noted especially at the period of separating from CPB. Limit of Agreement between each monitor has a tendency to narrow after CPB. We assume PulseCO monitor could be used in postoperative management of thoracic aortic surgery. Our study method does not require simultaneous cardiac output monitoring during the operation and also show another utility of storing arterial waveform feature which is equipped in anesthesia monitoring system.

3AP2-6
Relationship between accuracy of arterial based cardiac output and systemic vascular resistance during liver transplantation
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Background and Goal of Study: Arterial based cardiac output (APCO) measurement is newly introduced technique which measure cardiac output from arterial pressure waveform. FloTrac™ System (Vigileo™ Monitor and FloTrac™ Sensor, Edwards Lifesciences LLC, CA, USA) is one of these monitors and is less invasive compared to other method such as continuous cardiac output (CCO) measured by pulmonary arterial catheter (PAC). Their accuracy is already reported and is thought to be acceptable. But from our experiences, FloTrac™ tends to underestimate cardiac output in certain conditions when peripheral pulse pressure no longer reflects central pulse pressure. Such conditions include severe sepsis or post-liver transplantation and are characterized by hyperdynamic circulation and low systemic vascular resistance (SVR). In this study, we measured APCO and CCO simultaneously to investigate whether SVR affect the accuracy of APCO measurement.

Materials and Methods: We retrospectively analyzed the data of patients who underwent liver transplant surgery in Kyushu University Hospital. Anesthesia was maintained with fentanyl and isoflurane. All patients were underwent pressure-controlled mechanical ventilation with mixed oxygen. In addition to standard hemodynamic monitoring, cardiac output was measured by arterial pulse contour analysis using FloTrac™ and by PAC (Swan-Ganz™, Edwards Lifesciences LLC, CA, USA). The data were expressed as means SD. Pearson’s product moment correlation (p) and Spearman’s rank correlation (r) were used for linear regression analysis. P<0.05 was considered statistically significant.

Results and Discussion: We obtained data from 5 patients. There was no complication during measuring APCO. From this study, no significant relationship was found between CO/APCO and SVR. However, CO tends to show 50% greater value compared to APCO when SVR decreased to 500 dyne sec cm⁻².

Conclusion(s): It was suggested that APCO may not be reliable in patients when SVR remarkably decreased.

3AP2-8
Reliability of esophageal echo-doppler cardiac output measurements in patients undergoing liver transplantation: Relevance of MELD score
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Background and Goal of Study: Determination of Cardiac Output (CO) is crucial for perioperative monitoring of liver transplant (LT) recipients in which important variations of blood volume and CO occur. The purpose of this study was to evaluate the use of esophageal echo-doppler (EED) device in the OLTx setting compared with standard pulmonary artery catheter (PAC) technique. Comparison of the two techniques has taken into account the severity of liver candidate recipients defined by multiple end stage liver disease score (chemical MELD) (MELD<15 = GI; 15< MELD<29 = GII; MELD>29 = GIII).

Materials and Methods: After approval of the local ethics committee and written informed consent, 42 adult patients scheduled for liver transplantation were included in the study. Paired measurements of CO by EED and PAC were obtained at standard times. 1) after tracheal intubation; 2) after laparotomy; 3) during heparinization; 4) just before veno-venous bypass (VVB); 5) at beginning of WBP; 6) during VVB; 7) at the end of portal bypass; 8) after venous reperfusion; 9) after arterial reperfusion; 10) at the end of surgery, statistical analysis over results were performed by ANOVA regression analysis and blood Allman blot.

Results and Discussion: The main haemodynamic results are summarized in Table 1.

Table 1

<table>
<thead>
<tr>
<th>GI</th>
<th>GII</th>
<th>GIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>CO</td>
<td>6.75</td>
<td>1.87</td>
</tr>
<tr>
<td>Rel error</td>
<td>1.66</td>
<td>8.1</td>
</tr>
<tr>
<td>bias</td>
<td>0.12</td>
<td>0.55</td>
</tr>
</tbody>
</table>

*p<0.05 compared to group I (GI).
EED underestimated CO PAC and mean bias of pooled data was 0.34±0.90.

Conclusion(s): Even if EED exhibited a limited precision (limits of agreement...
3AP2-9
Arterial pressure waveform analysis for less invasive determination of the cardiac output (FloTrac/Vigileo™): A comparison with bolus pulmonary artery thermodilution in patients undergoing cardiac surgery

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Background and Goal of Study: A recently introduced device without the need of invasive calibration (FloTrac/Vigileo™, Edwards Lifesciences, Irvine, CA) bases continuous CO calculations on arterial waveform characteristics using standard arterial access in combination with demographic data. We designed this study to assess the performance of the arterial pressure waveform device with latest software refinements compared with bolus pulmonary artery thermodilution in patients undergoing cardiac surgery intraoperatively and in intensive care unit (ICU).

Materials and Methods: Forty ASA III patients scheduled for elective coronary artery bypass grafting (CABG) with cardiopulmonary bypass (CPB) were studied. Patients with permanent cardiac arrhythmias, valvular dysfunction and the need of mechanical cardiac support were excluded. Simultaneous CO measurements by bolus thermodilution and the FloTrac/Vigileo™ device were obtained after induction of anaesthesia (T1), before CPB (T2), after CPB (T3), after sternal closure (T4), on arrival in the ICU (T5), 4h (T6), 8h (T7) and 24h after surgery (T8). CO was indexed to the body surface area (cardiac index, CI). A percentage error of 30% or less was determined for method interchangeability [1].

Results and Discussion: A total of 282 data pairs were analyzed. Thermolodulation CI values ranged from 1.2 to 4.1 L min⁻¹ m⁻² (mean 2.5 ± 0.54 L min⁻¹ m⁻²). Bias and precision (1.96 SD of the bias) were 0.19 L min⁻¹ m⁻² and ± 0.61 L min⁻¹ m⁻² resulting in a percentage error of 24.6% (Figure 1). Subgroup analysis revealed a percentage error of 28.3% for data pairs obtained intraoperatively (T1-T4) and 20.7% in ICU (T5-T8). In data pairs during low cardiac output (CI ≤ 2.0 L min⁻¹ m⁻²), a percentage error of 27.9% was found.

Conclusion(s): CI values obtained by the second generation, software improved semi-invasive arterial waveform device showed good intraoperative and postoperative agreement with intermittent pulmonary artery thermodilution CI measurements in patients undergoing CABG surgery.

Figure 1. Bland-Altman analysis of cardiac index obtained by arterial pressure waveform analysis (CI_PA) and pulmonary artery thermodilution (CI_PA) for all enrolled patients. Lines represent bias and precision (bias ± 1.96 SD).

References:

3AP2-10
Validation of a new continuous non-invasive arterial pressure device in post-surgical patients

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Background and Goal of Study: Many of our post-operative critical patients have an indwelling arterial catheter in place in order to monitor the invasive arterial pressure. Several devices have been developed to monitor the continuous arterial pressure in a non-invasive fashion in the last years, becoming none of those useful at the clinical practice. In this settings this study introduce a new device, CI-VAP® (Dräger Medical Systems, Inc.) which stands for Continuous Non-invasive Arterial Pressure. This monitoring offers a pressure value beat by beat along with a continuous pressure wave. This study will evaluate its precision and usefulness comparing it with the continuous invasive arterial pressure (iAP).

Materials and Methods: After written informed consent obtention blood pressure were evaluated using both methods simultaneously in postoperative adult stable patients recovering at our unit with an arterial indwelling catheter placed in the operating room. Four repeated measurements were obtained from each one for averaging. Measurements for arterial blood pressure for iAP and CIAP were correlated using the Pearson correlation coefficient. Bias and precision were also calculated. Bland-Altman plots were constructed of systolic, diastolic and mean arterial blood pressures to value graphically the data for agreement between the two methods and to determine the 95% confidence limits [1]. A twotailed p<0.05 was considered significant.

Results and Discussion: 30 patients were enrolled in the study and 3 were excluded because patient negative or unstableness. The Pearson correlations between both methods were significant for systolic, diastolic and mean pressures, r=0.53 (p=0.004), r=0.66 and r=0.64 (Figure 1) respectively (p<0.001). The 95% confidence intervals (Figure 2) show us that the mean difference for mean values (1.32±9.51).

Figure 1
The interchangeability of both methods relay on the assumption of a 95% confidence interval between ±18 mmHg.

Conclusion(s): Both methods for arterial pressure monitoring can be used in this setting assuming the wide confident interval that could be of clinical relevance. On the other side a continuous non-invasive pressure wave can be obtained.

References:

3AP2-11
Semi-invasive monitoring of cardiac output by a new device using arterial pressure waveform analysis. A comparison with intermittent pulmonary thermodilution in renal transplantation

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Background and Goal of Study: Clinical significance of PA catheter is controversial. We compared a new, semi-invasive device (FloTrac/Vigileo™) using
arterial pressure waveform analysis for CO measurement in patients undergoing renal transplantation with bolus thermodilution measurement. Simultaneously COO was measured, we compared COO with bolus thermodilution measurement.

Materials and Methods: Twenty seven patients undergoing renal transplantation enrolled. A PAC was inserted and radial arterial access was used for semi-invasive determination CO (APCO) with the Vigileo. CO was measured simultaneously by bolus thermodilution and the Vigileo technique and after starting of operation, volume loading, before surgery, and other points were measured over 1 hour during measurements. And COO was measured simultaneously at all points. Statistical analysis: Statistical analysis was performed using the method described by Bland and Altman. Bias was defined as the mean difference between pulmonary artery thermodilution and arterial pressure waveform analysis. Precision was presented by the upper and lower limits of agreement.

Results and Discussion: Demographics; Mean of Age was 43 years old, mean height was 165 cm and weight was 66 kg. Regression analysis of CO/APCO and ICCO = 0.8454 and 0.5085 R2 = 0.6142 COO and ICCO2 = 0.4382 and 0.6301 R2 = 0.7777 Average of APCO and ICCO; Bias = 0.57 SD = 1.47Average of ICCO and ICCO; Bias = 0.49 SD = 1.12

Conclusion: In renal transplantation, CO measured by a new semi-invasive arterial pressure waveform analysis device showed good agreement with intermittent pulmonary artery thermodilution measurement.

Disclosure: In renal transplantation, CO measured by a new semi-invasive arterial pressure waveform analysis device showed good agreement with intermittent pulmonary artery thermodilution measurement.

3AP3-1 Evaluation of six pulse oximeters in the environment of neuronavigation

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Department of Anesthesiology, Critical Care and Pain Medicine, Saarland University Hospital, Homburg, Saar, Germany

Background and Goal of Study: Pulse oximeters are considered a standard of care for monitoring anesthesia procedures. However, these monitors may be susceptible for different kinds of disturbances. Recently, a case reports suggested that the equipment used for neuronavigation could be a cause of interference with pulse oximeter accuracy. In this study, we evaluated the effect of a neurological image guidance system on the performance of six different pulse oximeters. Further, simple shielding methods were evaluated.

Materials and Methods: After approval by the institutional review board, twenty healthy, adult, non-smoking volunteers (department staff) were equipped with six different pulse oximeters on both hands. Interference between the probes was prevented by using plastic shielding between each finger. Baseline values for heart rate, arterial oxygen saturation and signal quality were assessed. After activation of the Brain Lab VectorVision Neuronavigation System, brought into position at 100 cm above both hands with an unobstructed view on the finition in all subjects with almost all monitors.

Results and Discussion: Longevity of CO2 absorbent was 486±11 minutes in control-D8, 435±9 minutes in control-DF and 357±27 minutes in Control-AP, TGR-DF (583±12 minutes) was 30% increase in longevity than Control-DF, TGR-D8 (813±16 minutes) was 27% increase than Control-D8, but TGR-AP (420±13 minutes) was only 17% increase than Control-AP. Before the experiments, water content of each group of CO2 absorbent was approximately 16%. At the end of the experiment, the water content of CO2 absorbent at the outside-top of the canister increased excessively to 32.5±0.7% in control-DF, but increased only to 20.4±0.4% in control-AP. Similarly, that in control-D8 less increased to 28.5±0.8% than control-DF or control-AP, and that in TGR-D8 increased to 25.3±0.7% (p<0.01) only a 3% difference with control-DF.

Conclusion: Infrared pulse waves from neurosurgical navigation equipment may interfere with the accuracy of pulse oximeters. This effect may be abolished by using plastic shielding between each finger. Baseline parameters. Activation of the image guidance system resulted in a significant change in all monitors. After the induction of anesthesia, mechanical ventilation was set at a respiratory rate of 12 breaths/min, and tidal volume was adjusted to 700 ml. All values are shown as means ± SD. The findings were compared by a one-way analysis of variance (ANOVA), followed by a Bonferroni multiple comparison test. Statistical significance was defined as p<0.05.

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Conclusion: Infrared pulse waves from neurosurgical navigation equipment may interfere with the accuracy of pulse oximeters. This effect may be abolished by using plastic shielding between each finger. Baseline parameters. Activation of the image guidance system resulted in a significant change in all monitors. After the induction of anesthesia, mechanical ventilation was set at a respiratory rate of 12 breaths/min, and tidal volume was adjusted to 700 ml. All values are shown as means ± SD. The findings were compared by a one-way analysis of variance (ANOVA), followed by a Bonferroni multiple comparison test. Statistical significance was defined as p<0.05.

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Conclusion: Infrared pulse waves from neurosurgical navigation equipment may interfere with the accuracy of pulse oximeters. This effect may be abolished by using plastic shielding between each finger. Baseline parameters. Activation of the image guidance system resulted in a significant change in all monitors. After the induction of anesthesia, mechanical ventilation was set at a respiratory rate of 12 breaths/min, and tidal volume was adjusted to 700 ml. All values are shown as means ± SD. The findings were compared by a one-way analysis of variance (ANOVA), followed by a Bonferroni multiple comparison test. Statistical significance was defined as p<0.05.
**3AP3-4**

**Predictive performance of an open-loop controller for sevoflurane with minimal fresh gas flow**


Department of Anesthesiology, Santa María del Rosell University Hospital, Cartagena, Murcia, Spain

**Background and Goal of Study:** The aim of this prospective study was to assess the predictive performance of an open loop controller for sevoflurane (sevo). The algorithm was derived from Hendrickx’s uptake model.

**Materials and Methods:** After IRB approval and informed consent, 10 ASA I–III patients, aged 30–69, scheduled for surgery were included. Heavy smokers and the morbidly obese were excluded. All patients were premedicated with midazolam (2 mg). After preoxygenation for 3 minutes, induction was performed with propofol (2.6 mg/kg), remifentanil, bolus (0.1 mcg/kg/min) and infusion (0.2 mcg/kg/min) and norcuronium (0.6 mg/kg). After tracheal intubation, the fresh gas flow was reduced to 0.5 L min$^{-1}$ of O$_2$ and the infusion of sevo was initiated adjusting the MAC according to the age and body surface in order to keep a concentration of 0.5±0.6 MAC. Through software developed with LABVIEW 6.0 (National Instruments), we controlled the infusion pump (Harvard Apparatus 22) which continuously infused the sevo into the inspiratory circuit branch of the workstational AVANCE (Datex-Ohmeda). Data were collected every 10 s for 4 h (via the SE COLLECT, v 4.0 Data/SE GE) and monitored. The work of the controller was acceptable with an inaccuracy of less than 15%, with a low bias, and an oscillation less than 10%.

**Results and Discussion:** The algorithm was derived from Hendrickx’s uptake model. The average MDAPE was 8.25% (5.96–10.20); 90% of the get was reached at 3.08 (2.4–5.4) min, with positive bias expressed by MDPE $\pm$ 0.02 with adequate depth, rapid wake up, and low sevo consumption. Such results recommend its use with adequate monitoring of gases and anesthetic depth.

**References:**

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**3AP3-5**

**The effect of desflurane on filter efficiency**

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**Background and Goal of Study:** Breathing system filters (BSF) are recommended during anesthesia to protect the patient and breathing system from contamination with micro-organisms and particulate debris. Exposure to desflurane reduces filter efficiency of certain pediatric BSF. Two types of Intersurgical filter were tested, the Filta-Therm BSF and the Inter-Therm BSF (Intersurgical Limited, Wokingham, UK).

**Results and Discussion:** The work of the controller was acceptable with an inaccuracy of less than 15%, with a low bias, and an oscillation less than 10%. This demonstrates that the anesthesia to be maintained with minimal flows from the start with adequate depth, rapid wake up, and low sevo consumption. Such results recommend its use with adequate monitoring of gases and anesthetic depth.

**References:**

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**3AP3-6**

**Metabolic oxygen consumption factors during the anesthesia**

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**Background and Goal of Study:** Metabolic oxygen consumption (VO$_2$) by indirect calorimetry is a new system of metabolic monitoring changes that can throw important data during anesthesia. The objective of this work is to value the modifications observed during surgery of paediatrics patients and the factors associate that could influence in the results obtained by the analyzing system.

**Materials and Methods:** Patients 2-4 years old, ASA I, during less than 2 hours surgery time were studied. Anaesthesia was induced with propofol, remifentanil and fentanyl. The anesthetic maintenance was made with sevoflurane to 2% in O$_2$/Air and Remifentanil in continuous perfusion, in spontaneous ventilation. Acid lactic in venous gaseousities (intervals of 20 minutes), hemodynamic and respiratory pattern, temperature, hypoxia level (Entropy), inspiratory and expiratory gases pattern, and VO$_2$ were monitoring. Data were obtained by modular analysis S/STM of Datex-Ohmeda (module M-CAI02X), and information was processed by the software "Datex-Ohmeda S/5 Collect". Correlation and Linear Regression was calculated.

**Results and Discussion:** N = 21 patients. In basal conditions VO$_2$ average was smaller of 0.6±0.12 ml kg$^{-1}$ min$^{-1}$. During anesthesia maintenance VO$_2$ average value was 5.3±0.3 ml kg$^{-1}$ min$^{-1}$, and in waking up was superior to 8.1±1.1 ml kg$^{-1}$ min$^{-1}$. After the first hour of anesthesia a progressive increase of lactic acid over the basal value was detected (average 0.9±0.1 mmol/l), until a value of 2.2±0.9 mmol/l, that did not correspond with changes in VO$_2$. A significant elevation of the VO$_2$ was detected (p<0.05), when these situations were corrected. The factors that threw statistical meaning (p<0.01) and a correlation index superior to ±0.95 were: temperature (decreasing each degree of temperature resulted in a reduction of VO$_2$ > 10% (p<0.01)), inspired oxygen fraction (FI$_O_2$ > 0.8), abrupt changes in the CO$_2$ expired fraction (± 6 mmHg), association to N$_2$O gas mixture (>20%), size of the line of sampling (>2m), and increases of respiratory rate (>35 r.p.m).

**Conclusion(s):** Anaerobiosis is not detected by the system. Factors mentioned modify the system and can produce error; a perfect system balance is needed to obtain a correct measurement of VO$_2$.

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**3AP3-7**

**Non-linear regression curve model for desaturation in pulse oximetry during breath-holding in healthy volunteers**

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**Background and Goal of Study:** Pulse oximetry, continuous noninvasive monitoring of arterial hemoglobin saturation (SpO$_2$), has become a standard tool for detecting hypoxia. Reports have analyzed the process of the desaturation of SpO$_2$, resulting from apnea by regarding it as one of linear change.

**References:**
even though the process shows a non-linear curve. In this study we observed the courses of changes in SpO2 values induced by breath-holding in healthy volunteers and determined a non-linear regression curve model of the desaturation process.

Materials and Methods: The 8 healthy male volunteers gave informed consent. MASIMO ear and finger SpO2 sensors were appropriately attached. To observe changes of SpO2 values, we instructed the volunteers to take a deep breath, and to hold as long as possible. We used a computer to record pulse oximetry-related data every second. We assumed a non-linear regression curve model of SpO2 (model: SpO2 = 100 - e\(^{-a(t-b)}\); a, b: parameters, t: elapsed time). The two parameters were determined from non-linear least squares regression analysis. We compared the observed SpO2 values with calculated ones.

Results and Discussion: Table 1 shows the two determined parameters, a and b, and the root mean square error of the regression curves. Figure 1 shows a regression curve well-fitted to the SpO2 observed in one subject.

Table 1. Observed SpO2 and parameters determined for a regression curve

<table>
<thead>
<tr>
<th>SpO2 site</th>
<th>Control SpO2 (%)</th>
<th>End BH SpO2 (%)</th>
<th>Parameter “a”</th>
<th>Parameter “b”</th>
<th>RMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear</td>
<td>98.54 ±1.1</td>
<td>98.94 ±4.3</td>
<td>0.0172</td>
<td>0.0462</td>
<td>24.0</td>
</tr>
<tr>
<td>Finger</td>
<td>98.54 ±1.0</td>
<td>98.33 ±3.3</td>
<td>0.0131</td>
<td>0.0580</td>
<td>13.2</td>
</tr>
</tbody>
</table>

BH = breath-holding, RMSE = root mean square error of the regression curve. Data are expressed as mean ± SD (SpO2, RMSE), or minimum and maximum values (a,b).

Conclusion(s): This is the first comparison between propofol measured in exhaled breathing gas by a sensor and arterial blood in 2 patients. These initial results of an ongoing study indicate that online monitoring of propofol concentrations in breathing gas may become feasible technology for monitoring plasma concentrations in patients.

Disclosure: Part of the work is financially supported by Draegerwerk AG, Lubeck.

References:

3AP3-9

Compatibility of various sevoflurane formulations in water-equilibrated vaporizers

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Background and Goal of Study: A previous experiment showed time-dependent, Lewis acid-mediated degradation (HF production, low pH, and vaporizer component degradation) with lower-water content sevoflurane formulations [Baxter (USA), Minrad/Richmond Labs (Argentina)] following storage in Penlon Sigma Delta vaporizers. No meaningful degradation occurred with the higher-water content formulation sevoflurane (Ullan®; Abbott). No significant degradation occurred in any product during storage in Draeger Vapor 2000 or GE Tec 7 vaporizers. Water content of lower-water formulations decreased in Penlon Sigma Delta vaporizers and increased in the other two types of vaporizers. The water content of higher-water sevoflurane decreased in all vaporizer types [1]. The experiment was repeated with an attempt to stabilize water content by vaporizer pre-equilibration.

Materials and Methods: An evaporation cycle and multiple fill/drain cycles with sevoflurane were conducted on 36 vaporizers (12 each of Penlon Sigma Delta, Draeger Vapor 2000, GE/Datex Ohmeda Tec 7) to stabilize the water content of the vaporizers with sevoflurane. Four sevoflurane products (3 lower-water content\(^{1,2}\) and one higher-water content\(^{3}\)) were placed in the vaporizers (9/product). Vaporizers were stored for 3 weeks under accelerated conditions to model longer-term room temperature storage. Sevoflurane aliquots were removed from the vaporizers weekly and analyzed for degradants (including HF), pH, and water content.

Results and Discussion: All 3 lower-water sevoflurane formulations\(^{1,2}\) showed significant degradation at 3 weeks in the Penlon Sigma Delta vaporizers (total degradants 9,500–21,000 ppm, fluoride<0.2 ppm, pH<3). No degradation was observed in either of the other two types of vaporizers. The higher water formulation\(^{3}\) had no significant degradation in any of the vaporizers (no significant changes in total degradants, fluoride, or pH).

1Baxter, Deerfield, IL (9/product water);
2Sivonasa (9/product water) Baxter, Japan;
3Eridan (7/product water) Minrad/Richmond Laboratories, Buenos Aires, Argentina;
4Ullan® (9/product water), Abbott, Abbott Park, IL.
Conclusion(s): Results confirm Lewis acid-mediated degradation by vaporizer components occurred in the Penlon Sigma Delta vaporizers with lower-water sevoflurane formulations, but not with the higher-water formulation. Formulation water content is a critical factor in determining sevoflurane degradation. Further experimentation in Penlon Sigma Delta vaporizers is warranted.

Acknowledgements: Supported by Abbott.

Disclosure: Employee of Abbott.

References:

3AP3-10
Airway gases monitoring in paediatric anesthesia. Intra and extratracheal differences
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Background and Goal of Study: A new endotracheal device was designed for monitoring inspired and expired fractions of gases, inside and outside the lungs. The objective is to demonstrate gases inspired and expired fractions obtained inside and outside the trachea are different.

Materials and Methods: Paediatric patients, 7-12 years old, ASA I, during one surgery hour time. We studied CO2 end-tidal fraction (EtCO2); O2, N2O and Sevoflurane (EtSev); inspired and expired fractions obtained inside the anaesthetic circuit before the carina and after the end of the endotracheal tube. Every variable was analysed in the following times: starting, 5, 10, 15, 20, 30, 40, 50 and 60 minutes.

Results and Discussion: N = 71 children. The average for endotracheal EtCO2 fraction is higher than the extratracheal measurement (p<0.005), and similar than the CO2 Arterial Pressure (a1.3). Gradients values inside and outside the trachea of Fi-e (O2, N2O, O2/Sev) equally showed a significative average difference (O2 and N2O 9±2 and Sev 0.6±0.2) (p<0.05). Differences are due to the dead space. Along the anaesthetic time, gradients values inside and outside the trachea for Fi-e (O2, N2O) put on the same level, until to equal, after 18±2 minutes after intubation (p<0.05). For sevoflurane this time is 8±2 minutes. FiFe ratio results of gases were similar to gradients Fi-Fe. Important correlations were found for all gases (p<0.001). A lineal regression was obtained. Organic desnitrogenation is not as quick as we thought. The system reaches the balance after having passed three time constants of sevoflurane (when gas in blood and alveolar pressures are equal). Once the circuit has been completely washed and the balance has been reached, extratracheal values become near alveolar values. Once this time has passed, values obtained in conventional extratracheal monitoring systems give us important clinical information, but not before it.

Conclusion(s): Gases measurements differences are due to different places where measurement is carried out. We must consider the possibility of following research of new intratracheal monitoring systems.

3AP3-11
Effect of propofol bolus on propofol concentration in breathing gas
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Background and Goal of Study: Propofol concentration in plasma is responsible for the anaesthetic depth but can not be measured non-invasively and continuously. The continuous measurement of propofol in breathing gas may become an alternative for the determination of propofol concentration in plasma [1]. The following study investigates the effect of propofol bolus during a constant infusion on propofol concentration in breathing gas, continuously measured by an electrochemical sensor.

Materials and Methods: After IRB approval we induced anaesthesia in 4 pigs with ketamine (1 mg kg-1), etomidate (0.3 mg kg-1) and after vecuronium (0.1 mg kg-1) the animals were intubated. After obtaining the baseline propofol was constantly infused (0.6 mg kg-1 h-1) and at 0 (T0), 30 (T30) and 60 min (T60) a bolus of propofol (4 mg kg-1) was applied. Before and 2 min after the three bolus the propofol concentration in breathing gas were measured by an electrochemical sensor.

Results and Discussion: During a constant propofol infusion with the periodical application of a bolus propofol concentration in breathing gas, continuously measured by an electrochemical sensor, varied from 0 to 11.9 ppb. The bolus increased the propofol concentration in breathing gas.

Conclusion(s): These initial results of an ongoing study indicate that propofol bolus (4mg kg-1) can be detected by the changes of propofol concentration in breathing gas, continuously measured by an electrochemical sensor.

Disclosure: Part of the work is financially supported by Draegerwerk AG, Luebeck.

References:

3AP4-1
6-Sigma systolic arterial pressure alarms
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Background and Goal of Study: Threshold systolic arterial pressure (SAP) alarms often use preoperative values as a guide for intra-operative values. Two systems (normalisation and principal component analysis, PCA) [1] have been described that use the ‘current’ SAP and the ΔSAP over a proceeding time interval to generate an alarm based on units of standard deviation (SD). These two methods were compared with each other and with threshold alarms.

Materials and Methods: With IRB approval and patient consent data were collected during major surgery. SAP was collected at 100Hz; obvious artefacts were removed. The time interval for analysis of ΔSAP using normalisation was five minutes, this assessment window being advanced every 10s. The PCA method was initially applied to measurements separated by 10 seconds, as per previous work [1]; it was also applied to a 5-minute window as above.

Results and Discussion: Total data collection time 34h 35 minutes, artefact time (includes a 5-minute reset period) 4h,

<table>
<thead>
<tr>
<th>Limits</th>
<th>Alarm duration (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold alarms</td>
<td>100-140 mmHg</td>
</tr>
<tr>
<td>Normalisation SD=3*</td>
<td>90-100 mmHg</td>
</tr>
<tr>
<td>PCA (10s) SD=3*</td>
<td>31</td>
</tr>
<tr>
<td>PCA (5-minute) SD=3*</td>
<td>38</td>
</tr>
</tbody>
</table>

Excludes SAPs 100-140 mmHg. *Without alarm at SD set at 3.

The duration of threshold alarms is high, about 13 - 30% of data collection time. Using normalisation (alarm set at SD) the activation time is about 3%. PCA produced fewer alarm activations at the 3SD level, but also tolerated lower systolic blood pressures without alarm if reached gradually. If the SAP falls from a low SAP it is more clinically significant than the same fall from a higher SAP, by using normalisation and PCA techniques these changes are highlighted and alarm activation reduced.

Conclusion(s): These statistic based techniques detect significant change but tolerate high or low blood pressures if the SAP is stable.

References:
3AP4-2
Stroke volume variation (SVV) monitors mainly predict changes of volume preload during major blood loss/resurrection surgery
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**Background and Goal of Study:** The aim of this study was to compare the SVV to commonly measured hemodynamic variables as predictor of normovolemia, during major blood loss/resurrection surgery (MBS).

**Materials and Methods:** After patient and institutional approval, 17 consecutive (ASA I-II) patients were studied. Monitoring consisted in HR, invasive MAP, CI, stroke volume index (SVI) and SVV by means of a FloTracTM Sensor, and CVP and continuous ScvO2 by a central PreSeth catheter. The changes in HR, MAP, CVP, SVI, SVV, ScvO2, CI and Hb levels, were recorded and taken at the beginning (BS), every hour and at the end of surgery (ES). Normovolemia (NV) was accomplished by maintenance of a CVP>5 mmHg, CI > 2.5 l/min/m2, and ScvO2 > 70 as we have previously reported (1,2), with infusions of crystalloid (Cri) and colloids (Co). Autologous transfusion (AUT) was administered when available, and allogeneic blood transfusions (ALO) was given when Hb<9 gr/dL. Estimated blood loss (EEL) was calculated using standard formulas (3). Statistical analysis was done using t-test, and correlation Pearsons test (p<0.05). Receiver operating characteristic (ROC) curves were generated for CVP, HR, CI, SVV and SVV to discriminate hypovolemia (SVV > 15%) and NV (SVV < 15%).

**Results and Discussion:** Mean age =36±12 years, weight= 77±16 kg and duration of surgery = 186±109 min. NV was maintained (HRES= 7.7±3 vs CVPES=3.5±0.3 mmHg; CIRES= 3.0±0.5 vs CIES= 3.3±0.6 l/min/m2; and ScvO2ES= 81±4 vs ScvO2ES=79±4%). NS with infusion of CRI=3187±1878 ml, Co= 983±844 ml, AUT= 208±262 ml and 19 units of ALO; in spite of significant bleeding (EEL= 1205±683 ml). Interestingly, HR (HRES= 78±14 bpm;p=0.001) and Hb (HRES= 12.6±1.5 vs HbES= 9.8±1.4 gr/dl;p=0.01) changed, while the same remained (the same (SVBVS=8±1.3 vs SVRES=7.6±6%), NS. SVV were predicted by the changes in SVI (r = 0.4, p=0.01), by those of CI (r = 0.25, p=0.02), and less by HR (r = 0.22; p= 0.04). However, no correlation with MAP (r=0.1±0.32, CVP (r = -0.1±0.2), or ScvO2 (p=0.17; p=0.05). The area under the ROC curve for SVV was 0.85 (95% confidence interval [C0.743 to 0.965]), for CI 0.783 (95% CI 0.636 to 0.931).

**Conclusion(s):** This study demonstrates that SVV mainly predicts preload volume changes during the maintenance of NV in MBS. It also suggest that SVV should be included in the future as a monitor to better assess hypovolemia.

**Disclosure:** Edwards LifeScience donated the 17 Flotrax for the performance of this study.

**References:**

3AP4-3
Automatic and non invasive fluid responsiveness assessment using the Pleth Variability Index in mechanically ventilated patients
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**Background and Goal of Study:** Respiratory variations in pulse oximetry plethysmographic waveform amplitude (AP0P) can predict fluid responsiveness in mechanically ventilated patients but cannot be easily assessed at the bedside. Pleth Variability Index (PVI) is a new algorithm allowing for automated and continuous monitoring of AP0P. We hypothesized that PVI can predict fluid responsiveness in mechanically ventilated patients under general anesthesia.

**Materials and Methods:** Twenty-five patients were studied after induction of general anesthesia. A pulse oximeter (NLOX Adt, Masimo Corp) attached to the index of the patients was connected to a monitor (Radical 7, Masimo Corp). PVI calculates the respiratory variations in the plethysmography waveform amplitude (Perfusion index (PI)) as: PVI=PImax-PImin)/PImax where PImax and PImin are the maximum and minimum PI values over a given period of time. Hemodynamic data (cardiac index (CI) measured using pulmonary artery catheter, respiratory variations in arterial pulse pressure (AP0P), and PVI were recorded before and after volume expansion (VE) (500 ml of hetastarch 6%). PVI Fluid responsiveness was defined as an increase in CI ≥ 15%.

**Results and Discussion:** VE induced changes in CI (2.0±0.9 to 2.5±1.2 l/min/m2, p < 0.01), AP0P (15±7 to 8±3%, p < 0.01), and PM (14.7±7 to 9±3%, p < 0.01). AP0P and PVI were higher in responders (n = 18) than in non-responders (n = 9) (19±9 vs. 9±4% and 18±6 vs. 8±4% respectively; p < 0.01 for both). A PVI > 14% before VE allowed discrimination between responders and non-responders with 81% sensitivity and 100% specificity. There was a significant relationship between PVI before VE and percent change in CI after VE (r = 0.67; p < 0.01).

**Conclusion(s):** PVI, an automatic and continuous monitoring of ΔP0P can predict fluid responsiveness non-invasively in mechanically ventilated patients under general anesthesia. This index has potential clinical applications.

3AP4-4
Ability of Pleth Variability Index to automatically and non-invasively predict the haemodynamic effects of PEEP
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**Background and Goal of Study:** Pleth Variability Index (PVI) is a new automatic and continuous dynamic indice of fluid responsiveness, based on ventilation-induced plethysmographic waveform amplitude variations in mechanically ventilated and sedated patients. Our aims were: 1) to study the effects of tidal volume (TV) on PVI and 2) to test the ability of PVI to predict the effects of positive end-expiratory pressure (PEEP) on cardiac index.

**Materials and Methods:** We studied 10 mechanically ventilated patients in the postoperative period following cardiac surgery. All patients were under general anesthesia. A pulse oximeter (LNOP Adt, Masimo Corp) attached to the index of the patients was connected to a monitor (Radical 7, Masimo Corp). PVI calculates the respiratory variations in the plethysmography waveform amplitude (Perfusion index (PI)): PVI=PImax-PImin)/PImax where PImax and PImin are the maximum and minimum PI values over a given period of time. Exclusion criteria were cardiac arrhythmia, and left ventricular dysfunction. Patients were studied at 3 successive TV (6, 8, and 10 ml/kg) under zero end-expiratory pressure (ZEEP) and after adjunction of a PEEP (10 cm H2O). Following haemodynamic data were recorded: mean arterial pressure (MAP), central venous pressure (CVP), cardiac index (CI measured using pulmonary artery catheter), and PVI. Haemodynamic instability was defined as > 15% decrease in CI following PEEP adjunction. ANOVA was used for statistical analysis.

**Results and Discussion:** Only TV 10 ml/kg induced changes in PVI compared to TV 6 ml/kg. Changes in PVI and CI related to changes in TV and end-expiratory pressure are shown in Table 1.

Table 1: Changes in Haemodynamic Parameters During the Study Protocol

<table>
<thead>
<tr>
<th>TV6 - ZEEP</th>
<th>TV6 - PEEP TV8 - ZEEP</th>
<th>TV8 - PEEP</th>
<th>TV10 - ZEEP</th>
<th>TV10 - PEEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM (ml/min)</td>
<td>9.4±3</td>
<td>11.4±3</td>
<td>12±4</td>
<td>15±5</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>79±12</td>
<td>80±9</td>
<td>82±11</td>
<td>79±9</td>
</tr>
<tr>
<td>CVP (mmHg)</td>
<td>10.3</td>
<td>12±3</td>
<td>10±3</td>
<td>11±3</td>
</tr>
<tr>
<td>CI (l/min)</td>
<td>2.8±0.5</td>
<td>2.8±0.6</td>
<td>2.8±0.6</td>
<td>2.8±0.6</td>
</tr>
<tr>
<td>Data are means±SD; *p&lt;0.05 compared to TV6 - ZEEP; **p&lt;0.05 compared to TV10 - ZEEP.</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Under TV10 ml/kg, PEEP adjunction induced changes in CI from 2.8±0.6 to 4.2±0.6, p<0.05 and PVI (from 12±6% to 18±6%; p<0.05). A PVI greater than 11% before PEEP adjunction predicted haemodynamic instability with 68% sensitivity and 75% specificity.

**Conclusion(s):** PVI can predict haemodynamic effects of PEEP in ventilated patients after cardiac surgery. This index has potential clinical applications.

3AP4-5
Intra-esophageal pressure and its relationship to cardiac function
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**Background and Goal of Study:** Most esophageal catheters used in aneste-
sia can be adapted to record intra-esophageal (I-E) pressures. We studied the I-E pressure waves with the aim of detecting its origin. Our analysis indicates that these waves are a reflection of the volume changes of the heart during its cycle. The I-E waves are similar to those of a cardio-ballistocardiogram. Several qualitative and quantitative cardiac performance parameters can be obtained.

**Materials and Methods:** Materials: Patients undergoing anesthesia with monitoring of Systemic Arterial Pressure (SAP) and EKG. Methods: After anesthesia was induced, a balloon esophageal catheter was placed and I-E and SAP pressure waves were recorded and analyzed. The EKG served as an internal time-line in order to study: 1) the I-E pressure wave and its relationship to mechanical cardiac function; 2) systolic time intervals; Pre-Ejection Phase (PEP) and Ventricular Ejection Time (ET) of the cardiac cycle; 3) comparison of acceleration of bloodflow as derived from SAP and I-E pressure waves.

**Results and Discussion:** The data is represented in graphical form in Figure 1. Fig. 1 shows simultaneous tracings of the SAP and the I-E waves and the EKG. The I-E pressure wave is almost the exact mirror image of that of the SAP wave and bears resemblance to a ballistocardiogram. It should be noted that the amplitude of the I-E wave is very low, approximately 1/100th of that of SAP. The EKG provides the timing of the onset of ventricular iso-volumetric contraction. The I-E wave at the point of a steep downward deflection indicates the onset of ventricular ejection. The time between the two is the PEP. ET (LVEF) can be determined from the SAP wave and also from the I-E wave. They are identical in value. The PEP/ET can thus be calculated non-invasively and in this case is a normal value of 0.35.

**Conclusion(s):** We are reporting on a novel approach to gain additional qualitative information about the cardiac performance through analysis of a pressure wave obtained with an intra-esophageal balloon catheter. The cardiac parameters e.g. systolic time intervals and blood flow acceleration can be non-invasively assessed by analysis of the I-E pressure waves.

**3AP4-7**

**Evaluation of cardiovascular function during short term application of continuous positive airway pressure and recovery in healthy volunteers as assessed by a Finometer®**

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**Background and Goal of Study:** The reported effects of continuous positive airway pressure (CPAP) on cardiovascular function are influenced by co-existing disease, drug therapy and autonomic integrity. Previously, we have demonstrated that CPAP of 10, but not 5 cm H2O, caused significant decrease in CO and increase in TPR and application of CPAP could therefore be used to test autonomic integrity. To develop this further, using a Finometer® we have assessed the dynamic changes in cardiovascular function associated with the institution and recovery from CPAP 7.5 and 10 cm H2O.

**Materials and Methods:** We recruited 10 healthy volunteers aged 28-37 yrs. The haemodynamic variables [heart rate (HR), mean arterial pressure (MAP), cardiac output (CO), stroke volume (SV) and total peripheral resistance (TPR)] were measured and recorded continuously using a Finometer® for 5 minutes each during baseline, CPAP at one of the levels, off CPAP, then other CPAP and off. The values were compared with the baseline using Friedman test. Results: We have assessed the dynamic changes in cardiovascular function associated with the institution and recovery from CPAP 7.5 and 10 cm H2O. The changes seen with CPAP 7.5 were similar to CPAP 10 but of less magnitude. There were fluctuations in the measured variables. The effects were pronounced during the first 2 minutes with institution of CPAP and 3 minutes when CPAP was taken off. Peak effect was seen within the first minute. A consistent time pattern was not observed.

**Conclusion(s):** Application of CPAP 10 cm H2O has produced consistent results. We believe evaluation of haemodynamic changes with CPAP 10 cm H2O for 2 minutes and recovery for 3 minutes can be used to test the integrity of autonomic responses. Further work will need to be done in patients with autonomic dysfunction.

**3AP4-8**

**New miniature epicardial ultrasonic probe for detection of myocardial ischemia in cardiac surgery**

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The Interventional Centre, Rikshospitalet University Hospital, Oslo, Norway

**Background and Goal of Study:** Myocardial ischaemia detection during and...
after cardiac surgery by ECG and blood pressure measurements is uncertain. We have developed a miniature ultrasonic probe that can be sutured to the myocardium for continuous real-time monitoring of regional myocardial function during and after cardiac surgery. The aim of this study was to validate if this new miniature probe can detect acute myocardial ischemia.

Materials and Methods: In 8 pigs: 5 MHz ultrasonic probes (0.5 mm) were sutured to the epicardium in the LAD and CX perfusion area. Wall thickness and radial myocardial velocities were assessed by the miniature probes at baseline and after 60 s of LAD occlusion. Conventional 2-D echocardiography and tissue Doppler imaging were used as reference methods.

Results and Discussion: During LAD occlusion, systolic wall thickness was significantly reduced (13.3±3.0 vs. 8.4±1.9 mm, p<0.01). Peak systolic velocities were reduced from baseline to ischemia, (1.1±0.3 vs. 0.3±0.1 cm/s, p<0.001), while post-systolic velocities increased (-0.2±0.5 vs. 1.6±0.7 cm/s, p<0.001). No significant changes occurred in the CX region. Measurements of systolic wall thickening and myocardial velocities by the miniature probe correlated well with echocardiographic measurements (R=0.84 and R=0.85, p<0.001).

Conclusion(s): A new miniature transducer for monitoring of LV function is introduced. The miniature transducer detects myocardial ischemia with high sensitivity and specificity, and has excellent correlation to echocardiography. With further development it may prove as a very useful tool for continuous monitoring of LV function in clinical cardiac surgery.

3AP4-9
Real-time assessment of myocardial ischemia during cardiac surgery using an epidural accelerometer
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Background and Goal of Study: Real-time detection of myocardial ischemia during cardiac surgery remains a major problem since ECG and blood pressure monitoring are insensitive. Echocardiography is sensitive, but resource demanding and continuous readings can not be obtained. We describe a new technique for continuous monitoring of regional myocardial ischemia during cardiac surgery using an accelerometer.

Materials and Methods: Ten patients with angina pectoris underwent off-pump coronary artery bypass grafting. An accelerometer (11 x 14 x 5 mm) was sutured on the left ventricle (LV) in the perfusion region of the LAD artery (LAD) stenosis. An accelerometer (11 x 14 x 5 mm) was sutured on the left ventricle in the LAD supply region. During a 3 min precondition occlusion of LAD, circumferential acceleration (sampling rate 500 Hz) was continuously measured and velocity calculated. Simultaneous, in the LAD region, longitudinal strain by Doppler echocardiography was recorded at baseline and at the end of the LAD occlusion.

Results and Discussion: During LAD occlusion accelerometer peak systolic velocity and longitudinal strain changed significantly.

Regional and global hemodynamic changes during LAD occlusion (n=10)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Occlusion</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echocardiography strain (%)</td>
<td>-27.9±5.7</td>
<td>-12.1±13.4</td>
<td>0.008</td>
</tr>
<tr>
<td>Accelerometer peak systolic velocity (cm sec⁻¹)</td>
<td>14.4±4.8</td>
<td>8.9±4.9</td>
<td>0.001</td>
</tr>
<tr>
<td>Pulsocor Doppler output (L min⁻¹)</td>
<td>5.8±1.3</td>
<td>5.8±1.5</td>
<td>0.493</td>
</tr>
<tr>
<td>Mean arterial pressure (mm Hg)</td>
<td>79±9</td>
<td>77±10</td>
<td>0.550</td>
</tr>
<tr>
<td>Heart rate (beats sec⁻¹)</td>
<td>70±10</td>
<td>71±10</td>
<td>0.678</td>
</tr>
<tr>
<td>Central venous pressure (mm Hg)</td>
<td>10±4</td>
<td>10±3</td>
<td>0.091</td>
</tr>
<tr>
<td>dP/dt (mm Hg sec⁻¹)</td>
<td>646±246</td>
<td>635±237</td>
<td>0.689</td>
</tr>
</tbody>
</table>

Values are mean ± standard deviation; dP/dt, positive time derivative of systolic femoral artery pressure.

No significant changes in ECG, cardiac output, mean arterial blood pressure, heart rate, central venous pressure or femoral artery dP/dt were found. A good correlation between accelerometer peak systolic velocity and strain Doppler echocardiography was observed (R=0.69, p=0.002).

Conclusion(s): In patients myocardial ischemia can be measured accurately and continuously with an accelerometer sensor. This new technique can improve monitoring during cardiac surgery.

Disclosure: The accelerometer is patented for the detection of myocardial ischemia during cardiac surgery. The patent includes the integration of the accelerometer into a temporary pacemaker wire. OJE, EF and Rikshospitalet University Hospital are patent holders.

3AP4-10
Clinical application of photoplethysmography waveform for noninvasive blood pressure estimation during general anesthesia
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Background and Goal of Study: During general anesthesia, monitoring blood pressure changes in real-time by intra-arterial catheter insertion might be helpful, but in most cases intra-arterial catheter insertion is not inserted when the operation time is short and when the patient has no severe general problems. Instead, noninvasive blood pressure (NIBP) is measured every 5 minutes. However, it is difficult to recognize real-time changes of the patients’ blood pressure with the NIBP. Attempts were made to estimate blood pressure changes by analyzing shifts in pulse transit time (PTT) and amplitude (AMP) while using the photoplethysmography (PPG).

Materials and Methods: Twenty-five patients receiving maxillofacial surgery were enrolled. Fourteen patients were designated as a regression group, and a regression equation was formulated by taking generalized estimating equations (GEE) on PPG AMP and PTT with arterial blood pressure. Using the obtained noninvasive blood pressure measurements, the regression equation was calibrated every 5 minutes and then compared with the next NIBP 5 minutes later. By applying the formulated regression equation on another set of 11 patients (application group), we estimated blood pressures and compared with the next NIBP 5 minutes later as the same methods.

Results and Discussion: After calibrating the regression equation every 5 minutes using NIBP from the regression group, the difference between the estimated and the NIBP 5 minutes later was 10.5±10.5 mmHg for systolic blood pressure and 9.5±8.4 mmHg for diastolic blood pressure. In the application group, the difference showed 8.7±7.3 mmHg for systolic blood pressure, and 7.5±7.0 mmHg for diastolic blood pressure.

Conclusion(s): The continuous blood pressure monitoring using PPG during anesthesia is highly correlated with changes in arterial blood pressure. The blood pressure changes have been estimated to be within average 10 mmHg, by NIBP measurements every 5 minutes for calibration.

3AP4-11
Continuous monitoring of global and regional ventricle function by utilizing an epidural accelerometer
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Background and Goal of Study: In cardiac surgery echocardiography is superior in quantifying heart function, but the method is resource demanding and unsuitable for continuous monitoring. We describe a new technique for real-time assessment of heart function during cardiac surgery using an accelerometer.

Materials and Methods: In 12 open-chest pigs an accelerometer (11 x 14 x 5 mm) was sutured on the left ventricle (LV) in the perfusion region of the LAD artery.
3AP5-1
The effects of bispectral index and neuromuscular block monitoring on anaesthesia depth and recovery at the cardiac patients
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Background and Goal of Study: The aim of this study is to investigate the effects of bispectral index (BIS) and neuromuscular block monitoring on anaesthesia depth and recovery at the cardiac patients that were scheduled to undergo open cholecystectomy operation.

Materials and Methods: The patients of both groups were operated by the same anaesthetists. ASA II-III patients, 30-65 years old 100 patients that were given under open cholecystectomy operation were divided into two groups. All patients received standard induction drugs, and 4-6% desflurane was used for maintenance of anaesthesia. In the group I, the anesthesiologist was blind to BIS, and inspired volatile agent concentration (IVAC) of desflurane was titrated according to the patients’ haemodynamic changes. In the group II, IVAC of desflurane was titrated to maintain BIS at 50-60. The haemodynamic data, BIS values, end tidal volatile agent concentration (ETVAC) and train of four (TOF) values of patients were recorded at pre-induction, post induction, post intubation, 1st and 5th minutes after the surgical incision and every 15 min. In addition, the BIS values were recorded by the primary anaesthetist in the group II and by another independent anaesthetist in the group I. At the end of the operation extubation time and aldrete recovery score were recorded at each groups. Additionally, neuromuscular agent and narcotic doses were recorded.

Results and Discussion: There were no difference about demographic data, haemodynamic data, extubation time, alldrete recovery score, neuromuscular agent requirement and, narcotic dose (p>0.05). The BIS values of the all times were lower at group I except pre and post induction times (p<0.05). ETVAC values of the all times were lower at group II (p<0.05).

Conclusion(s): Finally, the requirement of volatile agent that is given according to BIS monitoring is lower than standard technique, but we consider that it doesn’t effect the early extubation, recovery and neuromuscular agent requirement dependent to TOF monitoring.

3AP5-2
Effect of low dose ketamine administered by a slow bolus infusion on the bispectral index during stable propofol-remifentanil anaesthesia
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Anaesthesiology-Reanimation, CUB - Erasunys Hospital, Brussels, Belgium

Background and Goal of Study: The Bispectral index (BIS) is used to monitor the depth of hypnosis during general anaesthesia. Ketamine (0.15-1 mg/kg) has been demonstrated to decrease the postoperative morphine consumption (1) but 0.5 mg/kg is associated with an increase in BIS values which can lead to an oversedation of hypnic agents (2). The purpose of our investigation was to study the effect of 0.2 mg/kg ketamine administered over a 5 minute period on the BIS during stable TCI propofol - remifentanil general anaesthesia.

Materials and Methods: After approval from the local ethics committee and written informed consent, thirty patients scheduled for abdominal laparoscopic surgery were included in this double-blind, randomized study. Exclusion criteria included BMI under 18 kg/m² and over 35 kg/m², neurological disorder, recent use of psychotropic drugs and chronic alcohol consumption. Anaesthesia was induced and maintained with a TCI of propofol and remifentanil. The trachea was intubated following neuromuscular blockade. After 5 minutes of steady state anaesthesia (BIS at 40) without surgical stimulation, patients received either an infusion of 0.2 mg/kg ketamine diluted in a 50 ml syringe with NaCl 0.9% (n = 14) or the same volume of normal saline (n = 16). The test drug was infused over 5 minutes. Standard parameters and the BIS values were recorded every minute until 15 minutes after the administration of the test solution.

Results and Discussion: The baseline mean value for the BIS (SD) was 37 (5.3) for the Ketamine group and 39 (8.2) for the placebo group. The highest mean BIS value during the recording period was 41.5 (8.7) for the ketamine group and 40.1 (8.9) for the Placebo group. BIS values were not statistically different between the groups (p>0.05), there was no significant change over time (p>0.05) with no group x time interaction (p>0.05).

Conclusion(s): In ASA I and II patients under stable propofol and remifentanil TCI anaesthesia, we could not demonstrate that a slow bolus infusion of 0.2 mg/kg ketamine administered over a five minute period increases the BIS values during the next 15 minutes.

References:

3AP5-3
Quadratic phase coupling between EEGs recorded from left and right hemi-frontal leads during total intravenous anaesthesia
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Department of Anaesthesiology, Osaka University Graduate School of Medicine, Suita City, Osaka, Japan

Background and Goal of Study: Bispectral analysis can quantify not only the frequency but also such phase relation among the frequency components of a signal, but also such phase relation among the frequency components obtained from different signals recorded simultaneously. Our previous study suggested that two peaks of EEG bioherence emerged during anesthesia seemed to be related with spindle wave and delta wave whose rhythms were generated by the thalamic nuclei. It is known that thalamic nuclei dominates both hemi-spheres. Then we investigated the phase relation between the EEGs recorded from left and right hemi-frontal leads during propofol-fentanyl anesthesia.

Materials and Methods: After IRB approval and obtained informed consent from the participants, we enrolled 15 patients (either gender; 40-67 yr) who underwent elective abdominal surgery. We modified our original software Bispectrum Analyzer (BSA), and calculated cross-bicoherence as well as auto-bicoherence. Auto-bicoherence indicates the phase relation within a signal and cross-bicoherence indicates the phase relation between two signals. In bispectral analysis between two signals, one signal was handled as input and another was handled as output. Then two types of cross-bicoherence (Rlo and Blo) could be made. Anaesthesia was induced with propofol using target controlled infusion (TCI) system followed by fentanyl and vecuronium. EEG (FP1-A1 and FP2-A2 leads) were monitored by 514X-2 EEG telemetry system (GE Marquette, Tokyo, Japan). EEGs were sampled at 512Hz and recorded on a computer. Anaesthesia was maintained with propofol and fentanyl to keep SEP90 below 1.4 Hz . 3 minutes length of artifact free EEG data recorded in steady state were used to calculate each peak height of EEG bioherence (pBIC-low, pBIC-high).

Results and Discussion:

<table>
<thead>
<tr>
<th>Electrode</th>
<th>Mean ± SD (%)</th>
<th>Auto-R</th>
<th>Auto-L</th>
<th>Cross-Rlo</th>
<th>Cross-Llo</th>
</tr>
</thead>
<tbody>
<tr>
<td>pBIC-low</td>
<td>43.5±6.2</td>
<td>42.7±6.7</td>
<td>41.8±6.3</td>
<td>41.6±6.9</td>
<td></td>
</tr>
<tr>
<td>pBIC-high</td>
<td>37.5±5.4</td>
<td>36.9±6.4</td>
<td>32.2±5.4</td>
<td>32.8±5.2</td>
<td></td>
</tr>
</tbody>
</table>

38 Monitoring: equipment and computers
As shown in the table, significantly high pBIC values (≥0.20%) were observed in each signal combination. There were no statistical differences among them. These data indicated that right and left hemi-territorial regions were dominated by the same rhythms sources.

Conclusion(s): The peaks of EEG biocurrence emerged during propofol and fentanyl anesthesia would probably reflect the activity of spindle wave and delta wave whose rhythms were generated in the thalamic nuclei.

References:

3AP5-4
Measuring depth of sedation with bispectral index during controlled infusion of dexmedetomidine
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Anesthesiology and Intensive Care, Selcuk University Medical Faculty, Konya, Turkey

Background and Goal of Study: Dexmedetomidine provides sedation while preserving haemodynamic stability and is a new drug of particular importance. The adverse effects of this drug include hypotension and bradycardia. Nowadays, bispectral index (BIS) is an electrical method to monitor the depth of sedation. BIS has been reported to be valuable during propofol administration.

Materials and Methods: A prospective study was performed in 20 patients (ASA I-II) candidates to elective major gynaecological surgery. Our experience in the use of BIS during induction of anaesthesia with propofol and remifentanil is presented.

Results and Discussion: Bispectral index (BIS) is an electrical method to monitor the depth of sedation. BIS has been reported to be valuable for monitoring during propofol administration. BIS values were compared with 1mg of midazolam (MDZ). The times of recovery not differed meaningfully between the 2 groups. The times of recovery were observed in both groups (NT: 625 ± 145; MDZ: 683 ± 145).

Conclusion(s): Bispectral index (BIS) is an electrical method to monitor the depth of sedation. BIS values were compared with 1mg of MDZ. The times of recovery not differed meaningfully between the 2 groups. The times of recovery were observed in both groups. These data indicated that right and left hemi-territorial regions were dominated by the same rhythms sources. The peaks of EEG biocurrence emerged during propofol and fentanyl anesthesia would probably reflect the activity of spindle wave and delta wave whose rhythms were generated in the thalamic nuclei.

References:

3AP5-6
Cerebral oxymetry vs EEG as a clinical indicator of shunt placement in CEA patients
A. Vadi, S. Gazzanelli, S. Taquin, P. Sapienza, P. Petropaoi
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Background and Goal of Study: Carotid endarterectomy (CEA) is currently performed to correct carotid artery stenosis. Minor or major strokes account for 2-3% of perioperative complications due to cerebral ischemia or embolisms during surgery. Routine insertion of a shunt is able to prevent cerebral ischemia but it may increase the likelihood of a stroke caused by embolism. The revascularization of a subset of patients at risk for developing cerebral ischemia during carotid occlusion is currently not yet standardized. EEG detects alterations of cerebral perfusion in non-awake CEA patients. Cerebral oxymetry based on near-infrared spectroscopy (NIRS) is a non-invasive, continuous monitor of regional cerebral oxygen saturation (rSO2) through transcranial sensors (INVOS 4100, Somnatecs, Troy, MI, USA). We compared the clinical significance of rSO2 and standard EEG as predictors of shunt placement.

Materials and Methods: Between January 2006 and December 2006, 55 patients (35 M-20 F; mean age 69.6±7; range 60-77yrs) underwent CEA for carotid artery stenosis greater than 70%. Patients were studied with color flow Doppler imaging and magnetic resonance angiography. A detailed clinical history was obtained for each patient. Focal cerebral ischemic events were defined as transient ischemic attack, amaurosis fugax, central retinal artery occlusion, and minor and major stroke. Surgery was always performed under general anaesthesia, EEG monitoring and rSO2 through fronto-temporal skin sensors.

Results and Discussion: Data are summarized in Table 1. Carotid arteries were cross-clamped for 3 minutes to verify the need for a shunt. We observed an overall EEG voltage reduction of < -1 Hz and an ipsilateral rSO2 reduction of 18.5±3.1%. Twelve (22%) patients required the use of a shunt: they showed a marked EEG voltage reduction (< -3 Hz) and a rSO2 decrease of 26%±2%. After shunt placement rSO2 raised to 14 ±3% and EEG voltage returned to baseline. Our results confirm previous findings that changes in regional rSO2 during the first 3 minutes after carotid cross-clamping reliably correlate with the development of EEG signs of cerebral ischemia.

Table 1. Mean data during different times of intervention

<table>
<thead>
<tr>
<th>Time</th>
<th>NT</th>
<th>SE</th>
<th>RE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start D</td>
<td>2.3</td>
<td>4.6</td>
<td>4.8</td>
</tr>
<tr>
<td>5 min</td>
<td>5</td>
<td>2.8</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Conclusion(s): rSO2 is a simple and non-invasive method to indirectly assess cerebral preclusion. However, further studies are needed to better define a critical rSO2 threshold for shunt placement.

3AP5-7
Effect on neurological monitoring and on BIS values of patient sedation with midazolam and midazolam-fentanyl during awake carotid surgery
M. Estruch-Penzo, J. Balaguer, J. Solveres, M. Morales, C. Solaz
Anesthesiology and Intensive Care, Dr. Peset University Hospital, Valencia, Spain

Background and Goal of Study: Neurologic assessment of the awake patient is preferred during CEA under cervical block (CB). Premedication with endovenous (e.v.) midazolam (MDZ) or fentanyl (FT) helps to decrease anxiety and improve patient tolerance of the procedure. It can be a confounding factor on neurological monitoring specially in elderly patients because of the impact on sedation status. BIS correlates well with the depth of sedation induced by MDZ under regional anesthesia [1]. Our objective is to evaluate the effect of 10mg of MDZ as premedication on neurological monitoring and BIS values and to compare with 1mg of MDZ and 50 μg of FT as premedication during CEA under CB.
Materials and Methods: After approval of the local ethics committee, 76ASA-I-IV patients scheduled for CEA under CB were enrolled. In group A, 39 patients were given 1mg of e.v. MDZ and 50 μg of FT before CB. CB levels (Aspect A2000, software rev3), neurological assessment, ramsay sedation score and standard monitoring were recorded basal, after premedication, at the beginning of surgery, before clamping, during clamping and shunt, at declamping and at the end of surgery. Data were mean ±SD. Wilcoxon test was used to determine mean BIS value differences between both groups and Friedman test to determine BIS value differences within BIS values in each group along the surgery. A 95% significance level was used. We also compared the deficits in relation to premedication using Wilcoxon test. The statistical calculation was done with SPSSv15 software.

Results and Discussion: Patients characteristics were similar. Mean BIS values after premedication in A was 91.33±6.17 and in B 93.76±4.45. There were no differences between group A and B in BIS values and neurologic assessment during surgery. No differences were also shown in BIS values within the different surgery moments in group A and neither in group B after premedication. P-value was not statistically significant with regard to the number of deficits between the groups. BIS values were maintained along surgery descending in some occasions related with shunt and not with premedication. Only Ramsey 2.3 were reached. No desaturation or hypotension were recorded.

Conclusion(s): 1-2mg of MDZ or 1mg of MDZ and 50 μg of fentanyl premedication has no effect on neurological monitoring and on BIS values in the awake patients during CEA. We can safely use both premedications to avoid anxiolysis.

3AP5-8
Bispectral index monitoring can titrate target controlled infusions of propofol and remifentanil in morbidly obese patients
A. Mallick, E. Stuart
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Background and Goal of Study: TIVA has been increasingly used in morbidly obese patients. Diprifusor and Remifusor (Alaris PK pumps) infusions of propofol and remifentanil in morbidly obese patients. British journal of Anaesthesia 2002; 89: 260-4.

Materials and Methods: Following ethics approval and informed consent a total of 56 patients of age 27-62 yrs undergoing laparoscopic gastric bypass or band were enrolled from 2005-2007. In Diprifusor and Remifusor (Alaris PK pumps) patients weight was entered 90 kg irrespective of their actual body weight. Patients with hiatus hernia or reflux were excluded. BIS monitor (A-2000, Aspect Medical systems) was connected to forehead sensor prior to preoxygenation. Remifentanil was administered at plasma target of 4ng/ml. Propofol was then administered at a plasma target of 6 mcg/ml and increased if required until loss of verbal contact. Intraoperatively propofol was titrated to a BIS value of 35-45 during tracheal intubation and remifentanil as required. Time from start of remifentanil to tracheal intubation, and time to tracheal extubation from discontinuation of propofol and remifentanil were recorded. Next day patients reported no memory from the time of anaesthesia induction until they were in HDU.

Results and Discussion: A total of 56 patients (42 females and 14 males) enrolled. They were of age 27-62 years (median 38). BMI ranged from 35-69 (median of 46). BIS values dropped to 20-45 (median 27) on induction of anaesthesia. Time from start of remifentanil to tracheal intubation varied from 4-8 min (median 5.5 minutes). Time from discontinuance of TCI pumps to tracheal extubation varied from 5-11 min (median 6.2 minutes). 98% of patients responded to verbal commands soon after tracheal extubation. None reported intraoperative awareness.

Conclusion(s): The data of this study suggest that BIS monitoring proves valuable in titrating anesthetic depth in morbidly obese patients during TIVA using target controlled infusions of propofol and remifentanil.

References:

3AP5-9
Near-infrared spectroscopy to monitor tissue oxygenation in critically ill patients
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Clinic for Anaesthesiology and Critical Care Medicine, University Hospital Mannheim, Mannheim, Germany

Background and Goal of Study: Sufficient and continuous monitoring of oxygenation is essential during medical treatment on an ICU. Near-Infrared Spectroscopy technique (NIRS; InSpectra™, Hutchinson Technology Inc., USA) uses an oximeter sensor to measure local oxygen saturation of tissue (S(p)O2; e.g. muscle) non-invasively and to estimate oxygen consumption and perfusion of tissue [1]. This parameter is historically estimated by central venous oxygen saturation (SvO2), intermittently determined by blood gas analysis. The aim of the present study was to evaluate correlation of S(p)O2 and SvO2 in critically ill patients.

Materials and Methods: After approval of the local ethics committee and written informed consent, SiO2 was monitored continuously for 24 hours. The NIRS sensor was placed standardized at the right thenar. Additionally S(p)O2 was determined every eight hours via blood gas analysis (ABL800 Flex; Radiometer; Brønshøj, DK) of a central venous blood sample. Measurement error (bias, accuracy, ANSI) was calculated as ∆S(p)O2 = S(p)O2 -SvO2. SiO2 and S(p)O2 were correlated using regression analysis and the Bland-Altman method [2]. T-test was used for statistical analysis, P<0.05 was considered significant.

Results and Discussion: N=20 critically ill patients (means: 60.3±9.19 years old; 14 male, 6 female; body-mass-index 26.9±4.7 kg/m2) were investigated and N=80 data pairs were collected (N=4 each). Underlying diseases were: sepsis with multi organ failure, multiple trauma, subarachnoid and intracerebral bleeding. Mean S(p)O2 (79.5±8.4%) correlated weakly with SiO2 (74.4±7.5%), resulting in a ΔS(p)O2 (mean bias) of ±5.2±10.4% (P=0.003). Bland-Altman analysis revealed no significant measurement error for the following influencing factors [vs. control]: gender (male: ±4.75±11.93 vs. female: ±5.99±6.35; P=0.5827), sepsis (±4.2±12.1 vs. ±6.4±7.7; P=0.3713). The following influencing factors (vs. control) showed significant differences in ΔS(p)O2: analgesophobia (±0.81±9.63 vs. ±8.78±9.65; P=0.0014), and application of catecholamines (±2.1±9.4 vs. ±9.9±10.2; P=0.003).

Conclusion(s): Statistical correlation between SiO2 and S(p)O2 was found to be weak in critically ill patients with multiple influencing factors. NIRS facilitates continuous monitoring of SiO2 in contrast to intermittent S(p)O2 values. Further research with larger patient numbers is required for sufficient interpretation of data for critically ill patients.

References:

3AP6-1
The accuracy of central landmark used to catheterize internal jugular vein after laryngeal mask airway placement
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Background and Goal of Study: Catheterization of the internal jugular vein (IJV) after placement of a laryngeal mask airway (LMA) has been reported to be difficult (1). The purpose of the study was to evaluate the accuracy of the central landmark after LMA-Pro seal placement.

Materials and Methods: In this study we enrolled 80 subjects (50 men and 50 women) who scheduled to undergo size 3 LMA-Pro seal placement. We simulated needle path way based on the central landmark used for right IJV catheterization. Ultrasound images were obtained to evaluate the landmark accuracy in all subjects after LMA-Pro seal placement. Both frequency of simulated carotid artery (CA) puncture and overlapping between the LV and CA were also investigated.

Results and Discussion: The simulated needle path passed the lumen of right LV in 60% of subjects, and transsected the CA in 31.3% of subjects. Both events occurred in 20% of subjects. The landmark had a median deviation of 6.8 mm (95% confidence interval [CI], 5.3 to 8.4). In 85% of the subjects, the landmark was medial to the center of right LV. The degree of overlapping of the right LV and CA after LMA-Pro seal placement was high.

Conclusion(s): After placement of the LMA-Pro seal, the central landmark could not yield adequate success rate on first puncture attempt. We highly recommend the use of ultrasound guidance for LV catheterization to avoid CA puncture. If ultrasound guidance is unavailable, the measured deviation should be considered when the central landmark is used for right LV catheterization after LMA-Pro seal placement.

References:

3AP6-2
Perioperative acute remifentanil tolerance: Interest of pupillary diameter monitoring
P. Richebé, G. Thuiu, O. Pouquet, J. Calderon, G. Janvier
Service d’Anesthésie et Réanimation 2 du Professeur Janvier, Centre Hospitalier-Universitaire de Bordeaux, Pessac, France

Background and Goal of Study: High-doses of opioids are well known to
induce dose-dependent hyperalgesia and alodynia. [Richbe et al, Anesthesiology 2005]. It would seem licit to reduce peroperative opioids doses and to rapidly titrate these doses to the surgical preoperative painful stimulations by using specific monitoring: Pupillary Diameter Monitoring (PDM) [Larson et al, Anesth Analg 90]. On another hand, it has been reported that acute tolerance to opioids and especially to remifentanil could appear very early in human volunteers beginning after only 60 min of continuous remifentanil exposure (Vinik et al, Anesth Analg 1998). The aim of this study was to evaluate whether peroperative use of PDM could detect any acute remifentanil tolerance within the first hour of general anesthesia conducted with remifentanil.

Materials and Methods: This prospective and observational study was conducted after ethic committee approval and patient’s informed consent was obtained. 20 patients from 50 to 80 yo were included in this trial. All of them were scheduled for cardiac surgery with Cardiac-Pulmonary-Bypas (CPB); either single valve replacement or CABG. General anesthesia was conducted the same way for all included patients; after 5 min oxygen administration, propofol was intravenously administered using a TCI device (Schneider model) and one bolus of remifentanil was injected: 0.5 µg/kg in 1 min period of time. Then anesthesia was continued with TCI propofol for bispectral values between 40 to 60. The aim of this study was to evaluate whether peroperative use of PDM could detect any acute remifentanil tolerance within the first hour of general anesthesia conducted with remifentanil.

Materials and Methods: The background and goal of study was to clarify whether HRV is useful for the objective assessment of selective nerve root block in the patients with sciatica. Objective assessment with heart rate variability of the effects of selective nerve root block was assessed with conventional VAS. Ratio of low and high frequency (LF/HF) in HRV was obtained for assessment of sympathetic nerve activity. Based on the values of LF/HF and VAS showed a significant decrease at T1 (1.37 ± 0.9, p < 0.05). The values of LF/HF and VAS showed a significant correlation (r = 0.27). The decrease in LF/HF would indicate the decrease of sympathetic nerve activity resulting from radicular pain relief with selective nerve root block.

Conclusion(s): We conclude that LF/HF would be useful for the objective assessment of pain relief in the patients with sciatica undergoing selective nerve root block.
the end of ICU stay. The STG-22™ setting was as follows: insulin was infused continuously when blood glucose level was higher than 110 mg/dL, and 10% glucose solution was infused continuously when blood glucose level was lower than 90 mg/dL. The infusion speed depends on the original algorithm of the STG-22™. Blood samples were taken continuously, 2 ml/hour, through the 20G catheter in the antecubital vein for the monitoring of blood glucose level.

Results and Discussion: Eighty-one patients participated in this study and average driving time of the STG-22™ was 35.5 hours. The mean blood glucose level measured by the STG-22™ was 129.9 mg/dL. Especially, the blood glucose level was increased for several hours after the start of glucose infusion. The amount of the proportion of time that blood glucose level had been maintained at 71-150 mg/dL was 70.5%, but at more than 150 mg/dL was 24.3%; 71-89 mg/dL: 3.5%, 90-110 mg/dL: 19.7%, 111-130 mg/dL: 31.0%, 131-150 mg/dL: 16.3%, 151-200 mg/dL: 15.9%, 201-250 mg/dL: 5.6%, ≥251 mg/dL: 2.8%. The remaining 5.2% was time when monitoring was interrupted. There were no hypoglycemic events less than 71 mg/dL, but STG-22™ requires several hours to make the blood glucose level within the setting range.

Conclusion(s): The STG-22™ could maintain blood glucose level without causing hypoglycemia, but further study of the algorithm is required for tighter control of blood glucose level during perioperative period.

References:

### 3AP6-7

CT analysis of the elastic deformation and elongation of the abdominal wall during colon inflation for virtual coloscopy

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Background and Goal of Study: The abdominal pressure volume relation (APVR) is linear (1) It is unclear whether wall elongation is more important than wall deformation during laparoscopy.

Materials and Methods: Seven patients scheduled for awake virtual coloscopy were studied with approval of the hospital ethical committee. The colon is inflated with CO2 to a maximum pressure of 25 mmHg while measuring stepwise the inflated volume and the pressure. The APVR is calculated and a CT scan of the abdomen is taken at 15 and 25 mmHg. A cross section CT of the mid abdomen is investigated. An ellipse is drawn fitting the peritoneal line of the abdominal wall. The long axis and the short axis of the ellipse give area and circumference. This allows the calculation of the volume change due to wall deformation (change in long axis affecting area) and the amount of volume change due to wall elongation (change in circumference length affecting area).

Results and Discussion: An example of measurement is given in Figure 1.

### Table 1. Elongation and deformation

<table>
<thead>
<tr>
<th>Volume change (Vd)</th>
<th>E (mmHg)</th>
<th>PV (mmHg)</th>
<th>Vs (%)</th>
<th>Vd (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.33</td>
<td>8.47</td>
<td>78.4</td>
<td>21.6</td>
</tr>
<tr>
<td>SD</td>
<td>2.7</td>
<td>1.9</td>
<td>10.4</td>
<td>9.8</td>
</tr>
</tbody>
</table>

Abdominal elastance (E), Abdominal pressure at zero volume (PVO), proctal volume change due to elasticity (Vs), proctal volume change due to deformation (Vd).

PVO is high as patients are awake without muscle relaxation. Cross sectional wall elongation accounts for 78% and lateral wall deformation for 22% of the abdominal volume change. The linear relation of the APVR was previously explained on a mechanical model using only elongation effects (2) This model needs inclusion of deformation forces and analysis of its linearity.

Conclusion(s): The abdominal volume increases linear during inflation by elongation and by deformation of the abdominal wall.

References:

### 3AP6-8

Continuous tissue oxygen saturation in early evaluation of graft viability after microvascular maxillofacial surgery

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Background and Goal of Study: Regional tissue oxygen saturation (RTOO) index determined by near-infrared spectroscopy (NIRS) has been used as non-invasive monitoring of human muscle oxygenation. The ability of NIRS to predict postoperative vascular compromise in flaps has been tested in animal models. The aim of this study was to determine the ability of NIRS to monitor microcirculatory changes as a guidance of proper revascularization of the graft in maxillofacial surgery.

Materials and Methods: Five adult patients undergoing microvascular maxillofacial surgery were continuously monitored using NIRS technology by means of the INVOS 5100B Oxymeter System. Sensors were placed over the infer-
Drift of needle during internal jugular vein puncture and 3AP6-10

sent, 27 adults scheduled to dental interventions were included in the study and With institutional approval and written informed con-

ventionally, concerning the degree as they perceived the pain suffered dur-

The UBI Algigraphs are equipments con-

Health Sciences Faculty, University of Beira Interior, Covilhã, Portugal

Groups were compared by Mann-Whitney test. Data as mean ± SD.

The design of our preliminary study was unable to discriminate if these findings correspond to real less pain during dental interventions or only to a comfort feeling resulting from the possibility to communicate (and attract attention) during pain episodes of dental surgery. Conclusion(s): Vertical drift with conventional technique is so large that a needle may sometimes penetrated internal jugular vein. Guidewire preset technique reduced the drift to less than half.

Conclusion(s): Vertical drift with conventional technique is so large that a needle may sometimes penetrated internal jugular vein. Guidewire preset technique reduced the drift to less than half.

3AP6-11

The urinary bladder compliance is different from the abdominal compliance

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Materials and Methods: With approval of the hospital ethical committee first the UPVR relation is measured to a maximum pressure of 30 mmHg with increments of 50 ml Nal. The bladder is emptied and the UPVR is measured during CO2 inflation for a pneumoperitoneum with three points to a maximum pressure of 15 mmHg as previously described [2] Both data points are fitted to a linear relation and PV0 and E are compared with a paired t test between both measurements. Results and Discussion: Both measurements in a patient are given in graph 1 as an example.

APVR versus UPVR in 10 patients

E mmHg/liter PV0 mmHg P

mean APVR 3.1 5.4 0.98

std APVR 2.3 2.1

mean UPVR 6.4 4.1 0.67

std UPVR 12.2 3.6 P 0.001 0.31

Abdominal pressure volume relation (APVR), urinary bladder volume relation (UPVR), Elastance (E), Pressure at zero volume (PV0).

A guide wire sometimes is not inserted through the puncture needle, although blood flows backward from the needle. The most convincing explanation is the tip of the puncture needle is moved unintentionally before inserting the guidewire. We measured and analyzed movement of puncture needle during internal jugular vein puncture and the guidewire insertion with three different techniques by a three dimension motion capture in the present study. Materials and Methods: Thirty anaesthesiologists, residents, medical students were enrolled in this study. They inserted a guide wire into a right internal jugular vein of a training mannequin using central vein catheter placement kits (CV reglofex, Terumo, Japan) with three different techniques. Technique 1: conventional technique; needle puncture was performed with hand dominance and after that guidewire was inserted into vein though the needle. Technique 2: Guidewire was inserted into the puncture needle in midway before puncture. Needle puncture was performed with hand dominance, and wide wire was advanced with hand non-dominance. Technique 3: Guidewire was inserted into the puncture needle in midway before puncture. Needle puncture was performed with hand dominance, and wide wire was advanced with hand dominance. Motion of the tip of puncture needle was captured from the time at which blood flows backward from the needle and to three seconds after guide wire insertion. Motion was captured at 60 Hz and with precision of less than 0.2mm. Position of the tip of needle was averaged every 0.1 second.

Results and Discussion: Axial (head/tail), horizontal (left/right), and vertical (up/down) drift were 5.5 (SD 4.5) mm, 4.9 (2.7) mm, and 7.1 (9.2) mm respectively with technique 1 (conventional), 2.4 (2.1) mm, 1.9 (1.8) mm, 2.8 (3.1) mm with technique 2 (guide wire preset, hand dominance), 3.5 (2.6) mm, 3.1 (2.0) mm, 3.9 (2.3) mm with technique 3 (guide wire preset, hand non-dominance). Drift in conventional technique were significantly larger than those in guide wire preset techniques. Conclusion(s): Our preliminary data suggested the clinical usefulness of the UBI Algigraph during oral surgery. A real time non-verbal communication of pain, from patient to stomatologist doctor, appeared to result in a better management of pain during dental treatments. New studies, including a large number of pa-

patients, are necessary to confirm these data and to discriminate if the patient reports of less pain correspond to a real best pain management during dental interventions.

3AP6-10

Drift of needle during internal jugular vein puncture and insertion of guide wire

S. Uchisaki, T. Katoh, H. Makino, Y. Ishii, S. Sato

Department of Anesthesiology, Hamamatsu University School of Medicine, Hamamatsu, Shizuoka, Japan

Background and Goal of Study: During internal jugular vein catheter place-

motion was registered and then continuosuly recorded during 24 hours postoperatively. Red blood cell transfusion was indicated when hemoglobin lev-

els were <9 g/dl. In addition, patients underwent direct puncture of the graft on a 2 hour-basis for postoperative clinical assessment. Mean arterial pressure (MAP) was continuously measured and arterial blood samples were taken ev-

ry 6 hours for determination of PaO2, PaCO2 and hemoglobin levels. Declines in PaO2, below 50% or a 20% drop from baseline were considered a critical threshold and an indication for gammagraphic control.

Results and Discussion: In all patients, MAP, hemoglobin levels and blood arterial gases stable and unchanged during the postoperative period. On aver-

gage, mean rSO2 values were lower in the graft compared with contralateral side (73±12% vs. 84±14%). During continuous monitoring all grafts remained viable, except for 1 that required a radiological control due to a significant rSO2 drop from baseline value. The gammagraphic control in this patient was compatible with vascular impairment that required surgical review and graft removal.

Conclusion(s): In this preliminary study, rSO2 measurements after microvas-

cular maxillofacial surgery may predict vascular compromise of the graft during the postoperative period. Significant drop in rSO2 readings may be an indication for further clinical and radiological evaluations of the graft. This technique may substitute the invasive direct graft puncture during the postoperative period.

References:


3AP6-9

Evaluation of the clinical usefulness of a novel equipment (UBI Algigraph®) to translate and record pain during dental treatments under local anestesia – A preliminary report

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Background and Goal of Study: The UBI Algigraphs are equipments con-

ceived to a non-verbal communication of pain from patients to health care per-

sonal. In their basic presentation, they are monitors showing: a pain value con-

trolled by the patient; a figurative translation of this value, based on the icon
t “smile”; an oscilloscope with a line reflecting the pain value. The equipment pro-

duces a sound proportional to the degree of pain. The aim of our study was to

to compare patients treated with the aid of the UBI Algigraph with patients treated conventionally, concerning the degree as they perceived the pain suffered dur-

ing dental treatments under local anestesia. Materials and Methods: With institutional approval and written informed consent, 27 adults scheduled to dental interventions were included in the study and randomized in two groups: In Group I (14 patients) a UBI Algigraph® version 1.2 (University of Bera Interior, Portugal) was utilized during dental treatments. Pa-

tients could communicate the pain degree squeezing a hand sensor that trans-

late it to a monitory, based on the patient pressure. In Group II (13 patients), the UBI Algigraph was not utilized. After dental interventions, in a separate room, patients are interview by an independent health professional that did not knew if Algigraph was not utilized. After dental interventions, in a separate room, patients could communicate (and attract attention) during pain episodes of dental surgery.

Conclusion(s): Our preliminary data suggested the clinical usefulness of the UBI Algigraph during oral surgery. A real time non-verbal communication of pain, from patient to stomatologist doctor, appeared to result in a better management of pain during dental treatments. New studies, including a large number of pa-

patients, are necessary to confirm these data and to discriminate if the patient reports of less pain correspond to a real best pain management during dental interventions.

3AP6-10

Drift of needle during internal jugular vein puncture and insertion of guide wire

S. Uchisaki, T. Katoh, H. Makino, Y. Ishii, S. Sato

Department of Anesthesiology, Hamamatsu University School of Medicine, Hamamatsu, Shizuoka, Japan

Background and Goal of Study: During internal jugular vein catheter place-

ment, a guide wire sometimes is not inserted though the puncture needle, although blood flows backward from the needle. The most convincing explanation is the tip of the puncture needle is moved unintentionally before inserting the guidewire. We measured and analyzed movement of puncture needle during internal jugular vein puncture and the guidewire insertion with three different techniques by a three dimension motion capture in the present study.

Materials and Methods: Thirty anaesthesiologists, residents, medical stu-

dents were enrolled in this study. They inserted a guide wire into a right internal jugular vein of a training mannequin using central vein catheter placement kits (CV reglofex, Terumo, Japan) with three different techniques. Technique 1: conventional technique; needle puncture was performed with hand dominance and after that guidewire was inserted into vein though the needle. Technique 2: Guidewire was inserted into the puncture needle in midway before puncture. Needle puncture was performed with hand dominance, and wide wire was advanced with hand dominance. Motion of the tip of puncture needle was captured from the time at which blood flows backward from the needle and to three seconds after guide wire insertion. Motion was captured at 60 Hz and with precision of less than 0.2mm. Position of the tip of needle was averaged every 0.1 second.

Results and Discussion: Axial (head/tail), horizontal (left/right), and vertical (up/down) drift were 5.5 (SD 4.5) mm, 4.9 (2.7) mm, and 7.1 (9.2) mm respectively with technique 1 (conventional), 2.4 (2.1) mm, 1.9 (1.8) mm, 2.8 (3.1) mm with technique 2 (guide wire preset, hand dominance), 3.5 (2.6) mm, 3.1 (2.0) mm, 3.9 (2.3) mm with technique 3 (guide wire preset, hand non-dominance). Drift in conventional technique were significantly larger than those in guide wire preset techniques.

Conclusion(s): Vertical drift with conventional technique is so large that a needle may sometimes penetrated internal jugular vein. Guidewire preset technique reduced the drift to less than half.
Advanced age and the use of simplified EEG monitors: Part II of a cohort study comparing young and elderly patients

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APSIS, Division of Anaesthesiology, University Hospitals of Geneva, Geneva, Switzerland

Background and Goal of Study: Bispectral Index (BIS) and Spectral Entropy (SE) Response Entropy (RE) are simplified EEG monitors that are used to quantify depth of sedation. Since EEG is modified by age, we aimed to investigate whether age also influences BIS, SE and RE during induction of anesthesia with propofol. This is the second part of a two parts cohort study comparing young and elderly patients.

Materials and Methods: Observer Assessment of Alertness/Sedation (OAA/S) scores and corresponding BIS, SE and RE were recorded before induction (baseline) and throughout induction of anesthesia with propofol until loss of consciousness (defined as an OAA/S score <2 i.e. lack of response to mild probing or shaking). The association between OAA/S score and simplified EEG monitors was sought separately for young and elderly.

Results and Discussion: We analyzed 35 elderly (67 to 96 years) and 34 young patients (19 to 40 years). BIS, SE and RE for loss of consciousness of 50% of patients (BIS50 Difference SE50 Difference RE50 Difference

<table>
<thead>
<tr>
<th>BIS50 Difference</th>
<th>SE50 Difference</th>
<th>RE50 Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td>58 (45-61)</td>
<td>54 (39-61)</td>
</tr>
<tr>
<td>Elderly</td>
<td>70 (65-73)</td>
<td>70 (69-76)</td>
</tr>
</tbody>
</table>

Discrepancies in BIS, SE and RE between young and elderly increased as the depth of sedation increased (P=0.001 for interaction between OAA/S score and age); at OAA/S 2, indexes in elderly were 15.0 (BIS), 16.9 (SE) and 19.0 (RE) units higher compared with young patients.

Conclusion(s): The relationship between clinically evaluated depth of sedation and indexes of simplified EEG monitors is strongly influenced by age. The degree of discrepancy between young and elderly patients increases as the depth of sedation increases. During propofol induction, BIS, SE and RE at loss of consciousness are about 30% higher in the elderly compared with the young patients.

Acknowledgements: We are grateful to Datex-Ommeda Switzerland for making available the Spectral Entropy monitor for the duration of the study.

Does the AEPmonitor/2 volume controller improves the detection of mid-latency auditory evoked potentials during propofol anaesthesia?

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Background and Goal of Study: Mid-latency auditory evoked potentials (MLAEP) are elicited by repetitive click stimuli of fixed intensity. This fixed volume can provoke post auricular muscle contractions. Due to the homogenous features of this “startle response”, the signal-to-noise ratio (SNR) algorithms erroneously define it as “MLAEP signal”, resulting in false high MLAEP derived index calculations [1]. We tested whether applying the AEPmonitor/2 volume controller could improve MLAEP signal detection over a wide range of propofol concentrations.

References:
Materials and Methods: After Ethics Committee approval and informed consent, 37 patients received propofol 1% at 300ml/h, until maximally suppressed electroencephalogram (EEG) was obtained. In 20 patients (= group F), and 17 patients (= Group V), MLAEP was elicited using the AEP monitor/2 with respectively a fixed versus a variable click volume (using the inbuild volume controller). We defined MLAEP signal (AEPsync) as the peak amplitude found after averaging several EEG epochs, obtained synchronously after every click. We plotted AEPsync versus the effect-site of propofol (Ce PROP), predicted by the Schnider model \[2\] (Figures 1 and 2).

Results and Discussion: In group V, the mean volume delivered was lower compared to group F. In Group V high AEPsync was not observed in high CePROP ranges (8-14 \(\mu g/ml\)). The correlation between parameters in group V approaches linearity best. As high AEPsync in group F (circle on figure 1) were found simultaneously with high levels of suppressed EEG, they are false interpretations of the hypnotic drug effect.

Conclusion(s): The volume controller of the AEP monitor/2 should always be used for obtaining an adequate detection of hypnotic drug effect of propofol.

References:

Figure 1

Figure 2

Conclusion(s): IoC and BIS present values in the awake range while the CSI is lower than what is expected for a level of consciousness monitor when monitoring awake subjects.

References:

3AP7-5
Influence of high frequency distortion on BIS values
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Background and Goal of Study: The Aspect A-2000 monitor calculates the bispectral index BIS, a dimensionless number ranging from 0 representing the hypnotic component of anaesthesia (0: isoelectric EEG to 100: patient is fully awake). In this study, the influence of high frequency artefacts >60Hz on BIS is evaluated.

Materials and Methods: A five minute EEG sequence representing general anaesthesia under sevoflurane was replayed to the BIS monitor using the EEG player device[1]. High frequency noise generated from uniform white noise using a 40th order Butterworth filter was added in 36 steps to the EEG signal. At each step the noise amplitude was increased by the factor 0.2 (SNR: 0.6 to –16.6dB). EMG, EOG and signal quality were recorded every 5s.

Results and Discussion: With higher amplitudes of high frequency white noise distortion, the BIS value increases, while signal quality does not change. The change of BIS is displayed in figure 1.

Conclusion(s): BIS values in the gamma range above 30Hz are often contaminated by noise artefacts such as e.g. EMG. The index calculation should
Materials and Methods:
Data were collected during urological procedures, was to develop an educational software able to simulate the State Entropy. Difficulty in knowing which target concentration to choose. The goal of this study was to develop a simulation software for the state entropy using PKPD models. Entropy was monitored, and Rugloop II® was used to collect data every 5s. An algorithm was developed to extract the different drug combinations. Each time propofol or remifentanil effect-site concentration were built (nonlinear least squares regression)[3]: PropCe+RemiCe+SD. A software was constructed allowing simulation of SEnt for any given combination of drugs. MATLAB R2007a was used. (Data: Means±SD).

Results and Discussion:
Data were collected from 20 patients, 13 male, age 54±14 years, weight 70±14 kg, height 166±9 cm. Surgeries were: prostatectomy (8), nephrectomy (5), urether (3), other (4). The data sets provided 312 time periods for analysis. The developed software allows the user to simulate anesthesia using PropCe and RemiCe target steering, obtaining SEnt average values (Av surface). As optional features, the 99% confidence intervals of the simulation can be viewed, and generated disturbances introduced (SD surface).

Conclusion(s): The developed software is very user friendly, and allows the assessment of the drug combinations effect on SEnt. It may be used to provide some means of training to anaesthesiologists not familiar with TCI. Future developments will include data from our data-basis to incorporate other types of surgery, ASA status and, eventually, the use of other anaesthesia indexes.

Acknowledgements:
Fundacao para a Ciencia e a Tecnologia, Portugal.

References:

3AP7-6
A new simulation software for the state entropy using propofol and remifentanil effect-site concentrations’ steering
A. Castro, F. Martins, P. Sa Couto, P. Amorim, C. Nunes
Departamento de Anestesiologia, Hospital Geral de Santo Antonio, Porto, Portugal

Background and Goal of Study: TCI anaesthesia has become recently commercially available. One of the problems encountered by new users is the difficulty in knowing which target concentration to choose. The goal of this study was to develop an educational software able to simulate the State Entropy (SEnt) of the EEG, using TCI of propofol and remifentanil.

Materials and Methods: Data were collected during urological procedures, with TCI anaesthesia of remifentanil and propofol (Minto[1] and Schneider[2]). The Anaesthesia Stress Index (ASI, Morpheus Medical, Spain) was defined as an adaptive neuro fuzzy inference (ANFIS) combination of EEG parameters (beta, Energy band 30–42 Hz), symbolic dynamics (0–30 Hz) and Heart Rate Variability. Hence, the ASI is based on parameters from both central and autonomous nerve system. The EEG parameters also serve for compensating the hypnotic effect of the drug, in order for the ASI to be more specific to noxious responses.

Materials and Methods: Under IRB approval and written informed consent, 110 patients undergoing ultrasonographic endoscopy (USE) were randomly assigned to receive a fixed concentration of either propofol (0, 1.5, 2, 3 mcg/mL) or remifentanil (0, 0.5, 1, 2 ng/mL) while the other drug was allowed to change depending on the clinical requirements. EEG, hemodynamic parameters and respiratory rate were recorded online (Rugloop II). The Ramsay score (RS) was applied at random time intervals. RS levels 5 and 6 were defined as response/no response to a painful nail-bed pressure applied to the thumb of the patient. The prediction probability (pk) was calculated using the jack-knife estimate and a logistic regression. A total of 1304 RSS and corresponding AEP indices were measured in 110 patients. The Pk mean (SE) are shown in table 1. The term “All RSS” means that values RSS 2,3,4,5 were classified as responders while RSS 6 as no response. As expected, the Pk for “All RSS” is higher than that for “All RSS”, which is a more demanding test. The boxplot of the ASI is shown in figure 1. The boxplot show 5, 25, 50, 75 and 95% percentiles.

Table 1. Pk values for the ASI vs RSS

<table>
<thead>
<tr>
<th>Pk (SD)</th>
<th>ASI (all RSS)</th>
<th>ASI (RSS 5 vs 6)</th>
</tr>
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<tbody>
<tr>
<td>Pk (SD)</td>
<td>0.87 (0.01)</td>
<td>0.92 (0.01)</td>
</tr>
<tr>
<td>p&lt;0.05; pk=0.5*</td>
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Conclusion(s): The results of the present study show that the ASI correlates well to response/no response to painful stimuli during propofol remifentanil sedation, more studies are warranted for further validation.

3AP7-7
Prediction of noceptive response by the anaesthesia Stress index (ASI) during ultrasonographic exploration (USE)
P. Gambus, E. Jensen, M. Jospin, P. Caminal
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Background and Goal of Study: The assessment of surgical stress and nociception during anaesthesia might be useful for the administration of analgesics. The Anaesthesia Stress Index (ASI, Morpheus Medical, Spain) was defined as an adaptive neuro fuzzy inference (ANFIS) combination of EEG parameters (beta, Energy band 30–42 Hz), symbolic dynamics (0–30 Hz) and Heart Rate Variability. Hence, the ASI is based on parameters from both central and autonomous nerve system. The EEG parameters also serve for compensating the hypnotic effect of the drug, in order for the ASI to be more specific to noxious responses.

Materials and Methods: Under IRB approval and written informed consent, 110 patients undergoing ultrasonographic endoscopy (USE) were randomly assigned to receive a fixed concentration of either propofol (0, 1.5, 2, 3 mcg/mL) or remifentanil (0, 0.5, 1, 2 ng/mL) while the other drug was allowed to change depending on the clinical requirements. EEG, hemodynamic parameters and respiratory rate were recorded online (Rugloop II). The Ramsay score (RS) was applied at random time intervals. RS levels 5 and 6 were defined as response/no response to a painful nail-bed pressure applied to the thumb of the patient. The prediction probability (pk) was calculated using the jack-knife estimate and a logistic regression. A total of 1304 RSS and corresponding AEP indices were measured in 110 patients. The Pk mean (SE) are shown in table 1. The term “All RSS” means that values RSS 2,3,4,5 were classified as responders while RSS 6 as no response. As expected, the Pk for “All RSS” is higher than that for “All RSS”, which is a more demanding test. The boxplot of the ASI is shown in figure 1. The boxplot show 5, 25, 50, 75 and 95% percentiles.

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Conclusion(s): The results of the present study show that the ASI correlates well to response/no response to painful stimuli during propofol remifentanil sedation, more studies are warranted for further validation.

3AP7-8
The influence of electrode positions on cerebral state index
S. Papadyn, M. Kreuzer, A. Hock, E. Kochs, G. Schneider
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Background and Goal of Study: Different monitors of the hypnotic component of anaesthesia use different electrode positions to capture an EEG channel.
The BIS A-2000 (Aspect Medical Systems) calculates its index from electrodes on the middle of the forehead and the temple, while the Cerebral State Index CSI (diameter a/s) requires an electrode placed on the left side’s mastoid. In this study, we compared CSI values calculated from simultaneous EEG recordings from the BIS and CSI positions.

Materials and Methods: 13h38min of EEG from the forehead and the mastoid from non premedicated patients receiving remifentanil (0,2 μg/kg/min) and either propofol (8-14μm) or sevoflurane (BisCm 0.5) were continuously recorded with a sample rate of 1kHz and stored on a personal computer. Both recorded channels were played back to the CSI. CSI values were recorded every second and Pearson correlation between the two channels was calculated. In addition, the concordance of the indices being in the same index range (“awake or sedation”) CSI<60,”anesthesia”) 39>CSI<61, (“deep anesthesia”) CSI<40 was evaluated [1]. The calculations were performed over all valid values and over values with signal quality (SQI) above 79%.

Results and Discussion: The correlation and concordance values are displayed in table1.

Table 1. Correlation and concordance values dependent on SQI and anaesthetic regimen

<table>
<thead>
<tr>
<th></th>
<th>Correlation</th>
<th>Concordance</th>
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<tr>
<td>Sevoflurane</td>
<td>0.60</td>
<td>0.30</td>
</tr>
<tr>
<td>Propofol</td>
<td>0.60</td>
<td>0.30</td>
</tr>
<tr>
<td>Both regimen</td>
<td>0.63</td>
<td>0.30</td>
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Conclusion(s): If all calculated index values independent from SQI are taken into account, both correlation and concordance are rather low. But with high SQI both correlation and concordance are very good. This may suggest that electrode position is a major factor of the artefact content of a recorded signal (e.g. EMG contamination), and with high SQI the electrode position does not have major influence on index calculation of the CSI.

References:

3AP7-10

Bispectral index score (BIS) and level of cortisol response with different types of anaesthesia in breast surgery

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Background and Goal of Study: Neuroendocrine response to surgical trauma is characterized by increase in cortisol level. This may be attenuated by different types of anaesthesia but more with depth of anaesthesia. We investigated the inhibition of the surgical stress response of cortisol in relation to Propofol-Fentanyl versus Sevoflurane-Fentanyl general anaesthesia and Bispectral index score (BIS) kept within the range 30–50 in breast surgery.

Materials and Methods: Prospective randomised study included 60 female with breast surgery, aged 38–76 years, ASA I–II. Patients were randomised in two groups according to the type anaesthesia. Group I with Propofol- Fentanyl (n=30) and Group II with Sevoflurane-Fentanyl (n=30). Premedication was similar in both groups (Midazolam 0.05 mg/kg and Atropine sulfate 0.001 mg/kg), induction with Propofol 2 mg/kg and Fentanyl 1–2 μg/kg. After placement of a laryngeal mask airway anaesthesia was maintained with Propofol 6 mg/kg/h and Fentanyl 2 μg/kg/h. In the Group II anaesthesia was maintained with Sevoflurane end-tidal-concentration 1–3%. Neuroendocrine blockade was obtained with atracurium in the both groups. The level of cortisol in serum was measured using radio immune assay (normal range 154–638 nmol/l). BIS monitoring was performed using the BIS® XP A 2000TM monitor (Aspect Medical Systems, Newton, MA, USA) and a smoothing rate of 15 s.

Results and Discussion: All of 60 patients completed the study according to the protocol. There were 26 radical mastectomy, 24 quadrantectomy with axillary dissection and 10 tumorectomy. No significant differences were detected in the maintenance of anaesthesia in hemodynamic parameters (blood pressure and heart rate) in both groups. There was no statistical difference in the basal level of cortisol and glucose before operation in both groups, p>0.05. The level of cortisol significantly change after induction of anesthesia in relation to the basal values, and increased after extubation in both groups p<0.05. The level of glucose was correlated with level of cortisol in the both groups. BIS was lower in the Sevoflurane-Fentanyl group (35±5) versus Propofol-Fentanyl group (45±5) but without statistical importance.

Conclusion(s): Level of cortisol response during breast surgery is correlated with the depth of anaesthesia measured by BIS more than the type of anaesthesias and the hemodynamic parameters.

Clinical and Experimental Circulation

4AP1-1

Role of NF-κB-dependent induction of cytokines in the downregulation of vasopressin V1A-receptors during CLP-induced circulatory failure

C. Schmidt, K. Höcherl, B. Kurt, M. Bucher
Anesthesiology, University of Regensburg, Regensburg, Bavaria, Germany

Background and Goal of Study: Vasconstrictor dysfunction due to diminished expression of vasconstrictor receptors possibly contributes to cardiovascular failure during sepsis. Here we characterize the impact of NF-κB and cytokines on CLP-(cecal ligation and puncture) cardiovascular dysfuction and regulation of vasopressin-V1a-receptors during inflammation.

Materials and Methods: In this prospective animal trial with male C57BL/6 mice the effects of CLP on hemodynamic parameters and V1a-receptor expression were measured in cytokine knock-out mice, in mice without or with treatment with glucocorticoids as well as in mice pretreated with small interfering RNA (siRNA) silencing NF-κB. Furthermore, the effects of cytokines on V1α-receptor expression were determined.
Results and Discussion: CLP resulted in a hyperdynamic circulatory failure with diminished blood pressure response to the V1-receptor agonist Phe2, Ile3, Dmf-vasopressin and downregulation of V1A-receptors. Dexamethasone treatment inhibited proinflammatory cytokine production and attenuated CLP-induced cardiovascular failure in parallel with attenuated downregulation of V1A-receptor expression. TNF-α, IL-1β, IFN-γ or IL-6 dose-dependently decreased V1A-receptor expression, whereas blocking single proinflammatory cytokines using knock-out mice did not diminish CLP-induced downregulation of V1A-receptors. In contrast, inhibition of NF-κB siRNA targeting NF-κB strongly reduced induction of cytokines, prevented septic circulatory failure and downregulation of V1A-receptor gene expression and improved survival of septic animals.

Results and Discussion: Propofol administration during both the preischemia and reperfusion period demonstrated protective effects on hemodynamic function and infarct size reduction. In the control group, the peak rate of the ventricular pressure increase (+dP/dtmax) (P<0.001) and the peak rate of the intraventricular pressure decline (-dP/dtmin) (P<0.001) were significantly decreased compared to the sham group. In the propofol group, the +dP/dtmax (P=0.003) and -dP/dtmin (P=0.002) were significantly improved compared to the control group. The infarct size was 57.4% of the area at risk in the control group, and was markedly reduced by administration of propofol during the peri-ischemic period to 29.6% in the propofol group (P=0.004).

Conclusion(s): Propofol, at a clinically relevant concentration infused during the peri-ischemic period, had a protective effect after regional myocardial ischemic-reperfusion injury in an in vivo rat heart model.

References:

4AP1-3
New index of velocity with half-logistic time constant for inotropism and lusitropism of isometric tension curve in mouse papillary muscle
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Department of Anesthesiology, Tokyo University School of Medicine, Itabashi-ku, Tokyo, Japan

Background and Goal of Study: Myocardial tension and left ventricular (LV) pressure curves are useful for evaluating myocardial and LV performance, especially inotropism and lusitropism. We found that half-logistic (HL) functions provide better fits for two contractions and two relaxation phases of the isovolumic LV pressure curve than mono-exponential (ME) function, and that HL time constants for the partial pressure curves (PL; ) would be superior indices of velocity. In the present study, we examined this possibility by testing the hypothesis that myocardial partial tension curves would be precisely fit using HL functions.

Materials and Methods: We compared HL and ME curve fits for the partial phases of the isometric twitch tension curves in 15 mouse LV papillary muscles. Original tension curves were evaluated in four temporal phases: from twitch stimulation to dP/dtmax (Phase I), from dP/dtmax to the peak tension (Phase II), from the peak tension to dP/dtmin (Phase III), and from dP/dtmin to the end-point (Phase IV). The goodness of fit was compared between HL and ME fits by the correlation coefficient (r) and residual mean squares (RMS).

Results and Discussion: The HL r-values were higher than the ME r-values at four Phases.

4AP1-2
The effect of propofol at clinical relevant concentration on the rat left ventricular function in an in vivo rat heart model
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Department of Anesthesiology and Pain Medicine, Gyeongsang National University Hospital, Jinju, Gyeongsang Nam Do, Korea

Background and Goal of Study: It is known that propofol protects myocardial tissue against a global myocardial ischemic-reperfusion injury in the isolated rat heart model. The aim of this study was to investigate whether propofol, at a clinically relevant concentration infused during both the preischemia and reperfusion (peri-ischemic) period, also provides a protective effect against a regional myocardial ischemic-reperfusion injury in vivo.

Materials and Methods: Rats were subjected to 25 minutes of coronary artery occlusion followed by 24 hours of reperfusion. Propofol or intralipid was administrated during 35 minutes starting 5 minutes before the onset of ischemia until 5 minutes after the onset of reperfusion. A micromanometer catheter was advanced into the left ventricle via the right internal carotid artery and the hemodynamic function was evaluated after 24 hours of reperfusion. The infarct size was determined by triphenyltetrazolium staining after 24 hours of reperfusion.
time derivative of LV pressure ($dP/dt_{max}$) to the LV end-diastolic pressure were analyzed at five temperatures of 30, 33, 36, 38, and 40°C at constant 2 Hz pacing rate in 27 excised, cross-circulated canine hearts. We evaluated $\tau_r$ and $\tau_t$ by curve-fitting using the half-logistic function equation, $P_t = P_0 \exp(-t/\tau_t) + P_u$. The relationships between the $\tau_r$ values and temperature, and between the $\tau_t$ values and temperature were curve-fit by the half-logistic, mono-exponential, and linear functions using the least squares method.

**Results and Discussion:** The correlation coefficient ($r$)-values of the half-logistic, mono-exponential, and linear function fits for $\tau_r$ and temperature were 0.7983, 0.7980, and 0.7966, respectively ($p < 0.001$).

The $r$-values of the half-logistic, mono-exponential, and linear function fits for $\tau_t$ and temperature were 0.7785, 0.7840, and 0.7858, respectively ($p < 0.001$).

**Conclusion(s):** $\tau_r$ and $\tau_t$ for the LV pressure fall increase with decreasing temperature and decrease with increasing temperature. Half-logistic function represents the best relationships between $\tau_r$ and temperature, and between $\tau_t$ and temperature.

**References:**

**4AP1-5**

**Endothelial alpha-2 adrenoceptors are necessary to induce clonidine-induced post-hypoxic vasomotoric protection**

M. Gourdin, G. Ponchaux, J. Jamart, M. De Kock
Department of Anesthesiology, Cliniques Universitaires UCL de Mont-Godinne, Yvoir, Belgium

**Background and Goal of Study:** Clonidine (CL), an $\alpha_2$-adrenoreceptor agonist, reduces perioperative myocardial ischemia in patients undergoing surgery1. In previous studies, we have showed that CL improves post-hypoxic vasoconstriction and endothelium-dependent vasodilatation (PVD) in young rats. Our experimental study intends to understand the mechanisms underlying this phenomenon.

**Materials and Methods:** After animal ethic committee approval, 120 rings aorta (4x3x) from 30 rats were studied according to a validated methodology2. For every aorta, CL (10-4M) was added in two randomized baths and two used as the control group (CTL). We have assessed the effect of CL on aorta without endothelium and on aorta having beforehand received Rauwolscine (RW), an $\alpha_2$-adrenoreceptor antagonist, 15 minutes before randomization. In another group, with intact endothelium, CL was substituted by UK 44304 (UK, 10-4M), a specific $\alpha_2$-adrenoreceptor agonist. After fifteen minutes, all baths were washed and 25 minutes of hypoxia (PpO2 <10mmHg) was applied. After 40 minutes re-oxygenation (PpO2 >400 mmHg), post-hypoxic vasoconstriction was evaluated by cumulative phenylephrine (PE) concentrations (10-10-10-4M). Post-hypoxic endothelium-dependent vasodilatation was investigated respectively by cumulative acetylcholine and nitroprusside concentrations (10-10-10-4M) on pre-contracted aorta. The statistical analysis used GEE regression, $p<0.05$ significant.

**Results and Discussion:** In CL group, post-hypoxic endothelium-dependent vasodilatation is significantly different from the CTL group ($p=0.038$). When considering post-hypoxic endothelium-independent vasodilatation and post-hypoxic vasoconstriction no significant difference was found.

**References:**

**4AP1-6**

**Clonidine enhances post-hypoxic dysfunction in old rats**

M. Gourdin, G. Ponchaux, J. Jamart, M. De Kock
Department of Anesthesiology, Cliniques Universitaires UCL-Mont-godinne, Yvoir, Belgium

**Background and Goal of Study:** In previous studies, we have showed that clonidine (CL), an $\alpha_2$-adrenoreceptor agonist, improves post-hypoxic vasoconstriction and endothelium-dependent vasodilatation (PVD) in young rats. Our experimental study intends to evaluate the CL effect on post-hypoxic vasomotoric in old rats.

**Materials and Methods:** After animal ethic committee approval, 60 rings aorta (3x20) from 15 old rats (11-12 months) were studied according to a validated methodology1. CL (10-4M) was added in two baths (CL Group). Two were used as the control group (CTL Group). After fifteen minutes, all baths were washed and 25 minutes of hypoxia (PpO2 <10mmHg) was applied. After 40 minutes re-oxygenation (PpO2 >400 mmHg), post-hypoxic vasoconstriction was evaluated by cumulative phenylephrine (PE) concentrations (10-10-10-4M). Post-hypoxic endothelium-dependent and independent vasodilatations were investigated respectively by cumulative acetylcholine and nitroprusside concentrations (10-10-10-4M) on pre-contracted aorta. The statistical analysis used GEE regression, $p<0.05$ significant.

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**References:**

**4AP1-7**

**Inhaled carbon monoxide mediates its antiinflammatory qualities in the lungs during cardiopulmonary bypass by induction of the heat shock response**

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Department of Anesthesiology and Intensive Care Medicine, University Hospital Freiburg, Freiburg im Breisgau, Germany

**Background and Goal of Study:** During cardiopulmonary bypass (CPB) a pulmonary inflammatory response is induced, causing lung injury and functional impairment1. Inhalative carbon monoxide (CO) reduces pulmonary cytokine formation2 and contributes to organ protection. We hypothesised (a) that these effects are mediated by induction of the heat shock response, and (b) that an inhibition of the heat shock response with quercetin (Q) would attenuate effects of CO.

**Materials and Methods:** Pigs (30 kg) were randomized to SHAM operation [n=3], standard cardiopulmonary bypass [n=7] or CPB with inhalation of 250 ppm CO [n=7] 1 hour prior to the operation. An identical number of animals were given 50 $\mu$mol/kg Q i.v. preoperatively. Pulmonary cytokine expression of IL-6 and IL-10 and expression of HSP-70 were examined by ELISA. Activation of heat shock factor-1 (HSF-1) was analyzed by EMSA. Lung tissue was stained with HE to demonstrate lung injury.

**References:**
Results and Discussion:

CO activated HSF-1 binding activity, which was inhibited by Q. CO significantly attenuated CPEB-induced IL-6 expression. Q treatment reversed CPEB-mediated induction of IL-6. In addition, CO-induced IL-10 expression was likewise decreased in the Q-group. Inhibitory CO induced HSP-70 expression, which was significantly attenuated in Q-treated animals. Histological analysis revealed edema, atelectasis and the migration of inflammatory cells into the lungs in the CPB group. CO significantly reduced lung injury, whereas Q suspended the CO mediated effects.

References:

4AP1-8

Changes of heart rate variability during severe normovolemic anemia

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Background and Goal of Study: Tolerance of acute normovolemic anemia is one of the cornerstones of modern blood sparing strategies[1]. However, in a clinical setting determination of the outer limits of acute anemia with standard techniques (e.g. decline of VO2) is complex and cumbersome. In contrast to this, changes of heart rate variability (HRV) might be an easily applicable, early stage indicator for anemia induced restriction of myocardial oxygenation. Therefore the aim of the study presented is to evaluate the changes of HRV in extreme normovolemic anemia.

Materials and Methods: 14 anesthetized pigs (bw 27.5±5.5kg) were hemodiluted by exchange of whole blood for hydroxyethyl starch (6% HES, 200 000/0.5) from a hemoglobin concentration of 4 g/dl (time point “4 g/dl”) until a hemoglobin concentration of 8 g/dl (time point “8 g/dl”) was met (time point “8 g/dl”). Time- and frequency domain calculations of HRV and Poincaré plots were performed on two short-term recordings (5 min of consecutive RR-intervals each) at each time point [2]. A paired student’s t-test was performed to determine differences between the two time points.

Results and Discussion: No significant differences in frequency domain calculations were found between the two time points. At Hb 4g/dl standard deviation of normal to normal RR-intervals (SDNN, 5.7±2.3 vs. 4.4±1.2), standard error of mean (SEM, 0.2±0.1 vs. 0.1±0.0), coefficient of variance (CV, 1.0±0.4 vs. 0.6±0.2), variability index (VI, 1.7±0.6 vs. 1.1±0.4), cardiac sympathetic index (CSI, 3.6±1.9 vs. 2.2±0.9) and cardiac vagal index (CVI, 2.4±0.4 vs. 2.1±0.3) were significant lower compared to Hb 8g/dl (p<0.05).

Conclusion(s): Acute normovolemic anemia resulted in significant changes of several time domain parameters of HRV, whereas none of the frequency domain parameters was altered. The changes observed occurred before “physiological” transfusion triggers (ST-segment alteration, hypotension, tachycardia) indicated deterioration of myocardial tissue oxygenation. Therefore this specific pattern of HRV changes could probably be used as an early stage indicator for anemia induced restriction of myocardial ischemia. However, further studies are needed to describe the time course of different parameters of HRV during progressive anemia and at the critical hemoglobin concentration.

References:

4AP1-9

Effects of propofol on vasopressin-induced vasoconstriction in isolated human gastroepiploic artery

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Background and Goal of Study: Vasopressin is an important vasoconstrictor when grafting arteries during a coronary artery bypass graft (CABG). On the other hand, vasopressin has also been used for prophylactic treatment of refractory vasodilatory shock during CABG. We evaluated the effect of propofol on vasopressin-induced contractions in the isolated human gastroepiploic artery (GEA).

Materials and Methods: Normal segments of human GEA were obtained from 35 patients (43-74 yr), undergoing subtotalgastrectomy. Vasopressin-induced concentration contractions (from AVP 10-9 to 10-6 M) were measured in the vascular rings (intact or denuded endothelium). AVP induced a concentration contractions (from AVP 10-9 to 10-6 M) were measured after exposure to without propofol, propofol 10-5, 10-4, 10-3 M in denuded endothelium. In the denuded vascular rings, with or without pretreatment of glibenclamide (10-5 M), were exposed to with propofol, and vasopressin-induced concentration contractions were measured.

Results and Discussion: AVP induced contraction was inhibited high dose (>10-3 M) propofol. High dose propofol inhibit the AVP induced contraction in GEA independent of ATP sensitive potassium channel.

Conclusion(s): These results suggest usual dose of propofol anesthesia does not inhibit AVP-induced-contraction in isolated human GEA. High dose (>10-3 M) propofol inhibit AVP induced-contraction in isolated human GEA.

4AP1-10

Membrane stabilization in harvested vein graft storage: Effects of lidocaine

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Anesthesiology and Reanimation, Gazi University Faculty of Medicine, Ankara, Turkey

Background and Goal of Study: The greater saphenous vein (GSV), is the most frequently used conduit for coronary artery bypass grafting (CABG). Endothelial damage appears to be the major cause of graft failure. This injury may occur at the time of harvesting, due to blunt surgical trauma and stretch, or to ischemia and superoxide free radical generation during prolonged ex vivo preservation, storage conditions, and distension or pressurization. Local anesthetics have been reported to attenuate the inflammatory response and is-
Materials and Methods: GSV harvested from 11 patients, operating for CAAs, were divided into 3 segments. These segments were studied in groups control, SP and L: Control Group (Group C): without any manipulation, native GSV were divided into 2 segments, for histopathological and biochemical analyze. Group SP: after applying a pressure of 100 mmHg for 2 minutes by filling the vein with isotonic sodium chloride (SP), saphenous vein graft was kept in SP for 45 minutes. Group L: after applying a pressure of 100 mmHg for 2 minutes by filling the vein with SP + 100 mg lidocaine, saphenous vein graft was kept in SP + lidocaine for 45 minutes. Then grafts in groups SP and L were divided into 2 segments for histopathological and biochemical analyze. All saphenous vein segments were examined under light microscope and scored from 0 to 30: native, 3: worst. In the saphenous vein tissues, nitric oxide synthase (NOS), nitric oxide pool (NO+NO2 -), Super oxide dismutase (SOD) and thiobarbutiric acid reactive substances (TBARS) levels were measured.

Results and Discussion: Histopathological examination of the grafts in groups L and C were similar, but histopathological scoring of grafts in group SP were statistically higher than group C. SOD activity was higher in the groups L and SP than in group C. NO pool was higher in the group L and SP than in group C. SOD activity was higher in the group L than in group SP. SOD activity was lower in the SP group than in group C. There was no significant difference between TBARS levels of all groups.

Conclusion(s): Histopathological damage already occurs during the harvesting of GSV before placing it into the preservation solution. As a result lidocaine was found to be protective when added to preservation solution, on saphenous vein endothelium. In this experimental setup, SP + lidocain solution is an acceptable preservation solution for the saphenous vein.

4AP2-2
How long does it takes CCO to decrease during anhepatic phase of orthotopic liver transplant with caval-flow preservation?
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Results and Discussion: Cardio-Output fell in 52% of the patients after a partial cross clamping but following this shape.

Conclusion(s): Cardio-Output fall is not shown in the monitor as early as we can expected and it is always later than SV02.

4AP2-3
Anaesthetic implications of endovascular aortic aneurysm repair
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Background and Goal of Study: Endovascular Aortic Aneurysm Repair (EVAR) is gaining widespread acceptance as a minimally invasive technique alternative to open repair for patients that standard approach may result prohibitive because of co-morbid conditions with good short and medium term results.

Materials and Methods: We performed 5 consecutive elective descending thoracic EVAR under general anaesthesia. The range of co-morbidities included: hypertension, severe ischemic heart disease, history of previous abdominal aortic aneurysm repair, COPD, pacemaker for complete atrioventricular block, patients were defined as ASA grade III. AHA/ACC guidelines were followed to risk stratify patients and realize preoperative cardiac optimization. All patients were prepared as for open repair except for a CVP line and invasive BP was monitored. General anesthesia was induced and oral tracheal intubation was carried out. Hemodynamic stability was achieved through maintenance with Sevoflurane and Remifentanil perfusion, and controlled hypotension was gained by titrating Remifentanil perfusion to target MAP to assist proximal stent deployment and to attenuate sudden increase in SVR. Fast-track extubation was pursued at the end of surgery with diphenhydramine 35.4

Results and Discussion: Operating conditions were judged as excellent due to immobility of the patient, precise hemodynamic control and possibility to achieve periods of apnoea and controlled hypotension to facilitate stent placement. One patient developed cerebral infarction and one patient presented post implantation syndrome, both resolved with conservative treatment in 7 days. The rest of the patients were discharged from the hospital within 3 days.

Conclusion(s): Operative times, transfusion requirements, perioperative mortality, length of surgical high dependency unit and overall hospital stay were lower for patients undergoing EVAR. Recent studies seem to demonstrate certain benefits of local/regional anesthesia and conscious sedation over general anesthesia for abdominal EVAR by morbimortality reduction. We choose general anesthesia for thoracic EVAR because major hazard is always a possibility and conversion to open repair can be guaranteed with patient under general anesthesia with strict ventilatory and hemodynamic control. Studies to refine the anaesthetic practice for an operative technique that converts in attractive concept for high-risk patients affected by thoracic aneurysms are needed.

4AP2-4
Oxygen extraction ratio as the predictor of delayed postoperative recovery after the abdominal surgery
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Background and Goal of Study: The outcomes of patients in critical condition depends on the adequate oxygen transport (Panagiotis K., 2005). The postoperative recovery differ between patients. Goal of study is to determine the risk of delayed recovery of temperature homeostasis and metabolism in patients underwent abdominal surgery under combined epidural anesthesia.

Materials and Methods: The study was performed 24 hrs postoperatively on 56 patients underwent abdominal surgery (duration 6-9 hours) under combined epidural anesthesia (epidural ropivacain 0.5%/ 8-12 ml/h at THV-Thix level) with mechanical ventilation. Depend on rate of oxygen extraction index (ERO2) patients were divided in three groups: group 1 (n=14) – low ERO2 (< 21%), group 2 (n=15) – normal ERO2 (22-32%), and group 3 (n=28) – high ERO2 (>33%). Were assessed central hemodynamics, gas exchange, metabolic rate and temperature variables. Statistic was performed with Kruskall-Wallis test, the data shown as Me (q25-Q75).

Results and Discussion: In group 1 (ERO2 14.0 (11.0-15.2%)) was revealed the decreased cardiac index 2.3 (2.1-2.5) L/min/m2, mild hypothermia 35.4 (35.0-35.9) degree C, decreased DO2 9.2 (8.0-10.8) ml/kg/min and VO2 1.6 (1.4-2.5) ml/kg/min. In group 2 (ERO2 30.0 (25.5-30.5%)) was revealed the decreased cardiac index 2.7 (2.5-3.6) L/min/m2, mild hypothermia 35.6 (35.1-36.0) degree C, decreased DO2 11.0 (10.1-12.0) ml/kg/min and VO2 2.6 (2.4-3.6) ml/kg/min. In group 3 (ERO2 36.5 (34.5-39.0%)) was revealed the decreased cardiac index 2.9 (2.4-4.2) L/min/m2, mild hypothermia 35.7 (35.3-36.0) degree C, decreased DO2 8.6 (7.8-9.6) ml/kg/min and VO2 3.6 (2.4-4.0) ml/kg/min. The patients with low ERO2 (group 1) characterized with hemodynamic hypoxia caused with low cardiac output. Patients with high ERO2 (group 3) may be characterized as combination of the low cardiac output and normovolemic haemodilution.

Conclusion(s): Determination of ERO2 level after long abdominal surgery under combined epidural anesthesia allow to consider the risk factors of delayed
postoperative recovery. At low ERO2 risk factor is the hypodynamia, at high ERO2 level the hypodynamia and decrease of hematocrit level.

4AP2-5
Levosimendan election inotrope in cardiac surgery to high risk patients
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Background and Goal of Study: Validating use and safety of the levosimendan as initial drug in high risk patients. It improve the inotropism and avoid the increase of the consumption of myocardioc oxygen.

Materials and Methods: We have studied 10 patients programmed for cardiac surgery with low ejection fraction (EF<40%). Standard monitoring with pulmonary artery catheter. After the anesthetic induction we proceeded to measure the haemodynamics parameters: MAP, HR, CVP, PCWP, SVR, PVR, CI, SV and SvO2, if patient had an CI during CPB. Patients with recent myocardial infarction or unstable angina were excluded. Anesthesia consisted of a total intravenous technique with midazolam, sufentanil and pancuronium. Non-pulsatile mild hypothermic (32°C) cardiopulmonary bypass (CPB). Earlier studies described apoptosis in human atrial tissue after coronary artery bypass surgery with CPB (ref). Data on the clinically more relevant ventricular tissue are not available. We compared key mediators of apoptosis in human left ventricular and right atrial tissue obtained before and after cold cryopreservation.

Materials and Methods: After IRB approval and written informed consent we prospectively studied 10 patients scheduled for coronary artery bypass graft surgery with CPB. Patients with recent myocardial infarction or unstable angina were excluded. Anesthesia consisted of a total intravenous technique with midazolam, sufentanil and pancuronium. Non-pulsatile mild hypothermic (32°C) CPB was performed with a membrane oxygenator. Aprotinin was not used. Tissue samples were obtained from the right atrial appendage and the left ventricle at the start of CPB before aortic cross clamp (AoX) and at the end of CPB 15 min after release of (AoX). Immunohistochemistry for caspase-3 and TUNEL staining was performed on myocardial tissue sections. Labeled cells were counted and expressed per microscopic field. Data are expressed as mean ± SD and analyzed using paired t-test, Mann-Whitney U test and correlation analyses where appropriate. Statistical significance was accepted at p < 0.05.

Results and Discussion: Surgery (179±36 min) and postoperative course in all patients (60±10 yrs) was uneventful. CPB time was 80±25 min, with AoX of 46±17. After release of AoX Caspase-3 activity in ventricular tissue was significantly higher, while atrial activity did not change. However, TUNEL staining for apoptosis showed an increase in both ventricular and atrial tissue after AoX (figure).

Conclusion(s): In this study immunohistochemistry clearly demonstrates activation of apoptosis in human left ventricular tissue after cold cryopreservation cardiopegia. It’s observed fall of the SVR but obtaining an stable MAP thanks to the phenylephrine (figure 2).

Use of levosimendan in perioperative period like it’s a good inotrope, it doesn’t change diastolic phase, doesn’t increase the consumption of myocardial O2 and is a vasodilator coronary, doing of it an ideal drug for high risk coronary surgery with cold blood cardioplegic solutions seem to be superior for myocardial protection during aortic cross-clamping and have decreased morbidity and mortality of cardiac procedures (1). The aim of this prospective study was to assess whether increasing infusion rate of intermittent cold blood retrograde cardioplegia might improve protection against myocardial injury and inflammatory response during on-pump coronary surgery.

Materials and Methods: Twenty-four patients undergoing coronary surgery with hypothermic (32°C) cardiopulmonary bypass (CPB) were randomly allocated in 2 groups. Group 1 received intermittent cold (10-12°C) blood retrograde cardioplegia during 2 minutes, group 2 during 4 minutes. Cardiac troponin I, myocardial fraction of MB-creatinine kinase, C-reactive protein (CRP), fibrinogen, white blood cell, neutrophil, lymphocyte and monocyte counts were obtained from arterial blood samples before induction of anesthesia, before and after CPB, and during the postoperative period (0, 8, 24, 48 hours). Hemodynamic indexes (cardiac output and systemic vascular resistance) were obtained before and after bypass using Swan-Ganz or arterial femoral Picco catheter monitoring. Ventricular fibrillation (VF) after aortic declamping and postoperative atrial fibrillation (AF) were recorded. Results expressed as mean±SEM were analysed using unpaired student t-test and Fisher’s exact test (p<0.05, significant).

Results and Discussion: Demographics, preoperative status, and number of grafts, did not differ between groups (p>0.05). Myocardial injury markers, hemodynamic parameters, use of vasopressor and inotropic drugs, VF, ICU and hospitalization duration did not differ between two groups (p>0.05). Regarding inflammatory response, median values of CRP were significantly lower in group 2 at 24 hours (29.99±6.22 vs 138±14.22, p<0.0001), and fibrinogen lower in group 2 at 24 hours (240±10±20.93, p<0.0001) and 48 hours (273±45±43 vs 686±4±14, p=0.0139). Despite implication of CRP in genesis of AF (2), we did not observe enhanced incidence of AF in group 1 (2/12 vs 5/12, p=0.37).

Conclusion(s): Our results suggest that four minutes prolonged intermittent cold blood retrograde cardioplegia reduces systemic inflammatory response to 24 hours postoperatively after CPB, and ensures myocardial protection comparable to the one obtained with conventional two minutes infusion.

plegia and arrest. Results in atrial tissue show a different characteristic, suggesting that activation of apoptosis after CPB is not uniformly distributed throughout the heart.

References:
1 Ramírez B; Circulation 2006; 114; 257-263.

4AP2-8
Low-dose epinephrine infusion in inadvertent hypothermia prevention during surgery
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Background and Goal of Study: Epinephrine infusion is widely used in current anesthetic practice to maintain cardiac output. Our goal was to investigate the possible role of low-dose epinephrine in inadvertent hypothermia prevention during surgery.

Materials and Methods: On institutional approval and informed consent, 178 ASA III patients, scheduled for elective total hip replacement (H, n=90) or anterior resection of the rectum for cancer (R, n=88) under epidural (bupivacaïne, T10-11; puncture level) and light general anaesthesia, were randomly distributed among three subgroups regarding hypothermia prevention technique.

In subgroup I, no specific prevention was employed; in subgroups II and III, epinephrine infusion (0.1,0.018 mg kg\(^{-1}\) min\(^{-1}\)) was used during all the time of anesthesia, in subgroup II it was accompanied with external air warming. Besides common monitoring (NIBP, ECG, SpO\(_2\), capnography, skin temperature), cardiac (Cl, \(\text{mL min}^{-1}\)) stroke volume (SV, \(\text{mL}\)) and systemic vascular resistance (SVR, dyn s \text{cm}^{-5}\) were measured and calculated. Intraoperative hypothermia was defined as TTmin < 36.5° C.

Results and Discussion:

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Group</th>
<th>n</th>
<th>TTmin</th>
<th>CImax</th>
<th>SVImax</th>
<th>SVRImax</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>H</td>
<td>34</td>
<td>34.0±0.9°</td>
<td>2.8±1.0</td>
<td>39.2±1.5</td>
<td>2754±504</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>26</td>
<td>34.1±0.4°</td>
<td>2.6±0.3</td>
<td>37.4±1.0</td>
<td>2433±712</td>
</tr>
<tr>
<td>II</td>
<td>H</td>
<td>31</td>
<td>35.0±0.7°</td>
<td>3.7±1.7</td>
<td>56.1±1.4</td>
<td>1904±363</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>30</td>
<td>34.6±0.4°</td>
<td>3.5±0.5</td>
<td>49.8±3.5</td>
<td>1795±429</td>
</tr>
<tr>
<td>III</td>
<td>H</td>
<td>25</td>
<td>36.3±0.5°</td>
<td>3.6±0.4</td>
<td>58.2±1.7</td>
<td>1990±442</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>32</td>
<td>36.3±0.7°</td>
<td>3.7±1.5</td>
<td>49.1±2.8</td>
<td>1563±328</td>
</tr>
</tbody>
</table>

*p<0.05 vs. subgroup I; **p<0.05 among all the subgroups.

In subgroup I minimal TT was lowest in both H and R groups, while in group II normothermia was maintained (TTmin=36.6°). Neither tachycardia nor hypotension were observed in both groups II and III; and there were no differences in heart rate and blood pressure with subgroup I. However, in subgroups II and III hemodynamic data analysis suggests, that SVI and CI rise with SVRI fall play a role in improving right ventricular function without an alteration in systemic vascular resistance.

Conclusion(s): Low-dose epinephrine infusion could be used for inadvertent hypothermia prevention during surgery.

4AP2-9
Iloprost and iNO for weaning from cardiopulmonary bypass during implantation of a left ventricular assist device
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Background and Goal of Study: Right- heart (RV) failure after implantation of a LVAD is associated with an increase in morbidity and mortality. Application of low-dose acting vasodilators into the pulmonary circulation system appears to be a promising approach to reduce the right ventricular afterload without a significant alteration in systemic blood pressure.

Materials and Methods: 14 patients who received intra-operative iloprost after implantation of a LVAD were analysed. Group 1 (initial administration of iloprost); group 2 (initial administration of iloprost); group 3 (initial administration of NO in combination with iloprost).

Results and Discussion: No significant side effects were attributed to either NO or iloprost. One patient from group 2 (n=4) required temporary mechanical right heart support. 6 patients of group 1 (n=6) with RV failure received additional iloprost, and one patient from group 2 (n=4) was administered additional NO. Iloprost was administered by using a specific ultrasonic nebulizer device.

Conclusion(s): Inhaled iloprost and iNO have the potential to prevent an acute RV failure after implantation of a LVAD. Risk patients should be treated with iNO in combination with iloprost. Randomized studies are needed to test procoagulant nebuliser in inhalation detail.

4AP2-10
Is hyperthermic intraperitoneal intraoperative chemotherapy cardiotoxic?
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Background and Goal of Study: Cyclothermidation with hyperthermic intraperitoneal chemotherapy (HiPc) is a treatment with a high morbidity. Cardiotoxicity has been reported as a side effect of ant-cancer drugs, and after other pathological situations associated with elevated temperatures as the heat stroke and thermal injury. Cardiac troponins are used to monitor myocardium damage after chemotherapy. However there are not previous studies that have been evaluated the impact of HiPEC on myocardium. The aim of this study was to evaluate changes in cardiac troponin T (cTnT) after HiPEC.

Materials and Methods: We have studied 19, ASA I and II, consecutive patient with peritoneal carcinomatosis scheduled to HiPEC. The anesthetic protocol was standardized. Blood levels of cTnT were assessed before HiPEC and for the first 3 days after surgery. Preoperative echocardiography, previous chemotherapy as well as intraoperative haemodynamic adverse events were recorded. Statistical: Chi-Square test, Student’s t-test.

Results and Discussion: There were 20 procedures (One patient had two HiPEC) The average age was 62±10 and there were 80% of females. Tropion-T levels increased in 6 patients during the first 3 days after surgery. The increase was in mild and moderate grade, according to the National Cancer Institute Common Toxicity Criteria Classification. The cTnT increases were not related with surgical duration, carcinomatosis, peritonitis index, maximum T° and lactated achieved during procedure, chemotherapy agent used, cardiac adverse events during surgery nor intensive care stay. There were a tendency between the troponin level and female gender (80% vs. 3%) and with previous diastolic dysfunction (60% vs. 20%), but without statistical signification, p= 0.09.

Conclusion(s): The incidence of cardiac toxicity associated with HiPEC was low. Although troponin’s independent predictive value seems to be reliable, our data do not address the immediate consequences associated with HiPEC related cardiac insult. The effect of cTnT elevation on clinical outcome is unclear and will require further investigation.

Acknowledgements: To Dr. L. Gonzalez Bayon.

References:
1 Gacsa G, de Lemos JA; Progress in Cardiovascular Diseases 2007; 50: 151-166.

4AP3-1
Evaluation of different cardiac risk indices for patients undergoing noncardiac surgery
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Background and Goal of Study: Anesthesiologists will be confronted with an increasing population of patients undergoing noncardiac surgery who are at risk for cardiac complications in the perioperative period. Perioperative cardiac complications are responsible for significant mortality and morbidity, and prediction of cardiac complications is important in the medical management of patients. The aim of the present study was to determine the incidence of perioperative cardiac complications and to compare the accuracy of four indices currently used for predicting perioperative complications (ASA Classification, NYHA Classification, the modified Detsky risk index and ACC/AHA Guidelines). A total of 145 patients undergoing noncardiac surgery were enrolled in this prospective study (Group A 50 patients undergoing intrapleural and Group B 50 patients undergoing breast and thyroid surgery). Predictive factors for perioperative cardiac complications were assessed through clinical history, physical examination and from preoperative testing, cardiac risk were evaluated and all patients were classified according to four indices of cardiac risk. The patients were followed up during the perioperative period and after surgery until leaving hospital to assess the occurrence of all cardiac events. Major cardiac events included myocardial infarction, unstable angina, acute pulmonary edema and death. To determine and com-
Short-term outcome of major vascular surgery whether or not identified at cardiac risk

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Background and Goal of Study: The American College of Cardiology/American Heart Association recommend preoperative coronary revascularization in selected patients (1), but a randomized trial that showed no difference in outcomes associated with revascularization (2) analyzed the cardiac outcome of patients with or without preoperative coronary angiography.

Materials and Methods: 70 consecutive patients undergoing an elective abdominal aortic repair between 09/2004 and 09/2006 were reviewed; 15 had no stress test and no angiography. Focusing on the 55 subjects with stress-testing: (a) 23 had myocardial ischemia or vavular disease, 14 of whom underwent coronary angiography, (b) 6 with a negative stress test underwent an angiography for dysymnia, poor venricular function, previous heart surgery, dyspnea or angina. A Student t-test compared stress-tested patients with vs. without coronaryography. A p-value of ≤ 0.05 was considered significant.

Results and Discussion: Preoperative characteristics of both groups were similar. Table 1 details post-coronarography management. Table 2 shows the characteristics of patients undergoing or not a coronary angiography. Half of the 16 positive angiographies were followed by a corrective intervention; 1 man deemed inoperable for CABG experienced a periopeirical myocardial infarction.

Table 1. Results of coronarography

<table>
<thead>
<tr>
<th>Negative angiography (N = 4)</th>
<th>Positive angiography (N = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stenting N = 3</td>
<td>CABG N = 4</td>
</tr>
<tr>
<td>Medical treatment N = 8</td>
<td>Vascular surgery N = 1</td>
</tr>
</tbody>
</table>

Table 2. Patient characteristics

<table>
<thead>
<tr>
<th>Coronography</th>
<th>No Coronography</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-blockers</td>
<td>11 (55%)</td>
<td>15 (43%)</td>
</tr>
<tr>
<td>Cardiac Events</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max c-Tn-I, ng/mL, median (P05-75)</td>
<td>0.08 (0.01-0.15)</td>
<td>0.02 (0.01-0.13)</td>
</tr>
<tr>
<td>ICU stay, d, mean (SD)</td>
<td>2.3 (2.0)</td>
<td>1.6 (0.9)</td>
</tr>
<tr>
<td>Hospital stay, d, mean (SD)</td>
<td>14.1 (12.4)</td>
<td>10.8 (6.8)</td>
</tr>
</tbody>
</table>

Alpha = fat embol.; beta = CI bias; c = hemorhage.

Conclusion(s): There was no significant difference in short-term cardiac morbidity and mortality between patients with or without preoperative coronaryography. When followed by an intervention coronaryography delayed surgery for up to 6 months. Because we ignore whether patients were lost to follow-up between coronaryography and aortic surgery, it cannot be concluded that a coronaryography and the ensuing cardiac interventions reduce the risk in patients scheduled for aorta repair.

References:

Serum S-100B protein levels as a predictor of short-term neurocognitive outcome following off-pump coronary revascularization

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Background and Goal of Study: Abeit off-pump coronary artery bypass grafting (OPCAB) technique is intellectually appealing, myocardial dislocation and hemodynamic changes seem to be predisposing factors to cognitive decline. Goal of the study was to investigate the pattern of release of the neurobiochemical marker protein S-100B during and after OPCAB surgery and its clinical relevance in predicting short-term cognitive outcome.

Materials and Methods: After ethics committee approval and informed consent, adult patients scheduled for their first elective OPCAB surgery were studied prospectively. Blood samples from jugular bulb (jv) and arterial (art) catheters for serum S-100B were collected on eight time points: induction of anesthesia, during the grafting of 3 main coronary arteries, after sternal closure, compared to the baseline. Cognitive brain function was notably impaired (26.6%) at 2-day follow-up, but recovered almost to normal (3.3%) 7 days later. S-100Bart (≥0.44 μg/L) and S-100Bjv (≥0.53 μg/L) levels had a sensitivity of 87.1% (95% CI: 80.2-92.8) and specificity in beta-blocked patients. We assessed the outcome of our patients who underwent off-pump vs. non-off-pump surgical treatment.

Materials and Methods: We reviewed 70 consecutive patients undergoing elective abdominal aortic surgery from 9/2004 to 9/2006. A Student t-test compared paired patients with stress-testing to those without; a p-value ≤ 0.05 was considered significant.

Results and Discussion: There was no significant difference in cardiac events; 30 day mortality was significantly higher in patients who had not undergone testing, but this was due to non cardiac complications.
82.6% (95% CI: 75.8-88.6) respectively, in identifying cognitive de-mentation at 2-day follow up.

Conclusion(s): OPCAB surgery promotes a transient S-100B release, which in turn seems to be quite predictive of early intellectual impairment. By identifying the pattern of release in patients with uneventful recovery, disproportionate ele-vation of S-100B protein in jugular bulb or arterial blood, may act as a predictor of adverse neurocognitive outcome.

References:

4AP3-5
Postoperative myocardial damages after hip fracture repair are frequent and associated with a poor long term cardiac outcome. A three hospitals study
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Background and Goal of Study: Cardiac complications are the leading cause of late mortality and morbidity after hip fracture repair. The aim of this study was to assess its correlation with perioperative myocardial damage (PMD) detected by serial measurements of troponin Ic (TnIc).

Materials and Methods: 75 patients in three academic hospitals had daily measurement of troponin Ic (TnIc) during the three first postoperative days. Values above the 99th percentile were considered positive. Major cardiac complications (cardiac death, myocardial infarction and cardiac failure) and all causes deaths were recorded during hospital stay and six months after surgery.

Results and Discussion: 75 patients were included. 20/75 (26.7%) showed PMID with TnIc elevation and 72 patients had a 6 months follow-up. Six months after surgery, mortality and incidence of major cardiac complications (MCC) were 21% and 14.7% respectively (figure 1). Multivariate analysis showed that variables associated with mortality were age and PMID (OR=3.6 CI 95%: 1.02-12.7), and that the only variable associated with MCC was PMID (OR=4.8 CI 95%: 1.5-28.7).

Conclusion(s): After hip fracture repair, PMID is very common and associated with a 6.6 fold increased incidence of long-term major cardiac complications and a 3.6 fold increased mortality as compared to patients with patients free of PMID. Despite its small sample size and the need for further studies, this study suggests that patients undergoing hip fracture repair may be at high risk of cardiac events and that PMID is associated with a poor long term outcome.

References:

4AP3-6
Incidence and time course of postoperative myocardial ischemia with TnIc release after major orthopedic surgery
S. Ausset, E. Lambert, P. Jault, I. Peleu, H. Le Floch
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Background and Goal of Study: Postoperative myocardial ischemia with Tro-ponin Ic (TnIc) release is associated with an increased long term mortality and morbidity[1]. The frequency and the gravity of this phenomenon had been studied after orthopaedic surgery but its timing and risk factors had not been described in this setting.

Materials and Methods: During three years, all patient undergoing major joint surgery in a multidisciplinary hospital had daily measurements of TnIc for the 3 first postoperative days.

Results and Discussion: 378 patients were included. 313 had 3 TnIc dosages, 42 had 2 dosages and 23 only one dosage. 21 (5.6%) patients exhibited TnIc beyond the pathologic threshold, 12 on the first postoperative day (D1), 18 on the second (D2) and 13 on the third (D3). The onset of TnIc elevation occurred on D1 or D2 for 10/21 patients and on D3 for one patient. Peak levels of TnIc occurred on D1 for 6 patients, D2 for 9 patients and D3 for 6 patients. The incidence of TnIc elevation varied widely according to the type of surgery (figure 1) and to the site of surgery: 7% (4%-9.7%) for hip surgery (n=297) vs 0% for knee surgery (n=81) (p<0.001).

Conclusion(s): The onset of postoperative myocardial ischemia with TnIc re-lease occurs mainly during the two first postoperative days. This phenomenon could be easily diagnosed by a single TnIc measurement on day 2 after surgery. Its incidence could be high after re-operation of hip surgery and after hip frac-ture. By contrast, myocardial ischemia seems to be very uncommon after knee surgery.

References:

4AP3-7
Perioperative mortality in cardiac surgery: A review of 3,822 cases at the Northern Cardiac Center, Thailand
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Background and Goal of Study: Cardiac operation is considered as a high risk procedure and causes higher mortality than non cardiac operation[1]. The objective of this study was to determine the incidence, causes, risk factors and suggestive corrective strategies of perioperative mortality in cardiac surgery related to anesthesia at Maharaj Nakorn Chiang Mai Hospital, a tertiary referral center in the north of Thailand.

Materials and Methods: All cardiac surgical patients who died intraoperatively or within the period of 24 hour after anesthesia between January 1,2003 and December 31,2006 were identified and reviewed by at least 2 independent reviewers. Descriptive statistics was used to summarize the data.

Results and Discussion: From a database of 3,822 anesthetics for cardiac surgery, the overall incidence of perioperative death was 11 per 1,000 anesthet-ics (95% CI 7.9[<math>\text{std dev}=\text{14.8} \end{math}]) and the incidence of perioperative death in closed...
and open heart surgeries per 1,000 anesthetics were 11.5 (95% CI 6.8,18.2) and 10 (95%CI 6.6,15.8) respectively. Two out of 42 cases were directly related to anesthesia (0.5 per 1,000 anesthetics (95% CI 0.1,1.9)); oes was one of the complications of central line insertion and the other one caused by inadequate blood transfusion. The non anesthesia related death was patient factors (48%) alone or combined with surgical factors (36%). Incidence of perioperative death was significantly higher in infants, patients with ASA physical status 4 and S, emergency operation, patients with cyanotic heart disease and open heart surgery with cardiopulmonary bypass time ≥ 3 hours (p < 0.05). The most common causes of this death were myocardial failure (26%) and hypoxemia (21%). More than half of this death occurred in cardiac intensive care unit (78%) and was not preventable (88%).

Conclusion(s): The majority of perioperative mortality in cardiac surgery were caused by factors not related to anesthesia and more common in infants, in patients with ASA physical status 4 and S, emergency operation, patients with cyanotic heart disease and open heart surgery ≥ 3 hours. Improvement of supervision during central venous monitoring and implement practice guideline for blood transfusion were suggestive corrective strategies for anesthesia related death.

References:

4AP3-8
Evolution of cardiac surgery implies a reform of EuroSCORE
B. Moncef, M. Alfonso, G. Mercedes, R. Mirella, L. Hector
Anaesthesia and Intensive Care, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain

Background and Goal of Study: As part of a quality project in cardiac anaesthetic assistance we developed a specific database which included EuroSCORE (ES) as a method for predicting mortality risk in cardiac surgery patients but overestimates mortality risk in all groups. This trend can be explained by the epidemiological and technical changes occurred during the last years. From these results we can imply that ES should be updated to give more accurate assessment of preoperative risk in cardiac surgery.

Materials and Methods: We registered all ES variables in a prospective sample of 503 patients during 2005-06. The discriminative power of ES was evaluated using a receiver operator characteristic (ROC) curve. Differences between observed and estimated mortality rates were analyzed using the non-parametric binomial test.

Results and Discussion: The predictive value of ES calculated with ROC curve was 0.77, 95% CI: 70 to 93, P-value = 0.0007. Values of observed and estimated mortality are shown in table 1, i.e.

<table>
<thead>
<tr>
<th>Risk group based on ES</th>
<th>Patients</th>
<th>Observed mortality %</th>
<th>Estimated mortality %</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk</td>
<td>170 (35)</td>
<td>6.9 (5.3-8.6)</td>
<td>6.7 (5.3-8.0)</td>
<td>0.713</td>
</tr>
<tr>
<td>Moderate risk</td>
<td>255 (52)</td>
<td>9.8 (6.1-13.6)</td>
<td>12.4 (7.7-17.2)</td>
<td>0.049</td>
</tr>
<tr>
<td>Total</td>
<td>525 (107)</td>
<td>7.5 (7.7-8.3)</td>
<td>7.6 (5.4-10.2)</td>
<td>0.023</td>
</tr>
</tbody>
</table>

Type of surgery differences between original model and ours are: 25% less isolated coronary surgery; 10% more valve surgery; 5% more aortic surgery. Mortality rate differences: 1.6% less in bypass-graft; 3.5% less in valve surgery.

Materials and Methods: We analyzed data from a multicentre cohort study (ARISCAT) carried out in 59 hospitals in Catalonia during 2006. This study gathered pre-, intra- and postoperative information on a random sample taken on 7 different days in each hospital. The sample included elective and emergency surgery (except obstetrics) under general or regional anaesthesia. We analyzed preoperative (age, gender, BMI, cardiovascular disease, cerebrovascular accidents and concomitant neurological disease, diabetes, chronic renal disease, pulmonar disease, hepatic disease and neoplasms), intraoperative (surgical speciality, kind of anaesthesia (general vs regional), hypotension and arrhythmia, blood loss and blood transfusion). We compiled descriptive statistics and compared qualitative variables with a x² test and quantitative variables with a t test.

Multivariate analysis

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease</td>
<td>5.05 (1.39-18.24)</td>
</tr>
<tr>
<td>Chronic renal disease</td>
<td>4.84 (1.30-18.02)</td>
</tr>
<tr>
<td>General anesthesia</td>
<td>3.05 (0.93-8.6)</td>
</tr>
<tr>
<td>Intraoperative hypotension</td>
<td>7.35 (1.66-32.53)</td>
</tr>
</tbody>
</table>

The hospital stay was longer in patients with PCVA (22.8 vs 7.14 days) and the rate of hospital mortality was higher in these patients (23.5% vs 1.2%).

Conclusion(s): The incidence of PCVA is consistent with previous reports in the literature (5.6-6%). Cardiovascular disease, chronic renal disease, general anesthesia and intraoperative hypotension were significant risk factors for PCVA, longer hospital stay and mortality. The management of preventable factors such as general anesthesia and intraoperative hypotension should be considered in order to prevent PCVA.

Acknowledgements: Supported by “Fundació La Marató TV3”Grant 04160-2003.

References:

4AP3-10
Influence of hospital initiated perioperative beta-blocker on post-thoracotomy atrial fibrillation
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Background and Goal of Study: Atrial fibrillation (AF) is a frequent complication after thoracic surgery in elderly. A preop β-blocker initiative (BBI) was started at our institution to reduce the incidence of postop cardiovascular morbidity in patients (Pts) with known or at risk for CAD. Our goal was to evaluate if the BBI had an impact on the incidence of AF after major thoracic surgery in Pts ≥ 65 yr.

Materials and Methods: We prospectively collected data on 88 Pts during a 1 yr period, aged 31-84 yr undergoing esophagectomy (n=12), pneumonectomy (n=8), lobectomy (n=68). Of these, 61 Pts were ≥60 yr enrolled in the BBI (metoprolol 25 mg po daily 1 wk prep, followed by IV titrated to heart rate (HR) of 60 and then po for 14 days). Study Pts were compared with a matched “control” group from our prospective database (n=66) that had surgery prior to this BBI and did not receive other drugs for AF prophylaxis except resumed β-blocker postop. All Pts had telemetry for 72 h. AF incidence was recorded 30 days postop. Data analysis was done by Fisher’s Exact or t-tests.

Table 1. Patient Characteristics

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Female (%)</th>
<th>CAD (%)</th>
<th>BMI</th>
<th>HTN (%)</th>
<th>FEV 1 (%)</th>
<th>Dlco (%)</th>
<th>Hospital stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>72±7</td>
<td>70±9</td>
<td>28±66</td>
<td>27±5</td>
<td>34±33</td>
<td>86±19</td>
<td>84±20</td>
<td>7±4±3</td>
</tr>
</tbody>
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Materials and Methods: We analyzed data from a multienchere cohort study (ARISCAT) carried out in 59 hospitals in Catalonia during 2006. This study gathered pre-, intra- and postoperative information on a random sample taken on 7 different days in each hospital. The sample included elective and emergency surgery (except obstetrics) under general or regional anaesthesia. We analyzed preoperative (age, gender, BMI, cardiovascular disease, cerebrovascular accidents and concomitant neurological disease, diabetes, chronic renal disease, pulmonary disease, hepatic disease and neoplasms), intraoperative (surgical speciality, kind of anaesthesia (general vs regional), hypotension and arrhythmia, blood loss and blood transfusion). We compiled descriptive statistics and compared qualitative variables with a x² test and quantitative variables with a t test.

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The hospital stay was longer in patients with PCVA (22.8 vs 7.14 days) and the rate of hospital mortality was higher in these patients (23.5% vs 1.2%).

Conclusion(s): The incidence of PCVA is consistent with previous reports in the literature (5.6-6%). Cardiovascular disease, chronic renal disease, general anesthesia and intraoperative hypotension were significant risk factors for PCVA, longer hospital stay and mortality. The management of preventable factors such as general anesthesia and intraoperative hypotension should be considered in order to prevent PCVA.

Acknowledgements: Supported by “Fundació La Marató TV3”Grant 04160-2003.

References:
**4AP-4-1**

The effects of microcirculatory responses to hypovolemic shock following resuscitation with 6% Hetastarch, 5% Albumin and 10% Pentastarch solutions

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**Background and Goal of Study:** There is still ongoing and unresolved discussion which volume replacement therapy may have the best prognosis on hemodynamic resuscitation. Goal of the study was comparison of volume replacement with 6% Hetastarch (HETA), 5% Albumin (ALB) and 10% Pentastarch (PENT) solutions following induction of hypovolemic shock (HS).

**Materials and Methods:** Rat cremaster model was used to evaluate in vivo microcirculatory changes after induction of HS by withdrawal of 15% of total blood volume (10 ml/kg). Rats were randomized into groups: 1) control (Group I, n=10) and had microcirculation hemodynamic parameters taken for four consecutive hours; 2) hemorrhagic shock (Group II, n=10) had blood withdrawn; 3) Hetastarch (Group III, n=6) had blood taken and replaced with 10 ml/kg of 6% Hetastarch; 4) Albumin (Group IV, n=6) had blood withdrawn and replaced with 10 ml/kg of 5% Albumin; 5) Pentastarch (Group V, n=6) had blood taken and replaced with 10 ml/kg of 10% Pentastarch. During 4hrs microcirculatory measurements of RBC velocity, vessel diameter, functional capillary per-centage starting 1 minute prior to the onset of reperfusion. Ca2+ administered micropermeability (EMP) was evaluated after 4hrs by FITC-albumin extravasation and immunofluorescence image analysis. The vital parameters (MAP, CVP, HR), as well as tissue oxygenation measurements were performed continuously.

**Results and Discussion:** At 4hrs after resuscitation with HET, ALB, and PENT respectively 70%, 84%, and 85% return of FCP was recorded compared to 33% in Group II, ALB and PENT resuscitation reduced level of sticking and transmigrated PMN’s. Groups: II, IV, V presented higher tissue oxygenation than Group II (IET – 10.1±0.25, ALB – 12.5±0.28 and PENT 11.2±0.25 vs. Group II 8.1±0.15 mmHg). At 5 hrs after HS, EMP index was: Group I – 0.42; Group II – 0.86; Group III – 0.73; Group IV – 0.82; Group V – 0.7. After Hemorrhagic Shock, resuscitation with Colloid Solutions improved microcirculatory hemodynamics. 5% Albumin, and 10% Pentastarch administration decreased level of sticking and transmigrated PMN’s. Albumin and Pentastarch volume replacement therapy after Hypovolemic Shock have beneficial effect on vascular permeability.

**Conclusion(s):** 5% Albumin and 10% Pentastarch solutions had comparable and more effective effect on microcirculation under hypovolemic shock conditions in comparison to 6% Hetastarch solution.

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**4AP-4-2**

Inhibition of mPTP combined with sevoflurane-induced POSTconditioning: No method to induce cardioprotection in obese Zucker rats in vivo

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**Background and Goal of Study:** Hyperglycaemia blocks Sevoflurane-induced POSTconditioning of the rat heart in vivo but inhibiting the mitochondrial permeability transition pore (mPTP) could restore cardioprotection.[1] Ischaemic preconditioning is abolished in Zucker obese rats with insulin resistance.[2] We investigated whether Sevoflurane-induced POSTconditioning is also blocked in the prediabetic heart and if so, whether we could restore cardioprotection.

**Materials and Methods:** Zucker lean (ZL) and Zucker obese (ZO) rats were randomly assigned to one of seven groups (each n=7). Control (ZL-ZO-Con), animals were not further treated. POSTconditioning groups (ZL-ZO-POST) received Sevoflurane with an enthalp concentration of 1 MAC for 5 minutes starting 1 minute prior to the onset of reperfusion. Ca2+ administration intravenously in a concentration of 5 (ZO-CsA/-CsA-POST) or 10 mg/kg (ZO-CsA10+POST) could restore cardioprotection.[1] Ischaemic preconditioning is abolished in Zucker obese rats with insulin resistance.[2] We investigated whether Sevoflurane-induced POSTconditioning is also blocked in the prediabetic heart and if so, whether we could restore cardioprotection.

**Results and Discussion:** In ZL-Con, infarct size was 60.6±6% of the area at risk. POSTconditioning by Sevoflurane significantly reduced infarct size to 35±12% (P<0.05 vs. ZL-Con). Neither sevoflurane nor CsA or combination of both could induce POSTconditioning in ZO rats (ZO-POST: 59±12%, ZO-CsA: 61±9%, ZO-CsA+POST: 59±7%, ZO-CsA10+POST: 57±14%; all P>0.05 vs. ZL-Con: 59±6%).

**Conclusion(s):** In contrast to hyperglycaemic animals,[1] combination of...
Sevoflurane- and CsA-induced POSTconditioning could not protect the heart of obese Zucker rats in vivo.

Acknowledgements: This study was funded by the European Society of Anesthesiology.

References:

4AP4-3
Effects of sevoflurane exposure on myocardial infarction and arrhythmias during ischemia and reperfusion in vivo in rabbit heart
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Background and Goal of Study: Recent investigations showed that sevoflurane can induce pharmacological preconditioning in myocardium. However, the effects of sevoflurane on myocardial ischemia and reperfusion injury have not been well studied. This study was designed to investigate the incidence and severity of ventricular arrhythmias observed during ischemia and reperfusion in an in vivo rabbit model. A second goal of this investigation was to assess whether sevoflurane can influence ischemia and reperfusion-induced arrhythmias and reduce the intensity of myocardial infarct size following ischemia and reperfusion.

Materials and Methods: Rabbits received regional ischemia by 30 min of the LAD occlusion followed by 3 hrs of reperfusion under ketamine/xylazine (k/x) or sevoflurane anesthesia. Before this, rabbits were randomized into five groups (n=6, respectively). In the control group and sevoflurane group, rabbits were subjected to 30 min of LAD occlusion and 3 hrs of reperfusion under k/x or sevoflurane anesthesia, respectively (C,S). The ischemia-preconditioned (IP) rabbits underwent 5 min LAD occlusion followed by 10 min of reperfusion (C-IP). In the C-SP (sevoflurane-preconditioned) group, 30 min of sevoflurane exposure at 1.5% end-tidal concentration was followed by 15 min of washout by 3 hrs of reperfusion under k/x anesthesia. At the end of the 3 hrs reperfusion period, area at risk (A) was delineated by Evans’s blue and infarct size (IS) determined by tetrachromic staining.

Results and Discussion: The hemodynamics and rate pressure product did not alter significantly at any point among all the groups. R revealed no significant difference among all the groups. I/Rvalues of each group were 59.2±4.8% in Group C, 30.9±3.6% in Group S, 59.2±3.3% in Group C-IP, 16.8±4.1% in Group S-IP and 45.2±3.0% in Group C-SP. Compared with group C, myocardial protective effect was observed in groups of S, C-IP, S-IP and C-SP. The incidence of arrhythmias during myocardial ischemia were 50% in C, 16% in S, 83% in C-IP, 0% in S-IP, 50% in C-SP. As for the incidence of arrhythmias during reperfusion was 67% in C, 0% in S, 67% in C-IP, 0% in S-IP, 67% in C-SP. These results suggest that sevoflurane exposure reduces arrhythmias during not only ischemia but reperfusion in rabbit heart.

Conclusion(s): It was suggested that sevoflurane protects the ischemic rabbit myocardium from infarction as well as ventricular arrhythmias.

References:

4AP4-4
Sevoflurane preconditioning increases AMPK activation during ischemia and reperfusion in isolated rat hearts
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Anesthesiology, Institute for Cardiovascular Research (ICaR-VU), VU University Medical Center (VUMC), Amsterdam, Netherlands

Background and Goal of Study: Adenosine monophosphate kinase (AMPK) is involved in the signal transduction of cellular energy status and is altered during diabetes. In addition, AMPK has been shown to be an important regulator in vascular reactivity of small arteries may represent one of the key elements. Thus, we investigated the vasoresponsiveness of coronary and mesenteric arteries after CPB in rats.

Materials and Methods: Male Wistar rats underwent CPB (n=8) or sham (n=8). Anesthesia consisted of induction with isoflurane, followed by fentanyl and midazolam during CPB. After catheterisation of the left femoral and carotid artery and the right heart, normothermic extracorporal circulation was instituted for 60 min. Targeted CBP flow was 140 mL kg⁻¹ min⁻¹. Following 90 min of recovery, rats were sacrificed and intestinal coronary artery and mesenteric artery were mounted on a wire myograph system (Danish Myo Technology). Constriction to phenylephrine (mesenteric artery) and serotonin (coronary artery), and relaxation to acetylcholine (both) were measured. Components of acetylcholine relaxation were studied by using inhibitors of prostaglandins (indomethacin) and nitric oxide (L-NMMA). Relaxation was expressed as % of preconstriction and measured as area under curve (AUC). Data are expressed as mean ± SEM. Student t-test and repeated measures ANOVA were used to assess statistical differences (p<0.05).

Results and Discussion: CPB did not affect contractile responses in both vessels. CPB significantly increased the total acetylcholine mediated relaxation of coronary artery compared to sham (CPB: 160.6±10.3 AUC and sham: 115.4±5.8 AUC), mainly due to an increase in the EDHF-mediated part (CPB: 124.5±13.1 and sham: 28.7±8.4 AUC). In the mesenteric arteries, acetylcholine relaxation and contributions of prostaglandines, NO and EDHF-pathways were not significant different.

Conclusion(s): CPB selectively augments acetylcholine mediated relaxant properties in the coronary artery of rat, due to increased EDHF-mediated relaxation. Vascular responses in mesenteric artery were unaffected.

4AP4-5
Changes in coronary and mesenteric vascular reactivity after CPB in rats
I. Samarska, R. Henning, H. Bukema, H. Murgroup, A. Epema
Anesthesiology and Clinical Pharmacology, University Medical Center Groningen, Groningen, Netherlands

Background and Goal of Study: Cardiopulmonary bypass (CPB) is associated with a decline in function of multiple organ systems including the heart and intestines. The mechanisms involved are not fully characterized and both ischemia-reperfusion injury and inflammatory response are implicated. Changes in vascular reactivity of small arteries may represent one of the key elements. Thus, we investigated the vasoresponsiveness of coronary and mesenteric arteries after CPB in rats.

Materials and Methods: Male Wistar rats underwent CPB (n=8) or sham (n=8). Anesthesia consisted of induction with isoflurane, followed by fentanyl and midazolam during CPB. After catheterisation of the left femoral and carotid artery and the right heart, normothermic extracorporal circulation was instituted for 60 min. Targeted CBP flow was 140 mL kg⁻¹ min⁻¹. Following 90 min of recovery, rats were sacrificed and intestinal coronary artery and mesenteric artery were mounted on a wire myograph system (Danish Myo Technology). Constriction to phenylephrine (mesenteric artery) and serotonin (coronary artery), and relaxation to acetylcholine (both) were measured. Components of acetylcholine relaxation were studied by using inhibitors of prostaglandins (indomethacin) and nitric oxide (L-NMMA). Relaxation was expressed as % of preconstriction and measured as area under curve (AUC). Data are expressed as mean ± SEM. Student t-test and repeated measures ANOVA were used to assess statistical differences (p<0.05).

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Conclusion(s): CPB selectively augments acetylcholine mediated relaxant properties in the coronary artery of rat, due to increased EDHF-mediated relaxation. Vascular responses in mesenteric artery were unaffected.

4AP4-6
Vascular reactivity of thoracic aorta after CPB in rats
A. Oldenburger, I. Samarska, R. Henning, H. Bukema, A. Epema
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Background and Goal of Study: Cardiopulmonary bypass (CPB), routinely
used in cardiac surgery, results in hemodynamic instability. One of the potential mechanisms is changes in vascular reactivity. Therefore, we studied the vasoreactivity of rat thoracic aorta after CPB.

Materials and Methods: Experiments were carried out in two groups of male Wistar rats. CPB rats (n=6) were anesthetized with isoflurane, fentanyl and midazolam, catheterized and subjected to normothermic CPB for 60 min (140 mL kg\(^{-1}\) min\(^{-1}\)). After weaning from CPB and recovery during 90 min, rats were sacrificed. Sham group (n=7) underwent the same surgical procedure without CPB. Thoracic aortic rings (4-5mm) were mounted in an isolated contraction setup. Contactile response to phenylephrine and angiotensin II, and relaxant response to acetylcholine (Ach) were assessed in both groups. In order to evaluate the contribution of different relaxant pathways, acetylcholine-mediated responsiveness were studied also in the presence of indomethacine and L-NAME, inhibitors of COX and eNOS, respectively. Data are expressed as mean ± SEM. Student t-test and repeated measures ANOVA were used to assess statistical differences (p<0.05).

Results and Discussion: CPB did not affect phenylephrine and angiotensin II evoked contractions. Acetylcholine relaxation was mainly evoked by nitric oxide (NO) pathway. CPB caused a significant impairment of acetylcholine mediated relaxation as compared to sham rats [E\(_{\text{max}}\): 76.3±8.8% (CPB) and 40.8±8.8% (sham)]. The relative contribution of different relaxing pathways was unaffected by CPB.

Conclusion(s): CPB impairs endothelial function of rat thoracic aorta without influencing the relative contribution of its components.

4AP4-7
Sevoflurane versus propofol: Hemodynamic effects in lung autotransplant in pigs
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Anesthesiology, H.G.U. Gregorio Marañon, Madrid, Spain

Background and Goal of Study: Sevoflurane protects different organs from ischemia reperfusion injury (IR), which is the main cause of primary graft failure in lung transplantation, but its effectiveness has not been demonstrated in lung transplantation. The aim of this study was to compare the hemodynamic effects of the administration of sevoflurane versus propofol during lung autotransplantation in pigs.

Materials and Methods: Two groups (sevoflurane and propofol) of 6 large pigs were submitted to a left lung autotransplant (ischemia time 111±13 min.). We catheterized femoral and pulmonary arteries. In one group, we used sevoflurane 3% until left pulmonary artery was clamped, then we continued sevoflurane 3.7% and in the other group we used propofol throughout the process. Hemodynamic and gasometric study were made in 5 different moments: 1) Basal (BAS); 15 min after anesthetic induction. 2) Precp (PRI); 5 min before clamping pulmonary artery. 3) Postclamps (POC); 5 min after clamping pulmonary artery. 4) Preoperfusion (PPT); before clamping. 5) Postreperfusion (POR): 10 min after reperfusion. To find statistical meaning we use non-parametric test (U Man-Whitney).

Results and Discussion: Data (Mean ± SD) are shown in table 1. The hemodynamic effects of sevoflurane that are shown in table 1, persist even when its administration is stopped, after pulmonary artery is clamped.

4AP4-8
Aprotinin inhibits sevoflurane induced preconditioning by inhibiting eNOS phosphorylation
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Background and Goal of Study: Aprotinin (APRO) inhibits sevoflurane induced preconditioning (PC) in rat hearts in vivo. The underlying mechanism is unclear. We investigated if aprotinin inhibits one key event in signalling PC-reperfusion of endothelial NO synthase in rat heart in vivo.

Materials and Methods: After approval by the local animal care committee, 24 male Wistar rats (425±20g) were randomized into following groups. Control (CON) animals were not further treated. To investigate the effect of APRO on PC animals received a bolus of 40,000 KIU APRO followed by a continuous infusion of 40,000 KIU/h (APRO-PC and APRO). 10 min after PC, or at corresponding time point, the hearts were removed and prepared for Western blotting. By using specific antibodies we detected the levels of total eNOS and phosphorylated eNOS and calculated the ratio of total eNOS and phospho-eNOS. All data are mean±SD. Statistics: ANOVA followed by Bonferroni’s multiple comparison test, P<0.05 was regarded as significant.

Results and Discussion: See figure.

Figure 1. Phosphorylation of eNOS.

Conclusion(s): Sev-PC led to a phosphorylation of eNOS which is blocked by APRO.

4AP5-1
Effects of remote ischemic preconditioning on myocardial oxidative stress and cardiac ischemia biomarkers in off-pump coronary artery bypass graft surgery
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Background and Goal of Study: Heart positioning during off-pump coronary artery bypass graft (CABG) surgery implies a potential myocardial damage due to ischemia-reperfusion (IR). Remote ischemic preconditioning (RIPC) decreases IR injury in distant organs, but there are few studies in the clinical setting. This randomized, prospective, controlled clinical study was aimed to evaluate the protective effects of RIPC on the myocardial ischemic damage and its correlation with the myocardial oxidative stress induced in off-pump CABG surgery.

Materials and Methods: 12 patients (aged 59±6 yrs), ASA III, undergoing off-pump CABG were randomized to RIPC (n=6) or control treatment (n=6). After anesthesia induction, RIPC was induced by four 5min cycles of lower limb IR using an ischemia cuff. Lactate levels and oxidative stress markers [GSSG; oxidized glutation; GSH; reduced glutation] in blood from coronary sinus were determined at 3 time points: after pericardiotomy (T1), and 5 minutes (T2) and 15 minutes (T3) after the last coronary bypass. Basal and postoperative levels of Troponine I were measured. Mann-Whitney U test and Wilcoxon signed ranks test were used for statistical analysis.

Results and Discussion: All data are given as Mean±SD. We observed a reduction of oxidative stress markers between T1 and T3 in both groups (table 1) as well as no significative differences in lactate levels. Postoperative Troponine I values increased slightly in both groups. No differences due to RIPC were observed (table 2).
4AP5-2

Effects of thiopental and propofol on skeletal muscle oxygenation

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Background and Goal of Study: Maintaining adequate systemic oxygen delivery and consequently local tissue oxygenation is regarded crucial in the management of shock or critical illness. Herein, non-invasive monitoring of skeletal muscle oxygenation (as an easily assessable tissue which may sensitively reflect changes in systemic oxygen delivery) has been advocated to track systemic oxygen delivery, to detect hypoperfusion and to guide resuscitation [1–3].

Materials and Methods: Measurements were performed in 25 patients (ASA I and II, 7 male, 18 female, age 43±12) undergoing general anesthesia. After routine preoxygenation (FiO \(_2\) 1.0) anesthesia was induced with Thiopental (THIO: 82±8; PROP 83±8 mg/kg, n = 15) or Propofol (PROP 2–3 mg/kg, n = 10) at the anesthetist’s discretion. Peak tissue oxygen saturation of the right hand thenar muscle was measured non-invasively with near infrared absorption spectroscopy (NIRS 730- and 805-nm wavelengths, INVOC™, Somatronics, Troy, MI, USA) before preoxygenation, during preoxygenation and after induction of anesthesia. Statistical mean ± SD, two-way repeated measures ANOVA.

Results and Discussion: In both groups, preoxygenation did not affect thenar oxygen saturation (THIO: baseline 59±6%; during preoxygenation 60±12%; PROP: baseline 59±11%, during preoxygenation 60±11%). Induction of anesthesia significantly increased muscle oxygenation in both groups (THIO 82±8%; PROP 83±13% p < 0.01 in both groups). Differences between the groups were not significant.

Conclusion(s): Interestingly, breathing of pure oxygen during preoxygenation did not increase microcirculatory oxygen saturation in our ASA I and II patients. Thiopental and Propofol both increase thenar muscle oxygen saturation, possibly through a reduction of the metabolic oxygen demand or through a redistribution of systemic blood flow towards the muscle due to a reduction of arterial vessel tone. This needs to be considered in the interpretation of muscle oxygenation measurements.

References:

4AP5-3

Combined severe liver and cardiac disease: Anesthetic and surgical considerations

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Background and Goal of Study: Advanced cardiac disease is increasingly common in patients proposed for liver transplantation (LT). Indication and sequences of surgery like perioperative challenges are difficult to manage.

Materials and Methods: We reported 7 procedures of LT before during or after cardiac procedure in 6 patients.

Results and Discussion: In two patients proposed for LT, left ventricular function was very altered (< 30%) and combined heart-liver transplantation was performed. In the third patient, cardiac pre-LT evaluation revealed aortic valve stenosis (aortic area < 0.9 cm\(^2\)). Because of mild clinical cardiac signs and volume of hepatic carcinoma, we performed once LT and 12 month later, because pulmonary oedema occurred, a bioprothesis in aortic site was inserted without complication. In the fourth patient, with aortic stenosis (0.80 cm\(^2\)) and severe stenosis of three coronary vessels, cardiac surgery was performed and with severe post-operative complications. Nevertheless, LT could be performed without complication 15 months later. Two other patients presented a history of coronary artery disease with stenting on two of three major coronary vessels. They did not require additional preoperative cardiac procedure and underwent LT without major complication. One of both presented 4 years later a recurrence of severe cirrhosis related to virus C and underwent a second LT without cardiac morbidity. At mean 47±15 months of follow-up (range 10–88), there was a 86% graft and 100% patient survival. No biopsy-proven liver and hepatocellular carcinoma, no graft ischemia and hemodynamic stability were our main perioperative goals and were obtained for all patients.

Conclusion(s): Coordination between anesthesiologists and transplant surgeons, for sequence of surgery and peroperative management permit to perform LT in advanced cardiac disease.

4AP5-4

Renal function during the perioperative period of liver transplantation: Study in 30 consecutive patients

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Department of Anesthesia and Intensive Care, University Hospital Geneva, Geneva, Switzerland

Background and Goal of Study: Renal dysfunction is an important complication of end-stage liver disease. During liver transplantation (LT), the anhepatic phase is the key event with major neurohumoral and haemodynamic homeostasis modifications. Aim of the study was to evaluate the haemodynamic and renal consequences of LT during the perioperative period in 30 consecutive patients.

Materials and Methods: After IRB approval, 30 patients (25 males; 5 females), median age 56 [23–65] were prospectively included in the study. Preoperative medical evaluation was assessed at inclusion and 6 months thereafter. All operative measures were recorded one hour after anaesthesia induction, during the anhepatic phase, 2 and 24 hours after reperfusion.

Results and Discussion: Median MELD and Child-Pugh scores were 13 [6–37] and 9 [8–14], respectively. Veno-venous by-pass was used in 11/30 patients. Median cold ischemic and anhepatic phase durations were 487 [289–719] and 70 minutes [48–124]. Median transfusion requirement was 4 (red blood cells), 6 (fresh frozen plasma) and 0 (platelets). Vasopressors were used intraoperatively in 7/30 patients for a limited period to maintain SvO\(_2\) into physiologic ranges.

Table 1. Renal function

<table>
<thead>
<tr>
<th></th>
<th>Pre-anhepatic phase</th>
<th>Anhepatic phase</th>
<th>2h after reperfusion</th>
<th>24h after reperfusion</th>
<th>Follow-up at 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFR</td>
<td>96±16</td>
<td>79±18</td>
<td>95±20</td>
<td>84±19</td>
<td>73±16</td>
</tr>
<tr>
<td>Urine output</td>
<td>60±54</td>
<td>28±33</td>
<td>72±39</td>
<td>65±30</td>
<td>73±16</td>
</tr>
</tbody>
</table>

Table 2. Oxidative Stress Markers

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T3</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.96±0.06</td>
<td>0.81±0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>NPC</td>
<td>0.93±0.05</td>
<td>0.83±0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>GSH</td>
<td>4.63±0.01</td>
<td>4.07±0.01</td>
<td>0.003</td>
</tr>
<tr>
<td>GSSG</td>
<td>3.72±0.02</td>
<td>3.72±0.02</td>
<td>0.96</td>
</tr>
</tbody>
</table>

# Conclusion
Oxidative stress markers do not increase in patients undergoing off-pump CABG surgery under propofol anesthesia. ROC does not modify oxidative stress nor perioperative Troponine I levels.

4AP5-5

Haemodynamic parameters and renal function

<table>
<thead>
<tr>
<th>Pre-anhepatic phase</th>
<th>Anhepatic phase</th>
<th>2h after reperfusion</th>
<th>24h after reperfusion</th>
<th>Follow-up at 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac index</td>
<td>4.0±1.2</td>
<td>2.5±0.8</td>
<td>4.6±1.4</td>
<td>4.2±0.7</td>
</tr>
<tr>
<td>SVR</td>
<td>157±866</td>
<td>240±1064</td>
<td>1145±437</td>
<td>1546±378</td>
</tr>
<tr>
<td>HR</td>
<td>123±59</td>
<td>182±400</td>
<td>141±71</td>
<td>144±52</td>
</tr>
<tr>
<td>SvO2</td>
<td>89±12</td>
<td>82±10</td>
<td>88±15</td>
<td>81±15</td>
</tr>
<tr>
<td>Serum lactate</td>
<td>1.4±0.7</td>
<td>2.7±1.1</td>
<td>2.6±1.8</td>
<td>0.9±0.4</td>
</tr>
<tr>
<td>Renin (PRA)</td>
<td>6.9±10.3</td>
<td>18.9±22</td>
<td>9.0±5.0</td>
<td>6.0±10.2</td>
</tr>
<tr>
<td>Adrenaline</td>
<td>1.3±1.1</td>
<td>4.0±3.0</td>
<td>2.3±2.8</td>
<td>0.6±0.6</td>
</tr>
<tr>
<td>Noradrenaline</td>
<td>4.3±2.9</td>
<td>7.9±6.3</td>
<td>5.3±2.8</td>
<td>4.4±3.8</td>
</tr>
<tr>
<td>GFR</td>
<td>96±30</td>
<td>44±47</td>
<td>51±69</td>
<td>84±72</td>
</tr>
<tr>
<td>Crystallin C</td>
<td>1.2±0.3</td>
<td>1.2±0.3</td>
<td>1.2±0.3</td>
<td>1.4±0.5</td>
</tr>
<tr>
<td>Fo Na</td>
<td>1.1±1.4</td>
<td>1.1±1.8</td>
<td>1.5±1.5</td>
<td>1.3±1.7</td>
</tr>
<tr>
<td>Urinary output</td>
<td>62±54</td>
<td>28±33</td>
<td>72±39</td>
<td>65±30</td>
</tr>
</tbody>
</table>

NA: Not available; NS: Not significant.

Conclusion(s): The anhepatic phase of LT is characterized by increases in plasma renin activity and sympathetic humoral response resulting in significant decrease of glomerular filtration rate. However, these events did not alter long term renal function.
4AP5-5
Bone cement implantation syndrome – Haemodynamic changes at the time of cement implantation implicate vasodilatation, not emboli-mediated right ventricular dysfunction
Department of Anaesthesia, Manchester Royal Infirmary, Manchester, United Kingdom

Background and Goal of Study: Bone Cement Implantation Syndrome (BCIS) is a poorly understood syndrome that may result in significant morbidity and mortality in patients undergoing cemented hip arthroplasty. BCIS has no agreed definition but is characterised by a constellation of clinical features including hypoxia, cardiac hypotension, cardiac arrhythmias, increased pulmonary vascular resistance and cardiac arrest, usually occurring between femoral reaming and prosthesis insertion. The aetiology of BCIS is not fully understood. Methyleneacrylate cement monomer-mediated changes including vasodilatation were initially proposed. These are now considered unlikely to be responsible. Much of the recent research has focused on emboli formation leading to right ventricular (RV) dysfunction. Goal: To measure haemodynamic changes at the time of cementing.

Materials and Methods: Standardised anaesthetic technique (general anaesthetic with epidural) including routine monitoring and an oesophageal Doppler. Observations recorded at one minute intervals at time of cementing; heart rate, blood pressure, oxygen saturations, end tidal carbon dioxide, and haemodynamic data from oesophageal Doppler.

Results and Discussion: We have recruited 7 patients to date (6 male, 1 female). Mean patient age was 66 years (range 54-76) and mean BMI 28.06 (range 23.25 to 33.33). Three were ASA 1 and 4 were ASA 2. We found an increase in cardiac index, corrected flow time, and peak velocity occurring after cement implantation. Oesophageal Doppler variables were compared pre-cement and 1 min post-cement using paired Student’s t-test.

Oesophageal Doppler variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre cement</th>
<th>1 min post cement</th>
<th>Change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac index</td>
<td>2.8 (2.3-3.3)</td>
<td>3.1 (2.3-4.3)</td>
<td>0.38</td>
<td>(1.0-0.61)</td>
</tr>
<tr>
<td>FTo</td>
<td>343 (325-362)</td>
<td>358 (334-382)</td>
<td>+14.3</td>
<td>(5.6-34.1)</td>
</tr>
<tr>
<td>Peak velocity</td>
<td>65.1 (53.8-76.4)</td>
<td>69.2 (55.4-91.1)</td>
<td>+3.1</td>
<td>(3.0-10.2)</td>
</tr>
</tbody>
</table>

95% confidence intervals in brackets.

>10% drop in systolic pressure from pre-cementing occurred in 1 patient. Two patients required support to blood pressure and 2 patients exhibited a transient drop in oxygen saturations.

Conclusion(s): The oesophageal Doppler findings are consistent with vasodilatation mediating the haemodynamic changes of BCIS. Embolism and RV dysfunction may be coincidental rather than causative. Further research should focus on elucidating the mediators of vasodilatation.

Disclosure: We received a grant of £4182 from the Royal College of Anaesthetists to fund the blood tests and purchase of the cardio Q oesophageal Doppler probes.

References:

4AP5-7
Factors during or after laparotomy that influence “change on the electrocardiogram like acute myocardial infarction”
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Department of Anesthesiology, Shinshu University Hospital, Matsumoto, Nagano, Japan

Background and Goal of Study: In Japan, many cases of “Change on the electrocardiogram like acute myocardial infarction” (“AMI”) have been reported. In these cases, electrocardiogram (ECG) changes mimic those of acute myocardial infarction (AMI) patients; however, these changes have been recovered in the short period (from a few days to about 1 month). The patients have practically no subjective symptoms and show only slightly increasing creatine kinase-MB (CK-MB) level. In many cases, a transient ballooning at the apex of left ventricles is shown by the ultrasound cardiograms. The purpose of this study was to determine the risk factors during or after laparotomy that influence “Change on the electrocardiogram like acute myocardial infarction”.

Materials and Methods: The study design was case-control study. The retrospective comparison of 49 factors (according to Framingham study) was performed between the groups of 11 patients who showed “Change on the ECG like AMI” and that of 102 patients who showed no postoperative ECG changes. We received the approval of the ethical committee of our institute.

Results and Discussion: Preoperative risk factors of the change on ECG like AMI were low RBC count, low hemoglobin (Hb), low hematocrit (Ht) value, high Ht/Hb ratio, low sodium, low calcium, low albumin, low choline, age, emaciation, ECG abnormality, prolonged QTc on ECG, and surgery on the lower digestive tract (mainly on chronic ileus). These of intraoperative risk factors were tachycardia, low urine output. These of postoperative were low sodium level and the prolonged QTc on postoperative day 1. A gender or a malignancy was not the responsible factor. Stepwise discriminant analysis revealed the major responsible factors in causing the change on the ECG like AMI: 1) tachycardia during the operation (heart rate; over 151 - 0.7 x age), 2) high Ht/Hb ratio on admission, 3) preoperative ECG abnormality, 4) intraoperative low urine output, and 5) surgery on the lower digestive tract.

Conclusion(s): Even if such abnormal performances of the heart after laparotomy are temporary as well as the good prognosis, it is notable that the risk factor of “Change of ECG like AMI” was haemoglobin decrease and dehydration (Ht/Hb=3).

References:

4AP5-9
Metoprolol infusion reduces fentanyl requirements during ballanced general anesthesia for moderate amplitude surgery
C. Gurun, E. Dragulin, G. Vasile Groux, A. Moise, N. Minou
Anesthesia and Intensive Care, “Prof. Dr. D. Genota” MIRA Hospital, Bucharest, Romania

Background and Goal of Study: Perioperative β-blockade has been used both as a cardio-protective measure and as an adjuvant for decreasing anesthetic needs (reduces BIS, volatile and opiate necessary). This study evaluates the influence of a per-operative infusion of the selective β-blocker Metoprolol on haemodynamic stability and morphinomymetic requirements during balanced general anesthesia.

Materials and Methods: Two demographically equivalent groups of 60 patients each received general anesthesia for moderate amplitude surgery (mostly abdominal procedures). Group M subjects received a continuous infusion of 20 μg/kg/h Metoprolol, beginning 10 minutes before induction and continuing until 10 minutes after extubation, while patients in Control group received the same amount of normal saline. General anesthesia was conducted in similar fashion (Induction with Perothal, Fentanyl, Atracurium, Succinyl-choline - when judged necessary, maintenance with Sevoflurane, Fentanyl, Atracurium). Postoperative analgesia prescriptions were similar. Intraoperative haemodynamics and fentanyl consumption were recorded. To test the statistic significance of the differences observed in the time-related evolution of these variables, we used the T Student test for central tendency (average) and dispersion indices (standard deviation, dispersion quotients).

Results and Discussion: Patients in group M received significantly lower Fentanyl doses (7.3±1.8 vs 10.1±2.1 μg/kg, p<0.05), while showing a reduced heart rate and mean arterial pressure on intubation, skin incision and extubation compared with Control group subjects. Atropine (8 versus 3 patients) and ephedrine (8 versus 4 cases) consumption was slightly higher in M group than in Control patients, without reaching a significance threshold. Postoperative pain intensity and side effects were equivalent in the two groups.

Conclusion(s): Per-operative Metoprolol infusion decreases hemodynamic responses and opiates requirements during general anesthesia for moderate amplitude surgery. These finding are judged as beneficial, as they prove a smoother induction and emergence, without postoperative opioid-induced respiratory depression or excessive pain intensity.

References:

4AP5-10
Hemodynamic changes after a modified cava clamping maneuver during anhepatic phase of orthotopic liver transplantation
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Department of Anesthesiology and Reanimation, Hospital 12 de Octubre, Madrid, Spain

Background and Goal of Study: Orthotopic liver transplant (OLT) with cava vein preservation is systematically performed in our centre. In spite of piggyback technique, some patients bear hemodynamic disturbances because of
decrease of blood volume returning to heart. A modification of suprabpnic veins clamping is performed to try to increase cava flow. Our goal was to evaluate if this maneuver improves the hemodynamics.

Materials and Methods: A prospective study including 36 consecutive patients undergoing an OLT with modified cava clamping maneuver. Hemodynamic data were recorded by Swan Ganz CCOMBO volumetric-pulmonary arterial catheter before clamping (T1), 15 minutes after clamping (T2) and 15 minutes after moving the clamp (T3) before reperfusion of graft. The studied variables were mean blood pressure (MBP), mixed venous oxygen saturation (SVO2), pulmonary wedge capillary pressure (PCWP), continuous cardiac index (CCI), systemic vascular resistance index (SVRI), femoral venous pressure (FVP), pulmonary volume (SV) and continuous right ventricular end-diastolic volume (RVEDV). Data are expressed in mean±SD and percentages. T-test. Significance: P<0.05.

Results and Discussion: Sample: n=36 (Male 10, Female 26). Mean age: 56.3±9.01 years. Mean BMI: 28.8±4.69 kg m⁻². In the 71.8% of the patients the CCI after vascular cross-clamping decreases more than 20%, in the 17.6% more than 50%. In the 51.9% the RVEDV decreases more than 20%. Patients with a severe decrease of CCI are those with a most significative improvement after this maneuver. Clinical and experimental circulation

Abstract 4AP6-1 – Table 1

<table>
<thead>
<tr>
<th>Hemodynamic values</th>
<th>T2</th>
<th>T3</th>
<th>Mean variation T2-T1</th>
<th>Mean variation T3-T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAP mmHg</td>
<td>11.26±3.05</td>
<td>18.66±8.87</td>
<td>10.56±4.11</td>
<td>7.33 (4.73–9.93)*</td>
</tr>
<tr>
<td>SVO2 %</td>
<td>86.86±4.13</td>
<td>83.66±9.9</td>
<td>88.64±4.1</td>
<td>-3.26 (5.28–1.23)*</td>
</tr>
<tr>
<td>CCI l/min</td>
<td>5.27±1.5</td>
<td>3.61±1.5</td>
<td>4.44±1.25</td>
<td>-1.61 (0.05–1.18)*</td>
</tr>
<tr>
<td>PCWP mmHg</td>
<td>10.51±4.32</td>
<td>7.25±4.44</td>
<td>8.5±1</td>
<td>-3.25 (4.73–2.27)*</td>
</tr>
<tr>
<td>SVRI dyn s⁻¹ m⁻²</td>
<td>1208.3±37.2</td>
<td>1870.26±92.9</td>
<td>1489.03±518.46</td>
<td>661.91 (932.67–931.15)*</td>
</tr>
<tr>
<td>SV ml m⁻³</td>
<td>114.84±29.55</td>
<td>78.3±32.81</td>
<td>95.3±4.25</td>
<td>-35.64 (45.88–27.28)*</td>
</tr>
<tr>
<td>RVEDV mm³</td>
<td>43.3±4.63</td>
<td>35.86±9.38</td>
<td>42.66±5.1</td>
<td>-7.47 (11.64–3.30)*</td>
</tr>
</tbody>
</table>

*P<0.05.

4AP6-2

Effects of volatile anesthetics on microcirculation during hypovolemia: A comparison of isoflurane and sevoflurane
M. Milenkuz, L. Krókowski, C. Grykien, K. Kusza, M. Siemionow
Anesthesiology and Intensive Therapy, Nicolaus Copernicus University in Toruń, Collegium Medicum, Bydgoszcz, Poland

Background and Goal of Study: Assessing of microcirculatory hemodynamcis may be used as a good indicator of tissue and organ survival. Patients under hypovolemic conditions are more susceptible to the circulatory depresses effects of volatile anesthetics than normovolemic healthy patients. This study investigated the effect of sevoflurane and isoflurane anesthesia on peripheral microcirculation during hemorragic shock (HS) using the rat cremaster model.

Materials and Methods: Twenty four Lewis rats were divided in 4 groups, after induction of the anesthesia with a single dose of intraperitoneal pentobarbital (40 mg per kilogram), then a tracheostomy was done, and next rats were ventilated with either 2 minimum alveolar concentration (MAC) sevoflurane or 2 MAC isoflurane. Under general anesthesia animals underwent flap isolation. Two groups served as controls and were not subject to HS but did receive isoflurane (group I, n=6), or sevoflurane (group II, n=6); next two groups, animals anesthetized with isoflurane (group III, n=6) or sevoflurane (group IV, n=6), were bled to value of MAP≤50 mmHg. Esophageal temperature, heart rate, central venous pressure, mean arterial pressure, and blood gases were measured over 4 hours. Microcirculatory changes were evaluated by measuring red blood cells (RBC) velocity, vascular diameters in arterioles (A1, A2, and A3) and the main venule (V1), functional capillary perfusion (FCP), and leukocyte-endothelial interactions in postcapillary venules.

Results and Discussion: There were not significant differences of microcirculatory parameters between group I and II. In group III, higher RBC velocities were recorded in arterioles A1 (6.4%), A2 (7.4%), and A3 (3.1%) when compared group IV. Capillary perfusion increased in group IV (5.1%) when compared to group II. The number of rolling leukocytes was higher in group III (3.4%) when compared to IV. Better hemodynamics in the peripheral microcirculation were seen during sevoflurane anesthesia, and were confirmed by FCP increase and by reduced number of activated leukocytes. That may shows that altering effect of hypovolemia on peripheral circulation may be milder expressed in case of sevoflurane than isoflurane anesthesia.

Conclusion(s): Under hypovolemic conditions, Sevoflurane anesthesia seems to be more advantageous to microcirculation when compared to Isoflurane anesthesia.

4AP6-3

Sevoflurane-induced cardioprotection in a rat model of high-fat diet-induced type 2 diabetes mellitus
R. Bouwman, C. van den Brom, S. Loer, C. Boer, R. Lamberts
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Background and Goal of Study: The heart can be rescued from perioperative ischemia and reperfusion (IR) injury by cardioprotection with volatile anesthetics via activation of survival kinases. However, diabetes mellitus (DM2), in humans linked to diet-related obesity, is associated with reduced activation of signaling cascades, which may diminish anaesthetic-induced cardioprotection. Therefore, the goal of this study is to investigate sevoflurane-induced cardioprotection in a high-fat diet-induced rat model of DM2 and we hypothesized that diet-induced DM2 is associated with an impaired cardioprotective capacity.

Materials and Methods: Male Wistar rats (n=18) received a diet high in saturated fat (HFD; fat: 40% of calories) or a diet low in saturated fat (LFD; fat: 4% of calories) for 20 weeks. After 20 weeks, isolated right ventricular trabeculae were subjected to an IR protocol by superfusion of hypoxic, glucose-free buffer for 40 minutes followed by 60 minutes of reperfusion. Trabeculae received either 3.8% sevoflurane for 15 minutes (SEVO) or no treatment (IR) prior to IR. Isometric force development was measured and contractile recovery (FRv) force after IR as percentage of force prior to IR was determined.
Clinical and experimental circulation

Results and Discussion: In LFD trabeculae, IR reduced FTRm from 75±10% [time control-LFD] to 21±8% [IR-LFD] (p<0.01). Preconditioning with sevoflurane reduced FTRm to 50±12% [SEVO-LFD] (p<0.001 vs. IR-LFD). In HFD trabeculae, IR reduced FTRm from 77±8% [time control-HFD] to 82±6% [IR-HFD] (p<0.01). Interestingly, IR-induced reduction of FTRm was less prominent in HFD trabeculae compared to LFD muscles (39±6% [IR-HFD] vs. 21±8% [IR-LFD], p<0.01). However, pretreatment of HFD trabeculae with sevoflurane failed to improve FTRm (46±5% [SEVO-HFD], p<0.05 vs. IR-HFD).

Conclusion(s): We demonstrated in a high-fat diet-induced DM2 model that DM2 cardiac tissue better resisted IR-injury compared to control animals. However, contractile recovery of DM2 myocardium after IR was not enhanced by sevoflurane preconditioning. These data suggest that diet-induced DM2 modulators deteriorating IR-related signaling pathways, which may interfere with volatile anesthetic-induced cardioprotective signaling.

4AP6-4

The effects of ischemic preconditioning on the lung autotransplant in pigs

A. Galán, J. Casanova, B. Martín, C. Simon, I. Garutti
Anesthesiology, H.G.U. Gregorio Marañón, Madrid, Spain

Background and Goal of Study: Ischemia reperfusion injury (IR) is the main cause of primary graft failure. Ischemic preconditioning (IPC) has been rarely studied in lungs. IPC protects organs of IR, but its efficacy has not been studied in a model of lung autotransplant yet. The aim of this study was to investigate the usefulness of IPC on lung vascular pressure and gaseous interchange.

Materials and Methods: Two groups [IPC and control] of 6 large white pigs (40±13 kg) were submitted to a left lung autotransplant (ischemia time 105±15 min). Femoral and pulmonary arteries were catheterized. In five moments we measured arterial gases, and we made an hemodynamic study: 1) Basal [BAS] 15 min. after anaesthetic induction; 2) Pretread [PT] 5 min. before clamping the pulmonary artery; 3) Postclamping [POC] 5 min. after clamping the pulmonary artery; 4) Preperfusion [PRP] before desclamping; and 5) Postreperfusion [POR], 10 min. after reperfusion. IPC was taken to end clamping the pulmonary artery; 4) Prereperfusion (PRR) before desclamping; and 5) Postreperfusion (POR).

Results and Discussion: Data (Mean±SD) are shown in the table.

<table>
<thead>
<tr>
<th></th>
<th>BAS</th>
<th>PT</th>
<th>POC</th>
<th>PRP</th>
<th>POR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAA</td>
<td>YES</td>
<td>20±±</td>
<td>34±6</td>
<td>20±10 ²</td>
<td>28±7 ²</td>
</tr>
<tr>
<td>NO</td>
<td>22±7</td>
<td>29±7</td>
<td>45±12</td>
<td>44±15</td>
<td>39±7</td>
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<tr>
<td>PAM</td>
<td>YEA</td>
<td>87±18</td>
<td>91±16</td>
<td>91±14</td>
<td>85±18</td>
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<tr>
<td>NO</td>
<td>91±18</td>
<td>90±17</td>
<td>92±19</td>
<td>74±23</td>
<td>64±18</td>
</tr>
<tr>
<td>CI</td>
<td>YEA</td>
<td>4±1</td>
<td>4±08</td>
<td>3±05*</td>
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<tr>
<td>NO</td>
<td>4±1</td>
<td>5±07</td>
<td>5±60±8</td>
<td>4±02</td>
<td>3±1</td>
</tr>
<tr>
<td>PaO2</td>
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<td>25±131</td>
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</tr>
<tr>
<td>NO</td>
<td>213±17</td>
<td>14±91</td>
<td>112±49</td>
<td>114±91</td>
<td>92±38</td>
</tr>
</tbody>
</table>

Conclusion(s): IPC has revealed its utility to mitigate the pulmonary hypertension after reperfusion, and also improve the damage in the gaseous interchange which appears after ischemia-reperfusion injury.

4AP6-5

Effect of xenon combined with hypothermia on myocardial reperfusion injury

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Background and Goal of Study: Therapeutic hypothermia following an ischemia-reperfusion event may be cardioprotective [1,2], but is often delayed. Xenon (Xe), in contrast, can be administered rapidly and provides effective post-conditioning in the rabbit heart [3]. We hypothesised that Xe applied at reperfusion can attenuate myocardial reperfusion injury until therapeutic levels of hypothermia are achieved, thus providing continuous and more efficacious cardioprotection than hypothermia alone.

Materials and Methods: Chloralose-anesthetized Wistar rats were allocated to eight groups (n=6-9) and subjected to 25 min of coronary artery occlusion followed by 120 min of reperfusion. At the onset of reperfusion, four treatment groups received an inspired oxygen fraction (FIO2) of 80% and either 30 min Xe 20% (Xe20), one hour of hypothermia at 34°C (Hypo34), both interventions simultaneously (Xe20+Hypo34), or Xe followed by hypothermia (Xe60–Hypo34). Two groups received intensified stimuli of Xe 70% and hypothermia at 32°C either simultaneously (Xe70+Hypo32), or successively (Xe70–Hypo32). Two groups received intensified stimuli of Xe 20% (Xe20) or 30% (Xe30), respectively, throughout reperfusion. At the end of reperfusion, infarct sizes (IS, percentage of area at risk) were assessed by triphenyltetrazolium chloride staining. Statistics: One-way ANOVA, Data are mean±SD.

Results and Discussion: IS (Control) (76.1±12.0%) were non-significantly reduced to 63.5±10.2% after Xe administration (Xe20) or 62.4±15.6% following hypothermia (Hypo34). Combination of Xe with hypothermia did also not reduce IS significantly (Xe20+Hypo34: 56.5±22.2%, Xe20–Hypo34: 64.7±13.4%, p>0.1). The intensified stimuli had no effect on IS (Control: 67.4±6.1%, Xe70+Hypo32: 62.6±17.3%, Xe70–Hypo32: 64.3±13.5%, p=0.82).

Conclusion(s): The administration of Xenon and hypothermia does not afford myocardial post-conditioning in a rat model.

References:

4AP6-7

Pre-treatment with Cpg-DNA modulates cardiac remodelling in mice

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Background and Goal of Study: Inflammatory mediators play an important role in the pathogenesis of cardiac hypertrophy. It has been shown that pre-treatment with bacterial components like Lipopolysaccharide (LPS) and bacterial DNA (CpG-DNA) significantly reduces ischemia-reperfusion injury. In addition, Toll-like receptors (TLR) have been described to modulate cardiac remodelling in mice following aortic banding (AB). Bacterial DNA, which is characterized by specific CpG-motives, is specifically recognized by TLR9. The induction of TLR9 leads to the activation of a signalling cascade and the gene expression of different cardiac relevant inflammatory mediators. 1668-ODN, which is a synthetic Oligonukleotide, has been shown to induce sepsis in vivo. Thus, we tested whether a specific CpG-Oligonukleotide (1668-ODN) possesses pre-conditioning properties in cardiac hypertrophy.

Materials and Methods: Mice, age and sex matched, were anesthetized; intubated and ventilated using a HSE MiniVent Ventilator (Harvard Apparatus GmbH). The aorta was exposed through a left thoracotomy and isolated. A 7-0 silk suture was drawn under the aortal arch between the carotid arteries and ligated against a 26-gauge needle which was promptly removed. In sham operated animals the suture was drawn under the aortal arch, but not ligated. One experimental group mice was heart preconditioned with 5 renal 1668. Thioat 16 hour before AB. At 1 d and 7 d after AB haemodynamic parameters were measured using a pressure-volume catheter (Millar Instruments). The heart weight/body weight ratio was determined to measure the amount of hypertrophy.

The cytokine synthesis was analysed by enzyme-linked immunosorbent assay (ELISA).

Results and Discussion: Following 7 d of AB, the HW/BN ratio increased significantly by 59% in WT mice compared to control. Preconditioning with CpG-DNA reduced significantly the HW/BN ratio following AB compared with control (AB without pretreatment with: ). Furthermore, AB, considerably increased the left ventricular pressure compared to sham operated animals. In contrast, CpG-DNA pre-treated animals developed only a marginal increase of left ventricular pressure. The protein concentration of IL-13 showed a significant increase at 6 h of IL-13 (TAK 12.9 pg/mg vs. CpG-DNA 0.8 pg/mg; n=3, p<0.05) and 3d (TAK 3.2 pg/mg vs. CpG-DNA 1.8 pg/mg; n=3, p<0.05) after AB compared to CpG-DNA preconditioned as well as sham-operated animals.

Conclusion(s): The available data suggest that preconditioning with CpG-DNA leads to a reduced cardiac hypertrophy in mice after AB.

4IL6-22

Interleukin-22 plays a protective role against ischemia-reperfusion injury in mouse hearts

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Background and Goal of Study: Interleukin-22 (IL-22) is a recently described member of the Interleukin 10 (IL-10) cytokine family. An anti-inflammatory role has been described for IL-22 in a rat model of autoimmune myocarditis [1]. IL-22 was shown to inhibit the production of factors incremented in inflammation, therefore, it is possible that IL-22 deficiency could increase the kinetics of cellular infiltrates in an inflammatory process. The aim of this study was to determine the
potential role of IL-22 in the process of ischemia-reperfusion following cardiac transplantation in a murine model.

Materials and Methods: After animal ethic committee approval, abdominal vascularized heterotopic heart transplants were performed with IL-22KO.B6- IL-22KO.BALB/c-wild type B6 and BALB/c mice in different experimental combinations and transplants were observed for rejection.

Results and Discussion: Data are shown below: the complete absence of IL-22 accelerated the rejection of cardiac allografts as shown in the figure. Survival of cardiac allografts in the presence or absence of IL-22 (p<0.05). Histology of rejected cardiac allografts exhibited intensive intra graft thrombosis and disseminated hemorrhagic necrosis associated with complete destruction of the vascular structures and the myocardium. Another striking feature in these sections was the prominent presence of polymorphonuclear cells in the infiltrates corresponding to the cytoligical characteristics of neutrophils.

Conclusion(s): IL-22 seems to play a protective role in the ischemia-reperfusion myocardial injury in a cardiac transplantation murine model. This new cytokine could represent a potential therapeutic agent for transplant survival.

References:

4AP7-1
Time-course of haemodynamic alterations during colon resections: General versus combined general and epidural anaesthesia
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Background and Goal of Study: In order to investigate the hypothesis that combined general and epidural anaesthesia provides less cardiovascular stability than general anaesthesia alone during colon resections, we compared the haemodynamic changes of both techniques using oesophageal Doppler (ODM II G 975).

Materials and Methods: 71 ASA I and II patients scheduled for elective colon resections were randomized into two groups; general (G) or combined general and epidural Anaesthesia (C). An epidural catheter was inserted to all patients at the T11-T12 interspace. Anaesthesia was induced with midazolam, remifentanil, propofol and cis-atracurium, and was maintained with sevoflurane in both groups. Intraoperative analgesia was provided either with remifentanil infusion (0.15-0.25 μg/kg/min - group G) or with epidural administration of ropivacaine 0.5% (50-75 mg initial bolus dose and top up doses of 15mg every hour - group C). Postoperative analgesia was provided with epidural morphine administration in both groups. Systolic, diastolic blood pressure, heart rate, and central venous pressure were recorded every 10 minutes. Cardiac output indices, including minute distance, stroke distance, stroke volume, peak velocity, corrected flow time, and systemic vascular resistance were recorded every 20 min.

Results and Discussion: After anaesthesia induction, significant decrease in systolic, diastolic and mean arterial pressure was observed in both groups. The difference between the two groups was statistically significant (p<0.05) only at 20 and 30 min after induction. Heart rate decreased in both groups and was maintained significantly lower compared to the pre-anaesthetic baseline. Statistically significant (p<0.05) difference between the groups was recorded only at 60 min. Cardiac output was similar in both groups except 90 and 110 minutes after induction, when cardiac output was significantly higher (p<0.05) at C group. Systemic vascular resistance was found significantly (p<0.05) lower in group C compared to group G at 30 and 90 min after anaesthesia induction. No significant differences were observed in myocardial contractability in any group. It seems that at the times of installation of sympathetic epidural blockade, although blood pressure decreases, cardiac output is maintained because of the equal decrease in systemic vascular resistance.

Conclusion(s): Combined general and epidural anaesthesia seems to provide cardiovascular stability to ASA I-II patients undergoing colon resection surgery.

4AP7-2
Preconditioning effects of levosimendan in cardiac surgery patients with poor left ventricular function
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Background and Goal of Study: Patients with poor left ventricular function require intravenous drug support after cardiopulmonary bypass. The use of levosimendan in these patients is associated with a better postoperative stroke volume index. We hypothesized that there could be a better postoperative cardiac function if the levosimendan was started before the cardiopulmonary bypass. In addition we wanted to see if there was a preconditioning effect in this group.

Materials and Methods: 60 patients with EF < 30 percent for cardiac surgery with cardiopulmonary bypass. All patients received anesthesia with sevoflurane, remifentanil and cisatracurium. For weaning from cardiopulmonary bypass, pat olution was randomly assigned to three different groups. Group A: 0.1 μg/kg/min + Dobutamine 5 μg/kg/min + Dobutamine 5 μg/kg/min started after the cardiopulmonary bypass. Group B: Levosimendan 0.1 μg/kg/min started before the cardiopulmonary bypass + Dobutamine 5 μg/kg/min started after the cardiopulmonary bypass. Data analysis: SVI, dobutamine/noradrenaline time and dose, cardiac enzymes, global hemodynamic variables, tracheal intubation time, ICU and hospital length of stay. Statistical significance was accepted at p<0.05. Statistical analysis: Chi-square analysis, one- and two way analysis of variance, Bonferroni-Dunn test, Mann-Whitney Rank Sum test, sigstat 2.03 software package.

Results and Discussion: There was no difference in postoperative stroke volume index between the two levosimendan groups. However, the euvolemic score was significantly higher in the preconditioning group (p = 0.056) and the aortic clamp time was significantly longer (p = 0.05). The occurrence of postoperative atrial fibrillation was significantly lower in the preconditioning group (p = 0.002). There was no difference in postoperative cardiac enzymes. Only the LVED pressure was lower in the preconditioning group at 48 hours postoperative.

Conclusion(s): In cardiac surgery patients with a low preoperative ejection fraction patients maintained a better stroke volume with levosimendan. However, there was no difference in cardiac function between the pre- and post-conditioning group. We didn’t find a clear preconditioning effect of levosimendan in this study.

4AP7-3
Effects of simvastatin on systemic inflammatory responses after cardiopulmonary bypass
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Background and Goal of Study: The 3-hydroxy-3-methyl-glutaryl coenzyme A (HMG-CoA) reductase inhibitors ("statins") are known to possess, besides their cholesterol-lowering properties, anti-inflammatory and immunosup Molly characteristic properties. In the present study, we test the hypothesis that the administration of simvastatin, at doses equivalent to those used orally for cholesterol control, cause a reduction in cytokine release during the inflammatory state following coronary artery bypass surgery with cardiopulmonary bypass.

Materials and Methods: Patients scheduled to undergo elective coronary artery bypass graft surgery at our center were evaluated for their possible inclusion in the study. Forty-four subjects who fulfilled the inclusion criteria were randomized for treatment with simvastatin (20 mg/day, group A, n = 22) or control (group B, n = 22) 3 weeks before surgery. Plasma levels of interleukin IL-6, IL-8, TNF-α, and SIRS score were measured during the surgical intervention and over the following 48 postoperative hours. Cytokine levels were measured by enzyme-linked assays from plasma samples obtained at specific time points pre- and post-operation.

Results and Discussion: In both groups, compared with the initial levels, interleukin-6, interleukin-8 and TNF-α levels peaked at 6 hrs after surgery. The SIRS score increased significantly over the baseline, though no significant differences were observed between the two groups. The preoperative and postoperative course did not differ between both groups.

Conclusion(s): On the basis of our data, it can be affirmed that the administration of simvastatin at a dosage of 20mg/day in patients undergoing coronary...
Results and Discussion: The mean age was 62.1±10.3 vs. 58.4±10.2 years. The body mass index (BMI) was significantly higher in the group A (30.0±5.5 vs. 27.4±4.7, p<0.05). The highest MAP was 133±19.3 in the group A and 102±16.5 mmHg in the group B (p<0.05). Patients in the group A required more anaesthetic blood pressure manipulations (42 vs. 23), more urapidil for intraoperative hypertension (13/44 vs. 2/44, p<0.05) and had more intraoperative hypotensive episodes (23 vs. 12; ns, p< 0.05). Intraoperative bradycardia (11/44 vs. 7/44), the use of atropine (16 vs. 9, ns, p> 0.05) were similar in both groups. One patient in both groups received remifentanil for hypertensive episodes with tachycardia up to 120 beats min−1. A core temperature decreased more in A group, although difference was not significant (0.40 vs. 0.36 °C h−1, ns, p=0.05).

Conclusion(s): Hypertensive patients required more anaesthetic interventions and had higher consumption of vasoactive drugs during anaesthesia for breast cancer surgery. This may reflect in the higher standards of anaesthetic care and higher costs of anaesthetic procedure.

References:

4AP7-7
Heart rate variability predicts cardiovascular events during general anaesthesia
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Background and Goal of Study: To investigate whether analysis of preoperative heart rate variability (HRV) in cardiac risk patients is suitable to predict incidence of cardiovascular events (CE).

Materials and Methods: HRV was analyzed in 102 patients (Revised Cardiac Risk Index score ≥ 2) scheduled for general anesthesia. CE were defined as ST segment depression or elevation in 24 hour Holter-ECG recording or significant increase of creatinine kinase MB. Retrospectively, 50 patients were assigned by CE in Holter-ECG recording. HRV of patients without CE (n=53) was compared to HRV of patients with CE (n=49). Prospectively, Total Power (TP) and Low to High Frequency ratio (LF/HF) were measured in another group. Length of hospital stay, incidence of postoperative cardiac ischemia and cardiac events after discharge were recorded.

Results and Discussion: Retrospectively, TP<400ms²/Hz demonstrated sensitivity of 76% and specificity of 88% for prediction of postoperative CE and was superior compared to LF/HF>2.5 (sensitivity: 95%; specificity: 37%). Prospectively, 26 patients (TP<400ms²/Hz) were compared with 24 patients (TP>400 ms²/Hz). Significant differences were found regarding CE in Holter-ECG recording (TP<400ms²/Hz: 8 patients vs. TP>400ms²/Hz: 1 patient, p<0.05), increased creatinine kinase MB (TP<400ms²/Hz: 4 patients vs. TP>400ms²/Hz: none, p<0.05) and length of hospital stay (TP<400ms²/Hz: 10±7 days vs. TP>400ms²/Hz: 6±2 days, p<0.05).

Conclusion(s): Preoperative TP in high risk patients predicted increased incidence of postoperative cardiac ischemia and extended length of hospital stay with high sensitivity and specificity. TP may be a suitable tool to detect patients at high risk of cardiac events and may suggest intensified postoperative monitoring in this patient population.

4AP7-8
Comparison of dexametomidine, remifentanil and esmolol in controlled hypotensive anaesthesia
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Background and Goal of Study: We aimed at comparing dexametomidine, remifentanil, esmolol in controlled hypotension application during tympanoplasty for intraoperative bleeding, preoperative hemodynamics, recovery and adverse effects.

Materials and Methods: This is a randomised, blinded and prospective study, 60 ASA I-II patients, aged between 18-60, undergoing tympanoplasty operation, were included in the study upon consent of the hospital’s ethical committee and written consents of the patients. Patients with dysrhythmia and with arterial pressure of 60 mmHg or lower were not included in the study. For hypotension, the target SAP was calculated as 40% below the basal value. Hypotensive agent was started in groups 5 minutes before the pullout of the microscope. Group D (n=20) Dexametomidine 1 mg m kg−1 (10 min), 0.2-0.7 mg m kg−1 h−1 infusion. Group R (n=20) Remifentanil 0.2-0.5 mg m kg−1 min−1. Group E (n=20) Esmolol 500 m g kg−1 (1 min), 50-300 m g kg−1 min−1 infusion. The same surgeon performed all the operations to ensure consistency in the estimation of the surgical field. Spontaneous eye open time, extubation time, verbal response time,
cooperation and orientation time were recorded. SPSS version 10.0 statistical software was used for data analysis. Data were expressed as mean ± standard deviation (SD) and p < 0.05 was considered significant. The sample number of the groups were found n=13 for Power 0.80, to 0.20 and ± 0.05 when D = 0.90. SD = 0.70 was accepted for surgical area bleeding score parameter.

**Results and Discussion:** Groups did not differ in surgical area bleeding assessment scores. No statistically significant difference was found between postoperative recovery features of groups.15% of the patients of Group E and 15% of the patients of Group D were observed to have hypotension that requires ephedrine. Hypertension was observed in 15% of the patients of Group D. These patients were excluded from the study. Hypertension observed in Group D was considered to be significantly higher than the other groups (p=0.043).

**Conclusion(s):** Dexmedetomidine, remifentanil and esmolol may be advisable for controlled hypotension during tympanoplasty in respect of intraoperative bleeding, recovery and adverse effects. In practice, particularly the loading dose and infusion of dexmedetomidine may be recommended to be started in the preoperative period, for the purpose of ensuring more stable conditions.

**References:**

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**4AP7-9**

Lack of cardioprotective effect of desflurane preadministration in coronary surgery: A multicentre randomised study

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**Background and Goal of Study:** Volatile anaesthetics have cardioprotective properties. They can mimic ischemic preconditioning (PC), leading to a decrease in myocardial infarct size in an experimental setting (1). Previous clinical trials have shown that administration of desflurane at 1-4% during the whole period, i.e. before, during and after cardiac pulmonary bypass (CPB) or at 15% (2.5MAC) during 5 min. after onset of CPB and before cross-clamping 2 decreased postoperative troponin I levels and improved LV function. The present study investigated if, as suggested in an experimental animal model, desflurane administration before CPB at 6% (1MAC) has cardioprotective efficacy.

**Materials and Methods:** Scheduled patients for elective CABG surgery were randomised in 2 groups among 9 French centres. Anaesthesia was performed with propofol and sufentanyl. Desflurane group (D) received 1MAC desflurane from anaesthetic induction until onset of CPB. Control group (C) received a propofol anaesthesia during the preCPB period. Troponin I and BNP were measured postoperatively. Results are expressed as mean±SD for ITT population.

**Results and Discussion:** Among the 171 (ITT) treated patients, 152 patients (PP) completed the protocol. 1 MAC desflurane exposure duration was 100±45 min for D group. Postoperative dosages of troponin and BNP did not differ between groups. Peak of troponin I was 8.6±11.2 and 8.3±17.6 μg/ml and AUC was 259±315 and 233±466 μg/ml.h for D and C group respectively (ns). Peak of BNP was 191±190 and 228±168 pg/ml and AUC was 781±3780 and 813±6107 pg/ml.h for D and C group respectively (ns). There was no difference in outcome.

**Conclusion(s):** This randomized multicenter study showed that desflurane preadministration at 1 MAC was not sufficient to induce a preconditioning effect in this clinical setting. A longer duration of administration (2) or a higher concentration, or more selected high patients are probably necessary to show a clinical cardioprotection.

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**References:**

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**4AP7-10**

Cutaneous microcirculation effect of noradrenaline in case of spinal anaesthesia

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**Background and Goal of Study:** Spinal anaesthesia (SpAn) results in a reduction in skin blood flow (evaluated by Laser-Doppler Flowmetry (LDF)) of the upper part of the body, and in increase in skin blood flow of the lower part of the body (1). This study compared the effect of noradrenaline (Nor), used to treat hypotension secondary to SpAn, on LDF of the lower and the upper part of the body.

**Materials and Methods:** After local Ethics Committee approval, 12 ASA I-II informed patients were included. SpAn was adjusted to achieve a T7-T10 sensory block level after injection of 12.5 mg hyperbaric bupivacaine plus 2.5 μg sufentanyl. Voluvex® was infused to avoid a reduction of MAP greater than 20% of the preoperative value. When T7-T10 sensory block was achieved and 15 minutes after spinal injection, Nor was administered to restore MAP at 95%± 105% preoperative value. Two fiberoptic light guides (Probe 407-4, Perimed®) were applied on the sternum and on the foot and connected to the LDF. LDF expressed microcirculation in Unit of Perfusion (PU), defined by the manufacturer. PU was recorded before SpAn (preSpAn), before Nor infusion (postSpAn) and after MAP restoration with Nor (postNor) and 5 minutes after Nor cessation (end). Data (mean±SDs) from each sides and MAP were analysed using repeated measures ANOVA (p<0.05=statistically significant).

**Results and Discussion:** SpAn resulted in a significant increase in skin blood flow on the foot and a significant reduction in MAP. A non significant reduction in PU of the sternum area was observed. Nor infusion significantly increased MAP. This increase was associated with a further increase in PU at the level of the foot but with no change at the level of the sternum. Cessation of Nor infusion resulted in return to post spinal injection value of PU and MAP.

**References:**

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**4AP7-11**

Dihydropiridine calcium-channel blockers and perioperative mortality in aortic aneurysm surgery

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**Background and Goal of Study:** Dihydropiridine calcium channel-blockers are alternative to beta-blockers in the treatment of hypertension are often used in patients undergoing aortic aneurysm surgery. This study aimed to study the relation between dihydropiridine calcium channel-blocker users and perioperative mortality in patients undergoing aortic aneurysm surgery.

**Materials and Methods:** We studied 1,000 patients (mean age, 69.0±10.0 years; males 810) who underwent acute or elective abdominal or thoracoabdominal aortic aneurysm surgery between January 1999 and April 2007, at the Department of Cardiovascular Surgery at our Institution. Patients were evaluated for clinical risk factors, chronic medication use and surgical characteristics.

**Propensity score analysis was used to adjust for baseline differences between patients undergoing aortic aneurysm surgery. This study aimed to study the relation between dihydropiridine calcium channel-blocker users and perioperative mortality occurring within 30 days of surgery.

**Results and Discussion:** Perioperative mortality occurred in 85 (8.5%) patients. The incidence of outcome was significantly higher in dihydropiridine calcium channel-blocker users compared to nonusers (8.0% vs. 14.0%; crude odds ratio [OR]: 2.6, 95% confidence interval [CI]: 1.6-4.0; p<0.001). After correcting for other covariates and the propensity for dihydropiridine calcium channel-blocker use, the association between dihydropiridine calcium channel-blocker use and perioperative mortality occurring within 30 days of surgery.

**Conclusion(s):** Dihydropiridine calcium channel-blocker use in patients with acute or elective aortic aneurysm surgery is independently associated with an increased incidence of perioperative mortality.

**4AP8-1**

Real intraoperative afterload assessed with transesophageal echocardiography

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**Background and Goal of Study:** End systolic wall stress is the correct physiological definition for afterload. However it is usually assumed afterload as the peripheral vascular resistance (PVR) measurement that similes extremely...
the real cardiovascular physiology. Intrinsic factors like intracavitary pressure, ventricular ratio and diameters of the walls and extrinsic factors like aortic impedance are the determinants of left ventricular (LV) wall stress and also afterload. Only aortic impedance is considered when calculating afterload with pulmonary artery catheter. A modern intraoperative cardiovascular monitoring device is transesophageal echocardiography (TOE). Doing very simple echocardiographic measurements, it is possible to assess real afterload calculating end-systolic LV stress. The goal of this study was to assess LV stress with TOE and compare the results with simultaneous measurements of PVR assessed with Swan Ganz catheter.

Materials and Methods: This is a prospective study of 37 patients having surgery. A modern invasive FloTrac/Vigileo™ system (Edwards Life Science, USA) calculates continuous cardiac output (CO) on arterial pressure waveform characteristics and patient’s demographic data. Because it calculates CO based on its internal database, it is unclear whether it can estimate CO precisely in patients with aortic regurgitation (AR). In this study, we compared CO calculated by pulmonary artery catheter (PAC) and FloTrac/Vigileo™ system in patients undergoing AR correction surgery to clarify whether less invasive FloTrac/Vigileo™ system can replace invasive PAC.

Results and Discussion: Patients were six male and one female. Patients’ age was 68±6 y.o., body height was 159±7 cm and body weight was 56±9 kg. Overall SV was 9.1±5.1 l/min and CEDVI was 12±4.19 l/min². Correlation coefficient was 0.123. Regression line was y = 0.48x + 120 (x: SV, y: CEDVI). Since data includes repeated measurement, p-value could not be calculated. But small correlation coefficient suggests no relation between SV and CEDVI. It is reported that both SV and CEDVI are good parameters to predict fluid responsiveness but SV is more accurate than CEDVI. We expected SV and CEDVI to show negative linear regression but not. Such difference of accuracy may be helpful to understand the cause of dissociation between SV and CEDVI.

Conclusion(s): We could not find a relation between stroke volume variation and end-diastolic volume measured by FloTrac/Vigileo™ and Vigileo™.
Background and Goal of Study: Subcutaneous tissue oxygen tension (PsqO2) is a major predictor for wound healing and occurrence of wound infections (1). Perioperative subcutaneous wound- and tissue oxygen tension is significantly reduced in morbidly obese patients. Even during intraoperative supplemental oxygen administration PsqO2 remains low (2). Tissue hypoxia is pronounced during surgery and might explain the substantial increase in infection risk in obese patients. It remains unknown whether long-term supplemental postoperative oxygen significantly augments tissue oxygen tension. Consequently we tested the hypothesis that 80% inspired oxygen administration during 12-18 postoperative hours significantly increases PsqO2 compared to 30% inspired oxygen fraction.

Materials and Methods: After IRB approval and informed consent 18 patients (9;9) with a BMI > 35 undergoing laparoscopic bariatric surgery were randomly assigned to receive either 80% inspired oxygen via a HiOx-mask (VASYS®) (10/min) or 30% oxygen via nasal cannula or open mask (2/min) after surgery until the next morning. Anasthesia technique, fluid administration and postoperative management were standardized. PsqO2 was measured with a temperature-corrected Clark type electrode (LICOX®, GMS Inc., Germany) in the subcutaneous tissue of the upper arm and adjacent to the wound. Arterial blood gas analysis was performed in regular intervals. Data were compared with Wilcoxon rank-sum tests; p<0.05 was considered statistically significant.

Results are presented as medians [25th, 75th percentile].

Results and Discussion: Morphometric and demographic data were similar in both groups. Confounding factors such as duration of surgery, anesthetic technique, perioperative fluid balance and VAS-scores did not differ significantly. Average investigation period in the HiOx group was 15±5 hours versus 16±2 hours in the LowOx group.

Arterial Oxygenation and PsqO2

<table>
<thead>
<tr>
<th></th>
<th>30% O2</th>
<th>80% O2</th>
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<tbody>
<tr>
<td>PaO2 (mmHg)</td>
<td>90 [84, 106]</td>
<td>233 [198, 291]</td>
</tr>
<tr>
<td>PsqO2 Arm (mmHg)</td>
<td>49 [39, 61]</td>
<td>60 [53, 80]</td>
</tr>
<tr>
<td>PsqO2 Wound (mmHg)</td>
<td>52 [47, 63]</td>
<td>80 [71, 96]</td>
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Conclusion(s): Arterial oxygenation and subcutaneous tissue oxygen tension was significantly increased by giving supplemental postoperative oxygen, if there is an effect on the incidence of wound infection in morbidly obese patients has to be matter of further research. Our results could constitute the background for trials on this issue.

References:
A and 6 patients from Group B. The duration of insertion and the number of attempts were similar in both groups (p>0.05). The local hematoma occurred in 11 cases in Group A and in 3 cases in Group B (p > 0.05).

Conclusion(s): Our results demonstrate no notable differences between the conventional technique and the ultrasound guided technique for the insertion of the central venous catheter via external jugular vein by un-experienced trainees.

References:

4AP8-8
Stroke volume averaging in stroke volume guided fluid therapy with the oesophageal doppler
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Background and Goal of Study: An individualized optimisation strategy, based on maximisation of cardiac stroke volume (SV) with colloid boluses, improves outcome after surgery (1). In this context the oesophageal Doppler is the most frequently used technique but evidence-based guidelines for the SV maximisation procedure are lacking and the natural variation in SV may influence the assessment and indication for fluid boluses. We therefore measured beat-to-beat SV before and after fluid optimisation, in order to estimate the optimal number of cardiac cycles to average for SV maximization.

Materials and Methods: Twenty patients scheduled for surgery were anaesthetised, using oesophageal Doppler (CED) for SV assessment. After 1 min of beat-to-beat data collection, a fluid challenge of 200 ml colloid was provided and repeated if a \( \geq \)10% increase in SV was obtained. Once no further \( \geq \)10% increase in SV could be achieved, optimisation was regarded as completed and further 1 min beat-to-beat data of SV were collected. The ratio between successive SV measurements were produced and the largest value of the 5th and the 95th percentiles was the variation in SV (SVVmax) calculated for 1 to 10 cycles.

Results and Discussion: 5 (25%) and 4 (20%) patients had \( \geq \)10% natural variation in SV when averaging 5 cardiac cycles before and after maximisation of SV, respectively. When 9 cardiac cycles were averaged, 2 (10%) and 1 (5%) of patients had \( \geq \)10% natural variation in SV before and after optimisation, respectively. Heart rate, tidal volume and peep were not found to be associated with SVVmax.

Figure 1 (continued)

Conclusion(s): Fluid optimization based on SV maximization with oesophageal Doppler technique should include SV averaging over 9 or more cardiac cycles to limit the influence of natural variation in SV.

Disclosure: Supported by a grant from Savvaerkejer Jeppe Juhl og hustrus Foundation, Grosseør Christian Andersen og hustrus Foundation and Deltex Medical, Chichester, UK.

References:

4AP8-9
Changes in central venous oxygen saturation monitoring in the peri-operative period of major surgery and association with outcome
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Background and Goal of Study: The ability to detect and resolve tissue hypoxia early in a patient care may have beneficial outcome. Mixed venous and central venous oxygen saturations (ScvO2) reflect the balance between oxygen requirement and delivery and thus may be used to assess the adequacy of tissue oxygenation. Aim of this study is to show whether ScvO2 has a prognostic significance in patients undergoing major surgery.

Materials and Methods: Data from 20 patients was analysed in a six-month period. The mean age was 67±9 years and 13 (65%) were male. All patients were ASA III. The duration of the surgery (colorectal, unilateral adrenalectomy etc) was 4.5±1 hours. ScvO2 was measured after the induction of anaesthesia and every 2 hours for the first 24 hours. Heart rate, mean arterial pressure (MAP), Spo2, and central venous pressure were continuously monitored. All patients were extubated after surgery and measurements were made under non-shock conditions. Cardiovascular instability measuring the need for additional fluid administration, isotropic support and re-intubation were evaluated.

Results and Discussion: Additional fluid administration was required in 2 patients and in one of them isotropic support. Emergency surgery was performed in one patient due to blood loss. In the above 3 patients ScvO2 was below 65%. All other patients maintained a mean ScvO2 of 73.6±10.2 and had no post-operative complications. In 15 (75%) patients during the first 2 post-operative hours there was a significant decrease in ScvO2 values (77.4±8% to 68.2±5%).

Conclusion(s): The use of ScvO2 monitoring in patients undergoing major surgery seems to be associated with outcome. Reductions of ScvO2 are common especially the first two post-operative hours. Further evaluation of peri-operative ScvO2 trends is required.

Respiration

5AP1-2
Effects on airway reflex using desflurane vs sevoflurane anesthesia with laryngeal mask in outpatients surgery (hernioplastic repair)
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Background and Goal of Study: The different soluble inhaled anesthetic de-
termine a delay in awakening in association with a delay in restoration of protective airway reflexes.

Materials and Methods: Seventy randomised patients received group A (n=36) Sevoflurane and group B (n=34) Desflurane via a laryngeal mask airway device (LMA supreme) (orthofix). Demographic data did not differ between two groups, the average M.A.C. for both groups was 0.72 and the mean M.A.C. hours was 1.02±0.09 for desflurane group vs 0.95±0.08 for sevoflurane. All patients received local anaesthesia.
Results and Discussion: The mean time from ending anaesthetic administra-
tion to appropriate response to command was longer after sevoflurane than
desflurane (6.4±2.3 vs 3.8±2.2 min, p<0.01). Also the time from first response
to command to ability to swallow 20 ml of water without coughing or drooling
was longer after sevoflurane. All patient received Desflurane were able to
swallow after 2 min responding command, without coughing or drooling, 55% of
patients given Sevoflurane coughed or drooled (p<0.01). Also at 8 min after re-
sponding to command 18% of patients given Sevoflurane still could not swallow
without coughing or drooling (p<0.05).

Conclusion(s): We conclude that Desflurane allows an easier return of protective
airway reflex.

References:
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   277.
3. Gajan F., Comparison of recovery profile after ambulatory anesthesia with propofol,
   641.

5AP1-3
Inhalation induction with sevoflurane for thyroidectomy procedure
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Background and Goal of Study: The volatile anaesthetics maybe anaesthetic
agents of choice for induction and maintance of anaesthesia many groups of
patients, because of their quick elimination, nearly no inadvertent reactions,
cardioprotection and anti-inflammatory effect. The aim of this research was to
evaluate the speed, quality and cost of induction and endotracheal intubation
with high inspired concentration of sevoflurane (7-8 vol%) for thyroidectomy
procedure in adults.

Materials and Methods: Twenty eight patients age 25-64, assessed as ASA II
scheduled for thyroidectomy entered the study. The inhalation anaesthesia with
6 lpm fresh gas flow was used. After the preoxygenation with face mask, the
sevoflurane 7-8 vol% (in mixture consisting of 28% O2 and 66% N2O) via face
mask was used for induction. The breathing circuit was filled with above mix-
ture before starting induction. After deep expiration (to the functional residual
capacity) the patient was asked to take 3 maximal breaths (called breaths with
vital capacity). Since this moment patients breathing was supported by anaes-
thetist squeezing the bag. The time needed to achieve relaxation enough for
intubation (Tint) was assessed. The leek of success was defined as masseter
muscle relaxation inefficient enough to perform laryngoscopy, cough or vocal
 cords relaxation insufficient enough for intubation. The time needed to loose of
conscious (defined as lost of verbal response ability) and potential inadvertent
reactions (respiratory, circulatory, motor fuction) were assessed. The inspired
oxygen concentration, expired concentrations of oxygen, nitrous oxide, car-
bon dioxide and sevoflurane, ECG, mean arterial pressure and diameter of both
pupils were assessed. The anaesthesia was maintained with sevoflurane (1-2
vol%)/O2/N2O with no muscle relaxants. The patients were asked next day to
assess the quality of anaesthesia.

Results and Discussion: Total Xe consumption, including initial loading period
and circle flushes was 13.4±6.0L or 4.8±1.2L.h⁻¹ (Mean ± s.e.m). However,
consumption during maintenance periods was only 2.54±0.2L.h⁻¹. Only 7.3% of
total Xe used could be recovered at the end of the procedure.

Conclusion(s): For a Xe mixture of ≥50% to be delivered for up to 34min, Xe
consumption can be reduced to 4.8± (0.2L.h⁻¹) ($US48.hr⁻¹), maintenance
being possible with as little as 2.54± (0.2L.h⁻¹) ($US25.4.hr⁻¹) and that with
a regime as efficient as this, Xe recovery/recycling would be of little additional
benefit.

5AP1-5
Effects of epidural bupivacaine (0.25%) on cough pressure
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Background and Goal of Study: Cough is a physiological mechanism in-
volved in the prevention of postoperative complications. It is related to expira-
tory muscle function, which can be weakened because of surgery, pain and/or
anaesthetics (1). Pressure generated by cough (Pcough) is usually measured
with osophageal and gastric balloons (2), but central venous and rectal pres-
sures have been proposed as alternatives (3). The goal of this study was to
examine the effects of thoracic epidural analgesia on Pcough.

Materials and Methods: Preoperatively, 10 patients scheduled for colon
surgery were asked to perform a maximal single cough effort from Total Lung
Capacity (TLC) in supine position. The manoeuvre was performed 3 times, al-
ways with the same command. Central venous (Pcv) and rectal (Prect) pres-
sures were recorded. After administration of 0.25% epidural bupivacaine to
reach a segmentary T6-T12 sensitive level via a T8-T10 catheter, measure-
ments were repeated. Best recordings obtained before and after bupivacaine
were compared (Student’s paired t-test).

Results and Discussion: Pcough (means±SD, cmH₂O) before vs after bupiva-
caine administration were: Pcv 122.2±34 vs 99±36 and Prect 126±41 vs 98±42
(p<0.001). Figure shows Pcough values.

5AP1-4
A minimal flow, minimal cost, xenon delivery regime in
humans using near-standard equipment
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Background and Goal of Study: Xenon (Xe) is an anaesthetic offering
favourable hemodynamics, minimal side-effects, fast emergence, which is also
showing promise as a neuroprotectant. Mechanisms of action include NMDA re-
ceptor antagonism. Possible applications include neonatal asphyxia and stroke
where its safety profile and reversibility could be advantageous. Global produc-
tion is relatively fixed. Although scarce and expensive (~$US10/l), uptake via
lungs is low which suggests that closed circuit delivery systems would be ideal
to contain costs. Objectives of the study were to investigate (i) the practicalities
of true closed circuit Xe delivery using a conventional anaesthesia machine, (ii)
a protocol designed to minimise Xe consumption and (iii) whether Xe recovery
would be worthwhile.

Results and Discussion: Total Xe consumption, including initial loading period
and circle flushes was 13.4±6.0L or 4.8±1.2L.h⁻¹ (Mean ± s.e.m). However,
consumption during maintenance periods was only 2.54±0.2L.h⁻¹. Only 7.3% of
total Xe used could be recovered at the end of the procedure.

Conclusion(s): For a Xe mixture of ≥50% to be delivered for up to 34min, Xe
consumption can be reduced to 4.8± (0.2L.h⁻¹) ($US48.hr⁻¹), maintenance
being possible with as little as 2.54± (0.2L.h⁻¹) ($US25.4.hr⁻¹) and that with
a regime as efficient as this, Xe recovery/recycling would be of little additional
benefit.
Epidural bupivacaine causes a motor blockade that decreases abdominal and intercostal muscle strength, which is expressed as a decrease in cough effort. This effect is probably counteracted by the quality of the analgesia achieved, which allows a strong expiratory effort with minimal pain. Parenteral analgesia would be in his inverse situation: minimal effect on expiratory strength, but expiratory effort limited by pain. This hypothesis might be verified in further studies. Also, comparison of 0.25% bupivacaine with other local anaesthetics is needed.

Conclusion(s): Our preliminary results showed a decrease in cough pressure after epidural 0.25% bupivacaine. The clinical relevance of this effect and the comparison with other analgesic techniques might be further evaluated.

Acknowledgements: Granted from FIS PI030127.

References:

**5AP1-6**

The effect of continuous positive airway pressure during preoxygenation and positive end expiratory pressure during induction upon duration of non-hypoxic apnea and haemodynamic parameters

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**Background and Goal of Study:** The aim of this study is to examine the effects of applying CPAP during preoxygenation and PEEP during mask ventilation upon duration of non-hypoxic apnea and haemodynamic parameters.

**Materials and Methods:** 100 patients, ASA I or II, aged 19-60 years, admitted for elective surgery were enrolled into the study. Patients were randomly located to four groups. For all groups, anesthesia was induced and maintained with standard methods. Mean arterial pressures, heart rate and SpO2 are measured when the patient came to the operating table; at the end of the preoxygenation period, mask ventilation, intubation and when the SpO2 reached 90%.

In Group I, preoxygenation was applied with CPAP mask with no air pressure for 5 minutes and then during induction ventilation was performed with volume-controlled ventilation (CMV) 6-8 ml kg-1 in Group II, preoxygenation was applied with CPAP mask with 6 cmH2O pressure for 5 minutes and then during induction ventilation was performed with CMV (6-8 ml kg-1); in Group III, preoxygenation was applied with CPAP mask but without any pressure for 5 minutes and then during induction ventilation was performed with CMV (6-8 ml kg-1) + 6 cmH2O PEEP and in Group IV, preoxygenation was applied with CPAP mask with 6 cmH2O pressure for 5 minutes and then during induction ventilation was performed with CMV (6-8 ml kg-1) + 6 cmH2O PEEP. All the patients were tracheally intubated. After intubation, the tracheal tube was left open to air at atmospheric pressure and the patient remained apnoeic until SpO2 reached 90%.

The time for SpO2 to reach 90% was recorded. The haemodynamic side effects were recorded.

**Results and Discussion:** The time for SpO2 to reach 90% is significantly longer Group IV compared to the other groups. The durations were 412.50 ± 97.37 sec in Group I, 443.52 ± 88.84 sec in Group II, 415.20 ± 117.45 sec in Group III and 522.92 ± 83.44 sec in Group IV (p < 0.001 Group I vs p > 0.030 Group II vs p > 0.001 Group III vs Group IV). The time for SpO2 to reach 90% is significantly longer in Group IV. Using only CPAP during preoxygenation and only PEEP during mask ventilation had no significant effect on duration of non-hypoxic apnea.

**Conclusion(s):** Specially for patients with difficult intubation, application of CPAP during preoxygenation followed with PEEP during mask ventilation safe, simple and it prolongs non-hypoxic apnoea period.

**5AP1-7**

The effects of sevoflurane, isoflurane, and halothane on the pattern of phrenic nerve activity in response to acute hypoxia in rats

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**Background and Goal of Study:** Anaesthetics have influence on chemical control of respiration either on central and/or peripheral level, modifying normal response to hypoxia. Phrenic nerve activity (PNA) is typically used as an equivalent of the central control of breathing. Even low concentrations of volatile anaesthetics are shown to decrease hypoxic ventilatory response (HVR). The aim of our study was to compare effect of halothane, isoflurane, and sevoflurane at equal MAC values of 1.75, 2.0 and 2.5 on the PNA in rats during acute normocapnic hypoxia induced by 10% oxygen concentration in inspired nitrogen.

Materials and Methods: We used the approval of the University of Split, School of Medical Medicine Ethics Committee, Sprague-Dawley males, laboratory rats. As a result, we used three experimental groups of seven animals each, which were operated regarding volatile anaesthetics used (halothane – H, isoflurane – I and sevoflurane – S). After tracheotomy was performed the animals were mechanically ventilated. Femoral veins and arteries were cannulated. All animals were vagotomized bilaterally. Phrenic nerve was dissected and recorded. Rhythm and pattern related changes of phrenic nerve were analysed during normocapnic hypoxia for three different volatile anaesthetics under three levels of anesthesia.

**Results and Discussion:** Halothane anaesthesia at 1.75 MAC markedly depressed PNA and abolished the ventilatory response to hypoxia. On the contrary, at the same level of isoflurane anaesthesia, hypoxia evoked marked increase of PNA. At 2.0 MAC and 2.5 MAC halothane and isoflurane abolished the HVR monitored by phrenic nerve activity. Hypoxia at sevoflurane anaesthesia at 1.75 MAC and at 2.0 MAC evoked increase in amplitude (p = 0.02) and rhythm related variables of PNA. At 2.5 MAC sevoflurane did not persistently affect phrenic nerve activity in response to hypoxia; increased PNA in 5 animals (p = 0.029), and evoked no change in 2 animals.

**Conclusion(s):** These results indicate there are both qualitative and quantitative differences in effects of halothane, isoflurane, and sevoflurane on the activity of phrenic nerve in response to acute normocapnic hypoxia in rats.

References:

**5AP1-8**

No cost TSE “mask”: A technically simple and effective face tent reduces severe oxygen desaturation and the need for assisted ventilation in deeply sedated patients during upper GI endoscopy

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**Background and Goal of Study:** Oxygen desaturation is a common occurrence in patients receiving moderate-to-deep sedation during upper GI endoscopy. Supplemental O2 via a nasal cannula is often insufficient for maintaining oxygenation when the patient’s mouth is kept open with a bite block and an endoscope is in place. It has been reported that a simple face tent (TSE “Mask”) made out of any clean plastic bag can easily convert an ineffective face mask used for sedation into an effective device that provides 40–60% FiO2 and improves oxygenation1. We tested this hypothesis in patients undergoing esophagogastroduodenoscopy, endoscopic ultrasound and endoscopic retrograde cholan- giopancreatography.

Materials and Methods: Our IRB approved this study. Patients (healthy or with mild disease) were consented and assigned randomly to the control (Con) or TSE “Mask” group (T) using an Excel–Random-Generator. Monitors included ECG, BP cuff, pulse oximetry and capnography. Patients received O2 via nasal cannula (4 and up to 10 l/min as needed) in the absence (Con, n=73) or presence (T, n=74) of a TSE “Mask” which is a face tent made out of a clean plastic bag. The bag was inflated with oxygen when the patient’s mouth is kept open with a bite block and an endoscope is in place. It has been reported that a simple face tent (TSE “Mask”) made out of any clean plastic bag can easily convert an ineffective face mask used for sedation into an effective device that provides 40–60% FiO2 and improves oxygenation1. We tested this hypothesis in patients undergoing esophagogastroduodenoscopy, endoscopic ultrasound and endoscopic retrograde cholan-giopancreatography.

Materials and Methods: Our IRB approved this study. Patients (healthy or with mild disease) were consented and assigned randomly to the control (Con) or TSE “Mask” group (T) using an Excel–Random-Generator. Monitors included ECG, BP cuff, pulse oximetry and capnography. Patients received O2 via nasal cannula (4 and up to 10 l/min as needed) in the absence (Con, n=73) or presence (T, n=74) of a TSE “Mask” which is a face tent made out of a clean plastic bag. Patients then received intravenous propofol that was titrated to achieve deep sedation as standard anaesthesia care. Data collected included the procedure duration and the total amount of propofol administered, the highest O2 flow, the lowest SaO2 saturation and the need for assisted ventilation using Ambu bag. Our data was analyzed using JMP 8 software. The mean propofol dose (mcg/kg/min) were calculated for comparison. SAS is used for statistical analysis (Mean±S.D.). A p value <0.05 is considered as significant.

**Results and Discussion:** There is no difference between two groups in the age (p>0.1), sex (p>0.1), BMI (Con: 26.7±4 vs T: 27.8±3), the procedure duration (min) (Con: 38±4 vs T: 31±2), the mean propofol dose (mcg/kg/min) (Con: 234±12 vs T: 250±13). There is a significant difference between two groups in the median of the highest O2 flow (l/min) (Con: 10 vs T: 6), the lowest SaO2 saturation (88±1% vs T: 90±3%), severe O2 desaturation (≥ 85%) (Con: 26% vs T: 8%), and the need for assisted ventilation using Ambu bag (Con: 22% vs T: 3%).

**Conclusion(s):** These data suggest that TSE “Mask” improves oxygenation in deeply sedated patients during upper endoscopy by preventing severe O2 desaturation. This face tent utilizes a plastic bag that is ubiquitous at no cost and should be used routinely in all patients undergoing upper endoscopy.

References:
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5AP1-9
Fentanyl from the exhaled breath may contribute to the occupational exposure
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Background and Goal of Study: Opiate narcotics, such as fentanyl, administrated intravenously to patients may be breathed out to be a source of exposure which may contribute to an increasing opiate abuse among the anesthesiologists. The aim of this study was to monitor fentanyl in the expired air of the patients.

Materials and Methods: Three patients undergoing cardiac surgery with cardiopulmonary bypass were involved. After fentanyl was administered, the air samples were collected from the expiratory circuit of the anesthesia machine prepared by solid-phase microextraction and analyzed by gas chromatography-mass spectrometry (GC-MS). Preliminary works were carried out using the GC-MS in the full scan mode to check the retention time of fentanyl, then the GC-MS was operated in the SIM mode to enhance the sensitivity and the selected m/z were 245,189 and 146. The air samples were monitored in both the SIM mode and the full scan mode.

Results and Discussion: Fentanyl was detected in the expired breath of patients in both the SIM mode and the full scan mode. The chromatograms are shown in Figures 1 and 2.

Anesthetics contribute to the arising health hazards among the anesthesiologists. Investigation showed an increasing number of anesthesiologist addicts. Fentanyl may induce the addiction if it can pass the pulmonary blood-gas barrier and be exhaled after intravenously administering. GC-MS is a highly sensitive analytical method and SPME is an effective sampling and sample preparation technique. In this study, they were applied to analyze fentanyl in the expired air of the patients.

Conclusion(s): In this study, they were applied to analyze fentanyl in the expired air of the patients. GC/MS is a highly sensitive analytical method and SPME is an effective sampling and sample preparation technique which may contribute to an increasing opiate abuse among the anesthesiologists. The aim of this study was to monitor fentanyl in the expired air of the patients.

5AP1-10
Effect of two different MAC concentrations of desflurane and sevoflurane on pulmonary resistance during anesthesia
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Background and Goal of Study: Among the anaesthetic drugs, volatile agents possess bronchoactive properties. There is consensus in the literature that isoflurane and sevoflurane are at least as potent bronchodilators as halothane. In contrast, the data on desflurane are conflicting.

Materials and Methods: 20 patients undergoing a VATS approach with the new device, a bronchial blocker tube, UNIBLOCKER™ to establish OLV by expert laryngoscopists were studied. The time to place the UNIBLOCKER™ to the right or the left mainstem bronchus, the quality of lung deflation was rated by the surgeon under direct visualization as excellent, good, fair, or poor.

Results and Discussion: In all 20 patients, placement of the UNIBLOCKER™ was easily with fiberoptic aided technique. Speed of insertion increasing as experience improved. One-lung ventilation was well tolerated in all. The quality of lung deflation was judged as being excellent or good in all patients, and the surgical field was excellent in all cases. Data (means±SD) are shown in the tables.

Conclusion(s): For the expert laryngoscopist, to place the UNIBLOCKER™ was performed easy and quickly. Lung isolation was both safe and very effective in VATS. Advantages of placing a UNIBLOCKER™ include complete lung separation, ability to deflate/inflate a lung on the operative side, easy and rapid insertion and cost. Disadvantages include potential for blocker dislodgement during surgical manipulation and inability to suction lung independently. In this study, UNIBLOCKER™ showed ease to placement to the left main bronchus, and a better quality of lung collapse showed left > right. The development and clinical use of UNIBLOCKER™ proved to be effective and easy to use for establishing OLV.

5AP2-2
Recent acute respiratory tract infection in adults is a significant risk factor of postoperative complications
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Background and Goal of Study: We hypothesised that a recent acute upper respiratory tract infection (URl) in adults before surgery could be a significant risk factor of postoperative complications.
DIA (cm), deep breathing 4.40 ± 0.45

We compared qualitative variables with a \( \chi^2 \) test and quantitative variables with a t test. Odds ratios (OR) and 95% confidence intervals were calculated for postoperative complications.

**Results and Discussion:** Of 2,468 patients meeting inclusion criteria, 146 (5.9%) had an URI. The OR were 2.4 (1.6-3.5) for any postoperative complication, 4.9 (3.1-7.9) for respiratory complications, 2.4 (1.3-4.4) for cardiovascular complications, and 2.5 (1.4-4.4) for wound complications. Postoperative length of stay was longer (8.3 vs 5.7 days; P=0.025) and mortality at 3 months higher (6.9 vs 2.2%; P=0.002) for patients who had an URI.

**Conclusion(s):** Our study demonstrates that an URI in adults in the month before surgery is a significant risk factor for a wide variety of postoperative complications. Our results suggest that URIs, through either local respiratory tract effects or systemic ones, can have a negative impact on postoperative outcome. The history of URI should be investigated preoperatively, and in patients at higher risk of postoperative complications elective surgery should probably be delayed.

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**5AP2-3**

Diaphragmatic function after liver lobectomy: A sonographic study

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**Background and Goal of Study:** Ultrasonography has been used as a means of assessing hemidiaphragmatic movement and it is now generally accepted to be an effective and reproducible method. We utilized a diaphragm function monitoring method to investigate the postoperative impairment of diaphragmatic movement using ultrasonography and compared with standard pulmonary function test (PFT) after liver lobectomy.

**Materials and Methods:** We used M-mode sonography to measure diaphragmatic movement in 15 patients before and after liver lobectomy. Diaphragmatic movements were assessed by ultrasonography after PPT before and after 24 hours, 48 hours, and 7 days after operation. We measured the diaphragm inspiratory amplitude (DIA, in cm), the diaphragm inspiratory/respiratory movement mean velocity (DIV/DEV, in cm/s) during quiet, deep and sniff breathing.

**Results and Discussion:** Postoperative DIA of deep inspiration showed significant reduction until 48 hours. Seven days after operation, the DIA and PFT progressively returned to the preoperative value. The changes of DIA correlated with changes of functional vital capacity (r=0.581-0.704).

**Sonographic measurement before and after liver lobectomy**

<table>
<thead>
<tr>
<th></th>
<th>Before surgery</th>
<th>POD 1 day</th>
<th>POD 2 day</th>
<th>POD 7 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIA (cm), quiet breathing</td>
<td>1.37±0.45</td>
<td>0.77±0.22</td>
<td>0.96±0.27</td>
<td>1.17±0.34</td>
</tr>
<tr>
<td>DIA (cm), deep breathing</td>
<td>4.40±0.53</td>
<td>1.43±0.49</td>
<td>1.76±0.89</td>
<td>3.43±0.71</td>
</tr>
<tr>
<td>DIA (cm), sniff breathing</td>
<td>1.56±0.36</td>
<td>1.14±0.38</td>
<td>1.00±0.25</td>
<td>1.16±0.32</td>
</tr>
<tr>
<td>FVC (lit)</td>
<td>2.80±0.88</td>
<td>1.46±0.44</td>
<td>1.49±0.38</td>
<td>2.19±0.37</td>
</tr>
</tbody>
</table>

Data are expressed as mean ± SD. DIA = quiet, deep, and sniff diaphragmatic inspiratory amplitude. *P* < 0.05 between before surgery and POD measurements. *P* < 0.05 between POD 7 days and POD measurements.

**Conclusion(s):** Using M-mode sonography technique, we were able to evaluate diaphragmatic function successfully and found a significant decrease of the DIA during immediate postoperative period with recovery until 7 days after liver lobectomy.

**References:**


**5AP2-4**

Does preoperative oral carbohydrate fluids administration improve the perioperative period after major thoracic surgery?

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**Background and Goal of Study:** Restrictive perioperative fluid management is recommended in major thoracic surgery. In association with preoperative fasting, it may result in dehydration and metabolic disturbances. The aim of the study was to compare patients discomfort, changes in the intraoperative blood pressure after combined anesthesia with thoracic epidural analgesia, postoperative renal function, plasma glucose levels, gas exchange, PONV and other early complications in patients who received carbohydrate drinks preoperatively to the overnight fasted control group.

**Materials and Methods:** Thirty patients aged 58±8 yrs undergoing lung resection were enrolled. In group A 15pts were given to drink 1500ml of 8% carbohydrate drink 8 hours before the anesthesia. In group B 15pts were fasted for 14 hours (evening and night), drinking water when required. Exclusion criteria included diabetes mellitus, renal and heart failure. We assessed patients discomfort using VAS scores for thirst, hunger, tiredness and inability to concentrate. Prior to the induction of anaesthesia, propofol, rocuronium, thoracic epidural analgesia (5-6, 0.25% bupivacaine and fentanyl 100mcg) was performed. Crystalloids and colloids up to 15ml/kg were infused intraoperatively. Hypotension defined as decrease in blood pressure during anesthesia below 80 mmHg or of 30% from baseline and dose of ephedrine used were evaluated. Fluid balance, urine output, creatinine clearance and excretion, PaCO2, plasma glucose, electrolytes and urea levels were measured on the operation day.

**Results and Discussion:** Demographic and clinical data in both groups were comparable. In group A patients were significantly less hungry (1.5±1.4 vs 5.9±2.3, P<0.001), thirsty (1.5±1.3 vs 6.9±2.1, P< 0.001) and tired (2.6±1.7 vs 5.1±1.6, P<0.01) before the surgery. Intraoperative changes in the blood pressure and ephedrine requirement did not differ between the groups but the volume of infused fluids was higher in group B (1091mL vs 1375mL, 12.4 mL/kg vs 15.2 mL/kg, P< 0.05). Incidence of PONV was higher in group B. Renal function, arterial blood oxygenation and plasma glucose levels were similar in both group. In group B cardiac arrhythmia occurred in 3 patients on the 3rd day and atelectasis developed in 2 patients.

**Conclusion(s):** Oral carbohydrate fluids before major thoracic surgery significantly improve patients comfort in the perioperative period. Potential dehydration has no relevant clinical consequences and may be reversed by controlled intraoperative volume replacement.

**5AP2-5**

Influence of the differential lung ventilation on stroke volume variation

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**Background and Goal of Study:** Many clinical studies have demonstrated the value of arterial pulse pressure variation or stroke volume variation (SVV) to predict fluid responsiveness in mechanically ventilated patients, while the filling pressures such as CVP or PCWP do not necessarily predict the cardiac preload. Especially it might be true during thoracotomy, because a part of the pleural pressure is atmospheric, thus affecting the transmural pressure of the major vessels. The present study was conducted to clarify whether differential lung ventilation (DLV) during thoracotomy could change SVV, compared with the values during two-lung ventilation immediately before DLV.

**Materials and Methods:** Twenty adult patients, who underwent video-assisted thoracic surgery (VATS), were studied, while the study was done before and during one-lung ventilation in lateral decubitus position. FloTrac/Vigileo monitor was used to estimate cardiac output (CO), stroke volume and its variation (SV and SVV) by analyzing arterial pressure wave form. Mean arterial pressure (MAP) and heart rate (HR) were also measured 5 min before DLV as well as 5 min immediately after the onset of DLV. Student’s-t-test was used to determine statistical significance (p<0.05).

**Results and Methods:** Patient’s characteristics were: Age 68±9, height 159.3±8.7 cm, weight 55.1±9.0 kg. After the application of DLV, SVV decreased significantly (13.4% to 8.5%), and the increase in PP and MAP was significant (45 to 54 mmHg, and 65 to 70 mmHg, respectively), while CO and HR did not change significantly. Since the measurement was continued before and after the application of DLV, it is most likely that no major hemodynamic...
double-lumen endotracheal tube was inserted and was controlled by auscultation. Thymectomy for myasthenia gravis in Fundeni Clinical Institute (2). After approval of the local Ethics Committee we performed assisted thoracoscopy and implies one-lung ventilation. The risk of developing individual patients may develop clinically significant desaturation. The aim of this study was to detect the possible decrease in PaO2 when ventilated on both lungs. Since the collapsed lung continues to be perfused and not ventilated, the patient develops a large intrapulmonary shunt and it can result in hypoxemia. The main aim of this study was to investigate the influence of one lung ventilation (OLV) modality, pressure versus volume controlled ventilation, on intrapulmonary shunt.

Results and Discussion: There were not significant differences in shunt values between the two OLV modalities (p=0.49). A statistically significantly increased pulmonary shunt was evidenced during the both OLV compared to TLV (p<0.05).

Conclusion(s): The OLV modalities investigated, volume-controlled and pressure-controlled ventilation, have a comparable effect on intrapulmonary shunt.

References:

5AP3-1
Monitoring alveolar derecruitment at bedside using functional residual capacity measurements in cardiac surgery patients
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Background and Goal of Study: Monitoring of functional residual capacity (FRC) using the oxygen washout technique is possible at bedside [1,2] and may help detecting alveolar derecruitment and guiding countermeasures like recruitment manoeuvres. The aim of this study was to detect the possible decrease of FRC after a suctioning procedure - indicating alveolar derecruitment - and the effect of a successful alveolar recruitment manoeuvre on pulmonary function.

Materials and Methods: We studied 20 postoperatively mechanically ventilated cardiac surgery patients. FRC was assessed by oxygen washout using
a sidestream O2-analyser (LUFU system; Dräger Medical AG, Lübeck, Germany). FRC, respiratory compliance, paO2/FiO2 (PF-ratio) and paCO2 were recorded at baseline, after a standard succioning procedure with disconnection of the ventilator (20 sec., 14 F catheter, 200 mmHg negative pressure) (post ETS), and after a standard recruitment manoeuvre (PEEP 15 mbar, PIP 35 – 40 mbar for 30 sec) (post RM).

Results and Discussion: FRC decreased post ETS (3.2L ± 1.2) compared to baseline (3.4L ± 1.1, p = 0.046) and increased post RM compared to post ETS (3.5L ± 1.0, p = 0.038). Compliance showed a similar course, paCO2 decreased and PF-ratio increased post RM compared to post ETS (p = 0.005, p = 0.028, respectively). Relative FRC changes post ETS and absolute differences of FRC post ETS correlated to changes of PF-ratio post RM (Pearson: -0.896, p < 0.001, Pearson: -0.792, p < 0.001, respectively).

Conclusion(s): In post cardiac surgery patients changes of FRC after alveolar de- and recruitment can be detected at bedside using the oxygen washout technique. There was a strong association of a FRC-decrease after open ETS with an improvement of oxygenation from a consecutive RM. A FRC decrease may help to identify those patients who profited from a RM in terms of increased oxygenation, even in absence of blood gas data.

Acknowledgements: The LUFU-system was provided by Dräger Medical, Lübeck, Germany.

References:

5AP3-2
Respiratory status that facilitates subclavian venous catheterization
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Background and Goal of Study: Cannulation of a large central vein is performed for a number of therapeutic interventions such as providing secure vascular access for the administration of vasoactive drugs. Since its introduction in the 1980s, the subclavian vein has remained as an important portal for central venous cannulation. Since subclavian vein is located just adjacent to the pleural cavity and its vascular volume may be influenced by respiration, we were interested in the respiratory status that facilitates the subclavian venous catheterization.

Materials and Methods: Ten healthy volunteers were placed in the supine position, and the right subclavian vein was visualized by placing the 4.0-10.0 MHz linear transducer probe (GE LOGIQ Book XP, San Jose, CA) in the infraclavicular place. To quantify the decrease of subclavian venous flow, we measured the average velocity of the subclavian vein through the Doppler signal linear transducer probe (GE LOGIQ Book XP, San Jose, CA) in the infraclavicular place. To quantify the decrease of subclavian venous flow, we measured the average velocity of the subclavian vein through the Doppler signal.

Results and Discussion: Since subclavian vein is compressed at the end-inspiratory period just between the clavicle and the thoracic cavity and the diameter decreases.

Conclusion(s): Since subclavian vein is compressed at the end-inspiratory period just between the clavicle and the thoracic cavity and the diameter decreases.

5AP3-3
A low cost, low oxygen consumption mechanical ventilator to meet a pandemic surge
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Background and Goal of Study: The UK plan for an influenza pandemic predicts up to 750,000 additional deaths, hospital capacity meeting only 25% of demand, limited “surge capacity” and need to prioritise patients against resources. Experience of previous pandemics suggests this may result in a shortage of mechanical ventilators and oxygen, with recruitment of wards as ITU areas. To meet such demands we propose a novel gas-efficient low cost pneumatic ventilator. We investigated the effect of different lung compliances (i.e. different ventilator workloads) on the delivered inspired oxygen fraction (FiO2).

Materials and Methods: The 4bar oxygen powered device compressed a single-use self-inflating bag, “waste” oxygen then entering the reservoir, enriching the air within. This device, constructed from readily available industrial components, ventilated a test lung over a range of rates, I:E ratios, tidal volumes, with compliance settings representative of normal/diseased lungs. Data collected included oxygen consumption and FiO2.

Results and Discussion: Oxygen consumption was 0.91 (0.2)L.min⁻¹ and 1.12 (0.27)L.min⁻¹ at tidal volumes of 500ml and 700ml respectively. The FiO2 increased marginally as the lung compliance was reduced, reflecting increased workload of the oxygen powered pneumatic mechanism and consequent increase in “waste” oxygen delivery to the reservoir bag.

Conclusion(s): This initial study suggests the potential to produce a gas powered ventilator with an extremely low oxygen consumption. It can be used on any ward where piped oxygen is available, and no piped air or electricity is required. The use of a single use self-inflating bellows prevents cross contamination and provides the one-way and safety overpressure valves required. The low cost ventilator mechanism could also be single use, and could be stockpiled for crises where there is an overwhelming demand for mechanical ventilation.

5AP3-4
Hyperoxic ventilation increases 6h-survival during extreme anemia and concomitant tachycardia
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Background and Goal of Study: Administration of 100% oxygen (hyperoxic ventilation, HV) enables survival in extreme normovolemic, and hypovolemic anemia1. However, in a clinical setting acute anemia might be accompanied by emerging tachycardia and as a consequence by an aggravation of myocardial dysfunction.

Conclusions: HV improves survival in extremely anemic rats. Results are comparable to those obtained in normovolemic rats2.
dial oxygen consumption. It is unknown whether HV also improves survival in this situation. Therefore the aim of the present study was to investigate the influence of HV on survival, oxygen transport, and tissue oxygenation during acute anemia and concomitant tachycardia.

Materials and Methods: After government approval 14 anesthetized pigs (BW 25.6±2.0 kg) ventilated on room air (FiO2 0.21) were hemodiluted by exchange of whole blood for 6% hydroxyethyl starch (200.000/0.5) until the individual critical hemoglobin concentration (Hbcr) was reached. Hbcr was identified by means of an investigator-independent algorithm detecting a significant decline of whole body oxygen consumption. At Hbcr tachycardia (heart rate 180 min⁻¹) was induced in all animals by an atrial pacing catheter (Elektrom E10, B.Braun, Melsungen, Germany). For the next 6 h animals were either observed without further intervention (NOX), or ventilated with pure oxygen (HOX). The main outcome parameter was the 6h-survival rate in both groups (Fisher’s exact test).

Results and Discussion: All animals of the NOX group died within the 6 h observation period. In contrast 6 of the 7 animals of the HOX group survived (survival rate 0% vs. 86%; p<0.05). 15 minutes after induction of tachycardia coronary perfusion pressure (CPP) was significantly higher in the HOX than in the NOX group (26±14 vs. 19±8 mmHg; p<0.05). As a consequence parameters of macrohemodynamics (mean arterial pressure, cardiac index) and oxygen transport (oxygen delivery, oxygen consumption) improved significantly in the HOX group, without the appearance of adverse effects of hyperoxic ventilation.

Conclusion(s): Application of HV increases short term tolerance to acute anemia and concomitant tachycardia. As a consequence HV can be judged a first-line intervention to bridge periods of acute anemia and concomitant tachycardia via a stabilisation of coronary perfusion pressure and by that an improvement of macrohemodynamics and oxygen transport; until red blood cells are available for transfusion.

References:
1. Maier J. Anaesth Analg 2004; 100: 70-76.

5AP3-5
Recruitment maneuver improves respiratory function after off-pump coronary artery bypass grafting
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Background and Goal of Study: Off-pump coronary artery bypass grafting (OPCAB) is a common cardiosurgical intervention; however, it can be accompanied by postoperative worsening of the respiratory function [1]. Thus, the success of OPCAB depends on prevention of perioperative complications that can include atelectases, pneumonia, pulmonary edema and acute lung injury (ALI). The alveolar recruitment maneuver (RM) was used in ALI as a method improving oxygenation and preventing the development of atelectases. However, this maneuver has not been evaluated in OPCAB. Thus the aim of our study was to assess the efficacy of RM for improvement of respiratory function after OPCAB.

Materials and Methods: Twenty adult patients (mean age 54±9 yrs, preoperative ejection fraction 55±6%) scheduled for elective OPCAB were enrolled into a prospective randomized study. Anesthesia was maintained with midazolam, propofol and fentanyl. During surgery, mechanical ventilation was maintained with FiO2 0.5, tidal volume 7 mL/kg of predicted body weight, respiratory rate 12-14/min, and positive end-expiratory pressure (PEEP) 4 cm H2O (Fabius, Dräger, Germany). After OPCAB, the patients were randomized either into a control group receiving conventional ventilation (n=10) or to a RM group (n=10) receiving conventional ventilation and RM. The RM was performed by means of an Anea respirator (Maury, USA) 15 min after transfer to the ICU by increasing airway pressure to 40 cm H2O for 40 sec subsequently adjusting PEEP to a level of 2 cm H2O above the lower inflection point of the pressure-volume curve. The measurements were repeated at 4-hr intervals over the next 24 hrs and included hemodynamics (LifeScope, Nihon Kohden, Japan), capnography (Orion Micropac Plus, Israeli), respiratory parameters, and blood gases.

Results and Discussion: The mean duration of surgery and respiratory support did not differ significantly between the groups. After transfer to the ICU, PaO2/FiO2 decreased in both groups compared with preoperative values. In the control group, PaCO2 increased postoperatively in parallel with a decline in PaO2/FiO2 until 8 hr (p<0.05). After RM, EICO2 increased at 4 hrs (<0.05) whereas PaO2/FiO2 returned to baseline values (p>0.05). These changes can be explained by the opening of atelectatic regions following RM.

Conclusion(s): Applying RM during the early postoperative period of OPCAB attenuates arterial hypoxemia and increases the elimination of CO2.

References:

5AP3-6
Changes of functional residual capacity during weaning from mechanical ventilation
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Background and Goal of Study: Reduction of high PEEP levels and augmented spontaneous breathing in combination with continuous positive airway pressure (CPAP/ASB) are frequently used before extubation in critically ill patients, but the impact of ASB on functional residual capacity (FRC) is unknown. The aim of this study was to detect the changes of FRC and pulmonary function during a weaning protocol in patients ventilated after cardiac surgery.

Materials and Methods: The LUFU system ( Draeger Medical, Luebeck, Germany) estimates FRC by oxygen washout, a variant of multiple breath nitrogen washout. A sidestream O2-analyser calculates FRC from the end-inspired and end-expired O2 concentrations during fast changes of FiO2. Postoperative cardiac surgery patients were initially ventilated using biphasic positive airway pressure ventilation (BiPAP) with a PEEP of 10 mbar. The upper pressure limit was adjusted to deliver a tidal volume of 6-8 mL/kg (11). After 30 minutes the upper and lower pressure limit both were reduced by 3 mbar, respectively (2). 30 minutes later ventilation mode was switched to CPAP/ASB using the former lower pressure limit as CPAP level and the corresponding pressure support of the former BiPAP adjustment (3). FRC, PaO2/FiO2, (Fr)-ratio and PaCO2 were measured.

Results and Discussion: We present here preliminary results of the ongoing pilot study; 6 of n = 10 patients were studied. FRC decreased from t1 to t3 (t1:3.54L ± 0.61; t2: 3.47L ± 0.68; t3: 3.23L±0.82 (Median ± 95% CI); p = 0.016 (Friedman-test)), as well as PF-ratio (t1: 454±82; t2: 428±61; t3: 376±76, p = 0.029 (see figure 1)). PaCO2 did not change significantly over time (p = 0.174).

Conclusion(s): FRC can be successfully monitored by the oxygen washout method during controlled and furthermore during spontaneous breathing in the weaning period (1,2). Decreasing FRC during the weaning process after cardiac surgery may – at least in part – be explained by alveolar derecruitment. If this parameter could help guiding a weaning protocol has to be studied further.

Acknowledgements: The Lufu-system was provided by Dräger Medical, Lübeck, Germany.

References:

5AP3-7
Assisted versus controlled mechanical ventilation in experimental lung injury
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Clinic of Anaesthesiology and Intensive Care Medicine, University Clinic Curaçao Gustav Carus, Dresden, Germany

Background and Goal of Study: Controlled mechanical ventilation represents the standard of care for patients suffering from acute lung injury/acute respiratory distress (ALI/ARDS). We investigated whether assisted mechanical ventilation with pressure support (PSV) is superior to pressure controlled ventilation (PCV) in a porcine model of ALI.

Materials and Methods: Sixteen juvenile pigs (27.2±3.7 kg) were anesthetized, had the trachea intubated and lungs ventilated with a mechanical ventilator (volume controlled mode; VT 10 ml/kg; respiratory rate to achieve normo-
CAPS; FIO2 1.0; PEEP 8cmH2O. ALI was induced by surfactant depletion until PaO2/FIO2 < 200 mmHg for > 30 min. Thereafter, the ventilation mode was switched to PCV with settings guided by the ARDSNetwork protocol (respiratory pressure titrated to VT of 6 ml/kg, respiratory rate to achieve pH 7.3–7.45; FIO2 0.5; PEEP 8cmH2O). After 30 min, animals were randomly assigned to PCV or PSV (n = 8 per group). Gas exchange, hemodynamics and respiratory mechanics were measured hourly. After 6h animals were killed and lung tissue samples were taken from gravitational dependent and non-dependent regions. Diffuse alveolar damage (DAD) was scored by a pathologist blinded to the therapy groups. Functional variables were tested with two-way ANOVA adjusted for repeated measures and DAD scores with t-test for independent samples. A p < 0.05 was considered statistically significant.

**Results and Discussion:** PaO2/FIO2 and venous admixture were improved with PSV (p < 0.05), whereas PaCO2 did not differ between ventilation modes. Mean arterial and pulmonary arterial blood pressure, as well as cardiac output were significantly lower with PSV compared to PCV (p < 0.05). Minor ventilation administration and peak airway pressures did not differ between groups, whereas mean airway pressure and elastance of the respiratory system were significantly improved with PSV (p < 0.05). DAD scores were significantly reduced with PSV in both dependent and non-dependent lung regions (p < 0.05).

**Conclusion(s):** In this model of ALI, assisted mechanical ventilation with PSV was superior to controlled mechanical ventilation with PCV not only with respect to respiratory function but also lung protection. Clinical trials are necessary to investigate the possible benefits of assisted mechanical ventilation in ALI/ARDS.

**Acknowledgements:** We are indebted to Prof. M. Kasper, Institute of Anatomy, Medical Faculty Carl Gustav Carus, Dresden, Germany, for histological evaluation.

**5AP3-8**

**Anti-inflammatory effect of ropivacaine in endotoxin-injured alveolar epithelial cells: Elucidation of cellular signalling**

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**Background and Goal of Study:** Ropivacaine is a new local anaesthetic that seems to have protective effects in inflammatory situations. As previously shown by our group ropivacaine exerts anti-inflammatory actions in the endotoxin-induced lung injury model [1]. Aim of this study was to investigate the intracellular signalling system leading to anti-inflammatory action of ropivacaine in an in vitro model of acute lung injury. We therefore focused on the role of protein kinase C (PKC) and the pro-survival kinases ERK and Akt, the latter two presumably being involved in the NFkappaB-pathway leading to cytoprotection [2].

**Materials and Methods:** Monolayers of alveolar epithelial cells (AEC) were stimulated with 20ng/ml lipopolysaccharide (LPS) and co-incubated with ropivacaine in a final concentration of 1mM (controls exposed to phosphate-buffered saline, PBS). Four different groups were designed: PBS/PBS, PBS/ropivacaine, LPS/PBS and LPS/ropivacaine. LPS and ropivacaine were added at the same time to the cells for 4h. PKC activity was assessed using a PepTag assay for non-radioactive detection. Activation of ERK and Akt via phosphorylation was determined by Western blotting, using a monoclonal anti-phospho-ERK (pERK) and a polyclonal anti-phospho-Akt (pAkt) antibody. Densitometry was performed, using 3 different experimental setups.

**Results and Discussion:** Assessing PKC showed that this intracellular signalling system significantly increased (p < 0.05) with ropivacaine-induced AEC protection. pERK levels, however, were significantly increased by 56% in the LPS/ropivacaine group in comparison to the LPS/PBS group (p < 0.05). pAkt levels, however, were significantly increased by 56% in the LPS/ropivacaine group in comparison to the LPS/PBS group (p < 0.01).

**Conclusion(s):** Our study shows for the first time that the anti-inflammatory and cytoprotective effect of ropivacaine might be mediated through phosphorylation of ERK.

**Acknowledgements:** This work was supported by a grant from the European Society of Anaesthesiology.

**References:**


**5AP3-9**

**Gene transfer of dominant-negative TRAF2 protein suppresses NF-kappaB activation following bacterial infection**

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**Background and Goal of Study:** Development of respiratory complications causes significant mortality and prolonged hospitalization. Tumor necrosis fac-

tor (TNF)-a induced activation of nuclear factor-kappa B (NF-kappaB) is a prerequisite step in a pathway that leads to pulmonary complications mediated by bacterial infection. TNF triggers recruitment of TRADD, followed by the recruitment of adaptor proteins TRAF2, RIP, and FADD, which subsequently activate NF-

kappaB, the major end-point of TNF-signaling. The efficacy of dominant-negative TRAF2 gene transfer for the gene therapy of pulmonary complications was tested.

**Materials and Methods:** RAW 264.7 cells, a murine macrophage lineage cell-line, were transiently transfected with dominant-negative TRAF2 expression construct together with NF-kappaB dependent reporter plasmid. The cells were then stimulated with bacterially derived products and the relative luciferase activities were measured.

**Results and Discussion:** Ectopic over-expression of dominant-negative TRAF2 expression cassette dose-dependently suppressed NF-kappaB activation fol-

lowing the stimulation with bacterial products. Our results indicate that ectopic over-expression of dominant-negative TRAF2 protein is efficacious in suppressing NF-kappaB activation following bacterial infections, thus paving the way to the new gene therapy approach for the life-threatening pulmonary complications such as acute respiratory distress syndrome.

**Conclusion(s):** Gene transfer of TRAF2 is efficacious for respiratory complications mediated by bacterial infection.

**5AP4-1**

**Preoperative paroxysmal attacks are not predictive of intraoperative hemodynamic changes in patients undergoing laparoscopic adrenalectomy for pheochromocytoma**

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**Background and Goal of Study:** Abrupt catecholamine release may cause paroxysmal attacks in patients with pheochromocytoma (1). Major intraop-

erative hemodynamic changes are associated with adrenalectomy for pheochro-

mocytoma (1). We investigated whether preoperative paroxysmal attacks are associated with further intraoperative adverse hemodynamic changes during adrenalectomy for pheochromocytoma.

**Materials and Methods:** From 1994 to 2006, 88 patients underwent laparo-

coscopic adrenalectomy for pheochromocytoma. Surgery was conducted under standard propofol, sufentanil, tracrium BIS-guided GA. An arterial line was in-

serted for blood sampling and arterial pressure monitoring. Esmolol was ad-

ministered when heart rate was above 120 bpm. Nicardipine was administered when systolic arterial pressure (SAP) was above 150 mmHg. Norepinephrine was administered when SAP was less than 90 mmHg after tumour removal. Paroxysmal attacks were defined as paroxysmal palpitations or/and high AP, sweating, flushing, headaches, nausea (1). Whether preoperative paroxysmal attacks were associated with esmolol, nicardipine, norepinephrine administra-

tion and duration of hospitalisation was investigated. Chi², Mann-Whitney and t tests were used. P < 0.05 was significant.

**Results and Discussion:** Patients of both groups did not differ with respect to demographic data, pre and intraoperative variables. Data are mean ± SD, median (range), or n.  

<table>
<thead>
<tr>
<th>Paroxysmal attacks (n=43)</th>
<th>No paroxysmal attacks (n=45)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperatively increase SAP (yes/no)</td>
<td>28/15</td>
<td>29/16</td>
</tr>
<tr>
<td>Intraoperative norepinephrine (mg)</td>
<td>0 (0 - 0.15)</td>
<td>2.9 (0.1 - 1.5)</td>
</tr>
<tr>
<td>Intraoperative esmolol (mg)</td>
<td>0 (0 - 30)</td>
<td>0 (0 - 600)</td>
</tr>
<tr>
<td>Intraoperative nicardipine (mg)</td>
<td>0.1 (0 - 0.15)</td>
<td>0 (0 - 3)</td>
</tr>
<tr>
<td>Hospitalisation (days)</td>
<td>5.6±2.2</td>
<td>5.8±2.2</td>
</tr>
</tbody>
</table>

**Conclusion(s):** Preoperative paroxysmal attacks were not predictive of intraop-

erative hemodynamic changes, thus confirming that there is no evidence-based factors likely to predict intra and postoperative hemodynamic instability in patients undergoing adrenalectomy for pheochromocytoma (1).

**References:**


**5AP4-2**

**Pneumoperitoneum in the morbidly obese patient does not affect immediate post operative recovery**

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**Background and Goal of Study:** Laparoscopic procedures are beneficial in terms of reduced morbidity and better post operative recovery. However, pneu-
mepivacaine leads to considerable physiological disturbance in most organ systems. These effects are exaggerated in the obese and are compounded by the head down position required for gynaecological surgery. At our institution the gynaecologists perform total laparoscopic hysterectomy for endometrial cancer in obese patients. However, we could not find any literature quantifying anaesthetic risk in such patients. We wished to determine whether our practice was safe.

Materials and Methods: We conducted a retrospective case note review over a 2 year period (2005-7) of our cases.

Results and Discussion: Patient demographics and physiological data is summarised in the table. No patient had major comorbidity preoperatively. One had obstructive sleep apnoea (OSA). All patients received GA and were ventilated with pressure control ventilation.

<table>
<thead>
<tr>
<th>BMI</th>
<th>N=14</th>
<th>N=7</th>
<th>N=6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean BMI</td>
<td>34±0.9</td>
<td>42.7±0.9</td>
<td>58.1±1.0</td>
</tr>
<tr>
<td>Age (years)</td>
<td>67.8±3.5</td>
<td>63.14±2.3</td>
<td>63.9±2.4</td>
</tr>
<tr>
<td>Mean Duration (mins)</td>
<td>150±60.0</td>
<td>171.4±15.7</td>
<td>185±18.6**</td>
</tr>
<tr>
<td>PaCO2(max) kPa</td>
<td>5.8±0.9</td>
<td>6.14±0.7</td>
<td>7.7±2.4</td>
</tr>
<tr>
<td>Mean TV min (mls)</td>
<td>46.9±3.2±7</td>
<td>42.6±13.6</td>
<td>40.2±2.97</td>
</tr>
<tr>
<td>Mean TV max (mls)</td>
<td>587.9±20.8</td>
<td>594±38.1*</td>
<td>501±3±16**</td>
</tr>
<tr>
<td>Mean IOP PAWP max</td>
<td>34.4±1.5</td>
<td>32.8±5.3</td>
<td>37.4±2.8</td>
</tr>
<tr>
<td>Mean OPAP or VENTURI</td>
<td>95.9±3.0</td>
<td>95.6±1.2</td>
<td>94.6±0.7</td>
</tr>
<tr>
<td>Mean Recovery SaO2 min</td>
<td>96.8±0.2</td>
<td>96.2±1.2</td>
<td>95.8±0.8</td>
</tr>
<tr>
<td>Mean Ward SaO2 min</td>
<td>96.8±0.2</td>
<td>96±1.4</td>
<td>96±0.4</td>
</tr>
<tr>
<td>Mean Length of stay (days)</td>
<td>4.1±0.5</td>
<td>3.3±0.2</td>
<td>3±0.4</td>
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</table>

(mean ± 1SD). TV tidal volume. IOP intra operative. PAWP peak airways pressure. *p<0.05 BMI 30-39 vs 40-49. **p<0.05 BMI 39-39 vs >50. ***p<0.05 BMI 40-49 vs >50. There were no major complications either intra or post operatively. Minor haemodynamic compromise requiring treatment with vasopressor drugs was common; occurring in 60% of cases. One patient was electively admitted to ICU post operatively due to a history of OSA.

Conclusion(s): We have demonstrated that it is possible to anaesthetise patients with a high BMI for laparoscopic gynaecological surgery. We have characterised the ventilatory settings required and although the PAPW may be considered high in all groups we have not seen any major complications and we believe the improved postoperative course justifies the attendant risk. Ongoing audit will help to define guidelines for patient selection.

5AP4-3

Hypercapnic lung ventilation reduces airway pressure during laparoscopic surgery

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Background and Goal of Study: Mechanical ventilation at a high end-tidal PCO2 improves microrcirculation in obese patients.1) The goal of this study was to accept a higher end-tidal PCO2 and to measure the effect on airway pressures and on vasopressor use.

Materials and Methods: With approval of the hospital ethical committee 20 obese patients with a BMI above 40 who underwent bariatric surgery received pressure controlled ventilation (PCV) at a rate of 14 respirations/min and a positive end-expiratory pressure (PEEP) of 5 cmH2O. The pressure was set to achieve an end-tidal PCO2 below 40 mmHg in one group and below 60 mmHg in the other group. To evaluate the comparability of the groups, each patient received volume controlled ventilation (VCV) before PCV, at a tidal volume of 500 ml, a rate of 14 respirations/min, and a PEEP of 5 cmH2O while the patient received volume controlled ventilation (VCV) before PCV, at a tidal volume of 500 ml, a rate of 14 respirations/min, and a PEEP of 5 cmH2O while the plateau airway pressure was measured. During PCV the following parameters were measured: the adapted minute volume, the airway pressure, the end-tidal PCO2, and the amount of ephedrine injected to keep the systolic arterial pressure above 140 mmHg during inspection of the staple line. These parameters were compared between the groups using a non paired t test. Oxygen saturation measured by pulse oximetry, switching to spontaneous breathing and awakening time were also compared.

Results and Discussion: There were no significant differences in BMI, age and airway pressure during VCV between the groups. Minute volume ventilation, airway pressures and ephedrine use were significantly higher in the group with normal end-tidal PCO2. Ventilation at a high end-tidal PCO2 below 60 mmHg is possible. Cardiac output was not measured but was probably higher as less ephedrine was needed to elevate the blood pressure. In the group with the high end-tidal PCO2 oxygen saturation was not lower, and spontaneous breathing and awakening occurred more rapidly.

Conclusion: We conclude that there is an advantage in hypercapnic ventilation in obese patients during a pneumoperitoneum with CO2.
was 5.3 ± 1.7 cmH₂O. None of the regimens could be considered as satisfactory concerning the prevention of postoperative pulmonary complication in obese patients, but Boussignac CPAP seemed to be the most efficient.

Conclusion(s): In obese patients Boussignac CPAP improved blood oxygenation compared to oxygenation with a Venturi mask with no influence on CO₂ elimination.

References:
1. Gazesky GJ and al.: Boussignac CPAP in the postoperative period in morbid obesity pa-

5AP4-6
Repercussions in advanced mechanical ventilation as a result of patient’s position and retroperitoneum during urological laparoscopy surgery
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Background and Goal of Study: During urological laparoscopy surgery, increases in arterial CO₂ and airway pressures have been described. But, for an ideal PEEP, we are carrying new studies to establish the ideal ventilatory strategy.

Evolution in 5 times

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
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<tbody>
<tr>
<td>Vt alv</td>
<td>141±62</td>
<td>132±38</td>
<td>124±58</td>
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<tr>
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<td>7±3±14</td>
<td>7±4±17</td>
<td>8±3±18</td>
<td>9±3±21</td>
<td>8±1±17</td>
</tr>
<tr>
<td>WOB</td>
<td>1±0±2</td>
<td>1±0±2</td>
<td>1±0±2</td>
<td>1±0±2</td>
<td>1±0±2</td>
</tr>
</tbody>
</table>

Vt alv, alveolar dead space (ml); Cor, compliance (ml/cmH₂O); Re, respiratory resistance (cmH₂O/L/s); MAP, mean airway pressure (cmH₂O); WOB, respiratory work (J/L) in the 5 times described. Difference with time 1, *p<0.05. †p<0.01.

Conclusion(s): Carbonic retroperitoneal insufflation means an important hand-

5AP4-7
Lung function after major upper abdominal surgery in patients with mild to moderate COPD: A randomized comparison between repeat boluses of epidural morphine/ropivacaine and a P.C.E.A for postoperative analgesia
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Background and Goal of Study: Episodic analgesia has been found to be an effective method for pain management after surgery. The goal of this study was to compare the efficacy of a thoracic epidural PCEA (patient control analgesia) using ropivacaine/morphine versus repeat bolus doses with the same mixture for treatment of pain after major upper abdominal surgery and lung function in patients with moderate to severe COPD.

Materials and Methods: We studied twenty-eight patients, undergoing gas-
troscopy, pneumoperitoneum and pneumoperitoneum, with moderate to severe COPD (forced expiratory volume in 1s (FEV1) and forced vital capacity (FVC) <70% of predicted values). The patients were randomized into two groups. Group A (n=14), patients received repeat bolus doses of epidural morphine 1-
2mg/ropivacaine 0.1% every twelve hours and (group B) patients received a PCEA of continuous infusion of morphine0.05mg/ml and ropivacaine 0.1% in a rate of 2-3ml/h. Pain intensity was measured every six hours for 72 hours af-
ter surgery while PVC and FEV1 were measured preoperatively, 24 and 72 hours postoperatively.

Results and Discussion: There were no differences in patient’s demographic characteristics between the groups. Postoperative pain scores VAS (visual anal-
log scale) were comparable. The patients receiving a P.C.E.A and these receiv-
ing repeat bolus doses of morphine/ropivacaine had similar impairment of PVC and FEV1 after 24 and 72 hours postoperatively (p>0.05).

Conclusion(s): Postoperative analgesia with a thoracic P.C.E.A and repeat doses of morphine/ropivacaine every twelve hours provided similar analgesic efficacy in patients undergoing major upper abdominal surgery and also similar influence in pulmonary function.

5AP4-8
Multimodal analgesia protocol, a tool for early recovery of ventilatory function after laparotomy for Scopinaro bariatric surgery
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Background and Goal of Study: Morbid obesity patients present certain ventilation characteristics, as a diminishing in functional residual capacity and in thoracic distensibility, which leads to an increase of shunt and dead space ven-
tilation. Therefore, they have an increased risk of developing atelectasis and a high respiratory workload, which ends up in hypoxemia and hypercapnia. All this can be magnified after a surgery. To prevent from respiratory complications in postoperated patients of bariatric surgery, we designed a protocol based in multimodal analgesia, being our goal to reach an ideal painless state in which this patients would be able to sit and start respiratory physical therapy, soon after the surgery.

Materials and Methods: 100 patients were analyzed (28 males and 72 fe-
males). Average age of 44 years old. Average BMI 33.32. In 94 of them an epidural thoracic catheter was placed, with a PCA infusion pump with levobupi-
avacaine 0.125% and fentanyl 4 mg/ml, combined with intravenous paracetamol and intravenous morphine, if needed. Visual analog scale (VAS) was measured as entering the ICU, when first sat, and 6 h after the surgery.

Results and Discussion: Right after the surgery, VAS was not measurable in 15 patients; it was 0 in 34; 1-2 in 31, 3-5 in 19, 6-9 in 1 and 9-10 in none of our patients. Sitting was possible 3 hours after the surgery in 79.4% of the cases, 12 hours were needed for the rest 20.6%. At that time, all of our patients, except 2, were able to start respiratory physical therapy. After 6 hours, VAS was not measurable in 2 patients; it was 0 in 35; 1-2 in 42, 3-5 in 18; 6-8 in 3 and 9-10 in none of our patients. After discharge from the ICU, patients were followed up by the Pain Clinic, with an uneventful course.
Conclusions: After a supra and infra-umbilicus laparotomy for bariatric surgery in morbid obesity patients, the use of our protocol facilitates the patients to initiate early respiratory physycal therapy by an appropriate analgesic control with minimum secondary effects. The update of this protocol in our service has lead to a decrease in the average stay of this patients from 48 to 24 hours.

5AP4-9
Morphine-sparing strategies and PaCO2 in hyper-obese patients following bariatric surgery
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Background and Goal of Study: Morbidly obese patients have a high incidence of occult sleep apnoea and are at high risk of post-op complications. We have developed a multi-modal analgesia technique that is used in the Hyper-obese, designed specifically to prevent CO2 retention and respiratory failure during the critical first 24 hours following surgery.

Materials and Methods: Between May 2006 and Dec 2007, 65 Hyper-obese patients (Body Mass Index >60 kg/m2) underwent open Roux-en-Y Gastric Bypass surgery at our Bariatric Surgical Unit. All patients had a radial artery cannula inserted pre-operatively. Patients received a standard anaesthetic with Fentanyl 1mcg/kg and morphine 20mcg/kg at induction then Propofol and maintenance with Sevoflurane or Desflurane in air. Post-operative analgesia was provided with a specific regimen of wound infiltration with Bupivacaine 0.2% (80-100ml), regular Paracetamol 1g qds, Diclofenac up to 100mg bid and morphine PCA set at either 1 or 0.5 mg bolus, 5 minute lockout. All patients were observed overnight in a high-dependency area. Patients with diagnosed sleep apnoea syndromes were continued on their normal ventilatory protocols. Paracetamol, Diclofenac and Morphine requirements were recorded and compared, as were the PCO2 levels from pre-induction, in recovery, and during each six-hour period over the first 24 hours post-operatively.

Results and Discussion: 65 patients (48 female, 17 male) with an average age of 40 years were studied. The median BMI was 65 kg/m2 (range 60-92) and the median weight was 184 kg (range 148-295). Patients stayed in a High-Dependency Unit with arterial lines in situ for a median of 20 (4-60) hrs.

Morphine and maximum PaCO2

<table>
<thead>
<tr>
<th>Theatre</th>
<th>Recovery</th>
<th>0-6 hrs</th>
<th>6-12 hrs</th>
<th>12-18 hrs</th>
<th>18-24 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine (mg)</td>
<td>7.5 (10)</td>
<td>6 (0-25)</td>
<td>17 (0-40)</td>
<td>9 (0-33)</td>
<td>8 (0-59)</td>
</tr>
<tr>
<td>Mean PaCO2 (SD)</td>
<td>6.1 (0.9)</td>
<td>5.9 (0.7)</td>
<td>6.10 (0.8)</td>
<td>6.2 (0.9)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The median duration of PCA usage was 62 (10-101) hours. Median hourly morphine dosage in the first 24 hours post-operatively was 2.0 (0-5.8) mg/hr. Median total morphine dose was 92 (5-258) mg. Only four patients had recorded PaCO2 levels of >8.0 kPa. Each of these was managed with an increased lock-out time on the PCA and Bilevel non-invasive respiratory support. No patient required Naloxone or re-intubation.

Conclusion(s): A multi-modal approach to post-operative analgesia can limit morphine requirements in a very high-risk group of patients and can maintain safe PCO2 levels following open Gastric Bypass Surgery.

5AP4-10
Influence of intraoperative PEEP during laparoscopic surgery on postoperative ventilation
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Anaesthesiology, University Clinic of Lübeck, Lübeck, Germany

Background and Goal of Study: Postoperative pulmonary atelectasis is a common complication of abdominal surgery, especially in morbidly obese patients (1) and might have serious consequences in postoperative recovery. Since differences in regional ventilation in comparison to preoperative values are difficult to assess, in the present study the non-invasive technique of electrical impedance tomography (EIT) (2) was used pre- and postoperatively in patients with laparoscopic surgery. The question if an intraoperative PEEP level of 10 cm H2O influences postoperative ventilation was clarified in a randomized prospective study.

Materials and Methods: After the local ethics committee approval we prospectively randomised 32 consecutive patients (ASA physical status I/II) scheduled to undergo elective laparoscopic cholecystectomy. The patients were randomly assigned to PEEP (10 cm H2O) or ZEEP group (0 cm H2O). EIT (EIT evaluation Kit, Dräger Medical, Lübeck, Germany/GoeM/F II system, University of Göttingen, Germany) was performed at an intercostal level of Th 6 pre- and postoperatively at 8 different time points during one hour. We calculated the ventral/dorsal and right/left lung impedance ratio (IR) to investigate the differences in homogeneity of pulmonary ventilation. EIT data and gas exchange parameters were compared between the randomized groups. T-test and variance analysis by Greenhouse-Geisser-ε-method was used for statistical analysis.

Results and Discussion: Groups showed no differences in BMI, preoperative lung function, ASA-Status, duration of anaesthesia, use of postoperative opioids and Aldrete-Score. Compared to preoperative data a significant increase in paCO2 and an increase of the ventral/dorsal IR ratio could be found postoperatively. Gas exchange and ventral/dorsal IR parameters were equal in PEEP and ZEEP group; only the right/left lung IR showed an increase (p<0.007).

Conclusion(s): After laparoscopic surgery there was a fixed postoperative shift of ventilation into the ventral parts of the lung with an increasing paCO2, which indicated a development of atelectic areas. Homogeneity of ventilation between the right and left lung was increased after intraoperative PEEP ventilation.

References:

In none of the patients included in the present study, an adverse event was documented.

Conclusion(s): Weight-related aprotinin regimen is as effective as high-dose regimen with regard to postoperative blood loss and transfusion needs.

References:
6AP1-2
Tranexamic acid reduces blood transfusion in total knee arthroplasty even when a blood conservation program is applied
J. Alvarez, F. Santiveri, I. Ramos, E. Yela, N. Baldoma
Anesthesia Department, IMAS, H. del Mar-Esparanza, Barcelona, Spain

Background and Goal of Study: In total knee arthroplasty (TKA) surgery, a blood conservation program is applied as a normal clinical practice to avoid allo- 
genic transfusions. The objective of this study was to assess the effectiveness of tranexamic acid (TA) to reduce transfusions in total knee replacement even when a blood conservation program is applied.

Materials and Methods: In a double blind prospective study the patients scheduled for TKA were included in a well established blood conservation pro-
gram and then randomly assigned into two groups: In TA group, 10 mg/kg ev bolus followed by 1 mg/kg/h perfusion was administered, while in the control group, saline was given matching the protocol.

Results and Discussion: 95 patients were included (TA group: 46; control group, saline was given matching the protocol. Bolus followed by 1 mg/kg/h perfusion was administered, while in the control group, saline was given matching the protocol.

Tranexamic acid reduces blood losses and transfusion require-
ments even when a blood conservation program was applied. It questions the usefulness of the postoperative re-infusion drains.

6AP1-3
Anaemia in oncological patients scheduled for surgery: Spanish Reciron study
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Anesthesiology and Critical Care, H. Clinico Universitario, Valencia, Spain

Background and Goal of Study: Anaemia and perioperative allo-genic blood transfusion could negatively affect the prognosis in oncological patients sched-
uled for surgery. An optimal assessment and preparation to reversal this clinical status before surgery could improve outcome in cancer patients; so the study aimed to know the perioperative situation in these patients.

Materials and Methods: Multicenter cross-sectional epidemiological study in 38 Spanish hospitals included patients scheduled for oncological surgery (di-
genitive, urological and gynecological). We studied preoperative analytical pa-
rameters, cognitive-functional status ( Karnofsky index) and number of preop-
erative transfusions.

Results and Discussion: 472 patients (261 males/211 females; age = 66±13 yrs) with 181 unoidal, 161 digestive and 130 gynaecological tumors (83.5% being priman) were included. Delayed time: 6.2±6.1 weeks from diagnosis to surgery, 19±24 days from pre-anaesthesia assessment to surgery. Preop-
erative Hb value: Median Hb was 13.1±2.1 g/dL; 44% of patients received less than 13g/dL (and less than 12g/dL found in 49% of patients with digestive tumors).

Conclusion(s): Tranexamic acid reduces blood losses and transfusion require-
ments even when a blood conservation program was applied and it questions the usefulness of the postoperative re-infusion drains.

6AP1-4
Preoperative optimisation of haemoglobin in major orthopaedic surgery
I. Marin, S. Zapatero, M. De Miguel, M. Paniño, M. Colomina
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Background and Goal of Study: To assess the increase of preopera-
tive haemoglobin (Hb) in patients with mild to moderate anaemia scheduled to undergo elective major orthopaedic surgery when treated with different erythropoiesis-stimulating agents (ESA).

Materials and Methods: Between May 2005 and December 2006, 138 pa-
tients, 120 women and 18 men with a mean age of 67.2 years (range 13 – 84) agreed to participate in this study. The mean criteria for inclusion were a Hb level <130 g/L. Preoperative Hb level was defined as according to protocol: (A): sc 40.000 UI epoetin alfa/week, (B): i.v. iron 200 mg/week and (C): sc 40.000 UI epoetin alfa + i.v. iron 200 mg/week.

Results and Discussion: 42 patients were included in group A, 66 in group B and 30 in group C. All groups were similar in baseline characteristics and compar-
son. No major differences in perioperative blood counts or iron metabolism variables were observed between groups. Hb increased significantly (P < 0.001) after treatment in group (A) and group (C). Overall, the mean maximum increase was 1.5±1.4 g/dL; 0.2–2.2 g/dL and 1.3±1.1 g/dL range, 0.1–3.2 g/dL respectively. The maximum increase of Hb was observed 2 weeks after the beginning of ESAs, indicating that administration of ESAs 2–3 weeks before surgery may be optimal. No adverse events related to ESAs were observed.

Conclusion(s): The use of ESAs was safe and effective to increase the Hb level preoperatively. A patient-specific plan allows the appropriate use of hospi-
tal, system and patient resources, ensuring that the patient’s recovery process is optimised.

References:

6AP1-5
 Intravenous iron efficacy on transfusion needs of the non-anaemic elderly patients with hip fractures
J. Moreno, A. Martinez, J. Fernandez, M. Moral
Anesthesiology and Critical Care Department, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain

Background and Goal of Study: As part of a project for the treatment of elderly trauma patients, we have developed a preoperative haemoglobin and comor-
dibilities. No major differences in perioperative blood counts or iron metabolism variables were observed between groups. Hb increased significantly (P < 0.001) after treatment in group (A) and group (C). Overall, the mean maximum increase was 1.5±1.4 g/dL; 0.2–2.2 g/dL and 1.3±1.1 g/dL range, 0.1–3.2 g/dL respectively. The maximum increase of Hb was observed 2 weeks after the beginning of ESAs, indicating that administration of ESAs 2–3 weeks before surgery may be optimal. No adverse events related to ESAs were observed.

Conclusion(s): The use of ESAs was safe and effective to increase the Hb level preoperatively. A patient-specific plan allows the appropriate use of hospi-
tal, system and patient resources, ensuring that the patient’s recovery process is optimised.

References:

Transfusion and haemostasis 81
Materials and Methods:
this study was to investigate the impact of shed blood on the immune system and therefore may modulate the recipient’s immune system [3]. Postoperative with increased postoperative infections [1] and higher tumor recurrence rates [2] rate, postoperative infection rate and length of hospital stay. We used \( \chi^2 \) and \( t \) include: age, weight, gender, ASA Physical status (ASA PS), type of surgery, co-bleeding risk, who underwent over the last five month of 2007 in our hospita...

Background and Goal of Study:
Allogeneic blood transfusion is associated with postoperative infections [1] and higher tumor recurrence rates [2] and may therefore modulate the recipient’s immune system [3]. Postoperative collection and transfusion of shed blood (SB) is standard practice to reduce allogeneic blood transfusion in patients undergoing hip replacement. The aim of this study was to investigate the impact of shed blood on the immune system in an in vitro model of blood transfusion. Materials and Methods: With local ethics committee approval, twenty patients undergoing hip arthroplasty were enrolled in this study. Shed blood was collected postoperatively. One part was left untreated, a second part was filtered with a leukocyte reduction filter and a third part was irradiated. Specimens were mixed with the patients’ venous blood in ratios of 3:1, 1:1 and 1:3 and incubated with LPS (polysaccharide:1μg/ml) for 24 hours. TNF-α and IL-10 were measured in cell culture supernatants by ELISA.

Results and Discussion: SB caused a significant suppression of stimulated TNF-α release. Neither leukocyte depletion nor irradiation eliminated this suppression. Addition of undepleted and irradiated SB had no significant affect on LPS-stimulated IL-10 release, whereas addition of leucodepleted SB increased significantly the stimulated IL-10 release.

Conclusion(s): In this in vitro model of transfusion autologous SB caused a significant suppression of stimulated TNF-α release. The observed changes are not eliminated by leukocyte depletion suggesting an inferior role of leukocyte-associated factors for the observed modulation in cytokine release after transfusion. We suggest that SB may also contribute to transfusion-associated immunomodulation.

References:

6AP1-6
Influence of postoperative collected shed blood on stimulated cytokine release
S. Schneider, A. Biedler, S. Ziegler, A. Mathes, H. Rensing
Anesthesiology, Intensive Care Medicine and Pain Management, University Hospital, Homburg, Saarland, Germany
Background and Goal of Study: Allogeneic blood transfusion is associated with increased postoperative infections [1] and higher tumor recurrence rates [2] and may therefore modulate the recipient’s immune system [3]. Postoperative collection and transfusion of shed blood (SB) is standard practice to reduce allogeneic blood transfusion in patients undergoing hip replacement. The aim of this study was to investigate the impact of shed blood on the immune system in an in vitro model of blood transfusion. Materials and Methods: With local ethics committee approval, twenty patients undergoing hip arthroplasty were enrolled in this study. Shed blood was collected postoperatively. One part was left untreated, a second part was filtered with a leukocyte reduction filter and a third part was irradiated. Specimens were mixed with the patients’ venous blood in ratios of 3:1, 1:1 and 1:3 and incubated with LPS (polysaccharide:1μg/ml) for 24 hours. TNF-α and IL-10 were measured in cell culture supernatants by ELISA.

Results and Discussion: SB caused a significant suppression of stimulated TNF-α release. Neither leukocyte depletion nor irradiation eliminated this suppression. Addition of undepleted and irradiated SB had no significant affect on LPS-stimulated IL-10 release, whereas addition of leucodepleted SB increased significantly the stimulated IL-10 release.

Conclusion(s): In this in vitro model of transfusion autologous SB caused a significant suppression of stimulated TNF-α release. The observed changes are not eliminated by leukocyte depletion suggesting an inferior role of leukocyte-associated factors for the observed modulation in cytokine release after transfusion. We suggest that SB may also contribute to transfusion-associated immunomodulation.

References:

6AP1-7
Preoperative anaemia influences postoperative outcome in oncological surgery patients
L. Molto, R. Arroyo, E. Terrer, C. Rodriguez, E. Bisbe
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Background and Goal of Study: Preoperative haemoglobin is an independent risk factor for allogeneic transfusion (ABT) and ABT seems to influence postoperative mortality and mortality. Anaemia in oncological surgical patients (OSP) is multifactorial and highly prevalent, and one of the few factors we can improve prior surgery. The aims of the study were to ascertain the impact of anaemia on transfusion rate and postoperative outcomes in OSP at our hospital, and to identify which patients will benefit from a blood saving program.

Materials and Methods: Preliminary study of all OSP with a moderate/high bleeding risk, who underwent over the last five month of 2007 in our hospital. We reviewed Blood Saving Program database (PBS) of www.awge.org that include: age, weight, gender, ASA Physical status (ASA PS), type of surgery, co-morbidity, pre and post surgical hemoglobin (Hb), length of surgery, transfusion rate, postoperative infection rate and length of hospital stay. We used \( \chi^2 \) and \( t \) Student for bivariant data, logistic or lineal regression for multivariable analysis.

Results and Discussion: Eighty patients (33 women and 47 men) with a mean age of 62.9 years were included in the study. According to WHO criteria, the prevalence of anaemia was 42.5% and the transfusion rate was 36.3%. Anaemic patients presented a higher postoperative infection rate (38.7 vs 20%) and a longer length of hospital stay (11 vs 6 days) than non-anaemic patients (p<0.05). In the final model only anaemia (OR 2.9) and ASA PS (OR 3.3) were independent predictive factors of transfusion (p < 0.05). Logistic regression analysis disclosed that the risk of postoperative infection increased only with transfusion (OR 6.4, 95% CI 2-23). Transfusion and ASA PS were significant predictive factors of longer length hospital stay with 12.1 and 8.6 coefficient respectively.

Conclusion(s): Anaemia is prevalent among OSP and is an independent risk factor of transfusion. Transfused patients have higher postoperative infection rate and longer length of hospital stay. Even though there are other factors influencing transfusion rate and postoperative morbidity, preoperative anaemia is one of the few conditions that we can improve before surgery with a blood saving program, specially in delicate oncological surgery.

References:
6AP1-9
Epsilon aminocaproic acid reduces blood loss and transfusion requirements in total knee and hip arthroplasties
M. Aguado, J. Santiago, J. Delgado
Anesthesiology and Reanimation, CH Torrecardenas, Almeria, Spain
Background and Goal of Study: Total knee and hip arthroplasties are associated with important perioperative blood loss requiring transfusion of multiple units of blood. Allogenic blood transfusion has been associated with increased postoperative infection, transmission of infectious diseases, acute lung injury and increased costs. The aim was to determine if the use of epsilon aminocaproic acid (EACA) contribute to decrease perioperative blood loss and need for blood replacement in these surgeries.

Materials and Methods: The study was approved by regional scientific Ethics Committee. All patients received a written informed consent. Forty randomized patients were enrolled in this prospective and double-blind study to received 8 g of EACA ten minutes before the release of tourniquet in knee arthroplasty or when the surgery start in hip cases, or equal volume of isotonic saline (100ml). All were under spinal anesthesia and a lumbar epidural catheter was inserted for postoperative analgesia. Blood loss during surgery and in the reanimation unit was recorded, together with the number of units of blood transfused in hospital. Blood transfusional trigger was a hematocrit value less than 27%. In all patients, a bilateral lower limb Echo Doppler was performed in the day 4-6 of postoperative.

Results and Discussion: The patients in both groups were similar. Total blood loss was significantly lower for patients receiving EACA compared to the saline group (696.38±261.78ml vs. 951.13±353.50; p < 0.010), a 26% reduction during the hospital stay the treatment group received 0.88±1.27 units of packed red blood cells compared with 1.18±1.26 in placebo group, no significantly different. Seven patients (38%) in the EACA group received transfusion vs twelve patients (64%) in control group, a 16% of patients were benefitted of use of EACA. No adverse effects were recorded. No abnormal Echo Doppler studies were reported.

Conclusion(s): The intraoperative use of EACA is helpful in decreasing blood loss and requirements in total knee and hip arthroplasties with no detectable morbidity.

Acknowledgements: Supported by grants from Instituto de Salud Carlos III and thanks to nurses of reanimation unit.

Disclosure: This study has been supported by a grant of Instituto de Salud Carlos III.

References:

6AP1-10
Reduction of blood transfusion and cost saving by thrombelastometry-based point-of-care coagulation management in visceral and transplantation surgery
K. Goerfinger, D. Dehmann, A. Hanke, F. Duse, M. Hartmann
Klinik fuer Anaesthesiologie und Intensivmedizin, Universitaetsklinikum Essen, Essen, Germany
Background and Goal of Study: In January 2000 we implemented rotational thrombelastometry (ROTEM) for point-of-care (POC) coagulation management in visceral and transplantation surgery, particularly for liver transplantation (LTX) and resection. On the basis of our experience from the first years, we developed and published an algorithm for ROTEM-based coagulation management during...
Results and Discussion: From 1998 to 2006 we were able to reduce the transfusion rate of red blood cells (RBC) from 3454 U to 1945 U (-43.7%), fresh frozen plasma (FFP) from 4466 U to 1098 U (-75.4%), and pooled platelet concentrates (PC) from 433 U to 177 U (-59.4%). Apart from the absolute reduction of transfused RBC and FFP, the RBC-FFP-ratio changed from 0.77 to 1.77. During the same period the usage of coagulation factor concentrates increased: fibrinogen concentrate from 68 g to 575 g (+746%), prothrombin complex concentrate (PC) from 65,500 IU to 171,000 IU (+161%), and antithrombin concentrate (AT) from 150,500 IU to 164,000 IU (+9.0%). Factor VII concentrates was only used in two patients with haemophilia A during LTX, factor XIII concentrate in one patient, and non patient was treated with rFVIIa in off-label use. The reduction of costs for blood products accounted for 411,120 Euro (-59.4%), whereas the increase in costs for coagulation factor concentrates amounted 152,637.06 Euro (+353%). Overall, this resulted in cost-saving of 258,482.94 Euro (-38.2%). The number of LTX per year was nearly the same in the 2 years (97 in 1999 and 91 in 2006).

Conclusion(s): The combination of ROTEM diagnostic, specific use of coagulation factor concentrates, and a diagnostic and therapeutic algorithm enables fast and effective POC coagulation management in visceral and transplantation surgery, which results in an overall reduction of transfused blood products and cost-saving.

Disclosure: The author held scientific lectures on fee basis for the following companies: CSL Behring GmbH; Novo Nordisk Pharma GmbH; DRK Blutspendedienst Hagen; Pentapharm GmbH; Instrumentation Laboratory; Diagnostica Stago; Laboratoire Francis du Fractionnement et Biotechnologie.
Materials and Methods: 30 hypothermic trauma patients, without any pre-existent coagulation disorder, admitted to our emergency and intensive care unit. Standard blood coagulation assays (prothrombin time [PT], activated partial thromboplastin time [APTT], platelet count [PC], and fibrinogen level [FB]) measured at 37°C as well as their corresponding ROTEM® variables (1) (respectively: CA15-Extem, CFT-Intem, CA15-Intem, and CA10-Fibtem, measured at patients body [oesophageal] temperature and at 37°C) were simultaneously performed on the same blood sample.

Results and Discussion: 38 blood samples from 30 patients (20 men and 10 women, median age: 46 yr, median ISS: 41, temperature range: 29.1°C-37.0°C) were studied. ROTEM® analysis at 37°C correlated with standard coagulation assays (r=0.47 to 0.85; P<0.005 for all four variables). Significant differences were found between ROTEM® analyzes at patients temperature vs. 37°C for CA15-Extem, CFT-Intem, and CA15-Intem, but not for CA10-Fibtem. The temperature thresholds below which these differences were significant were 33.9°C (CA15-Extem), 34.1°C (CFT-Intem), and 34.2°C (CA15-Intem).

Conclusion(s): ROTEM® analysis at patient’s body temperature alters the assessment of haemostasis in hypothermic trauma patients. Our results suggest that for body temperatures < 34°C, the coagulopathy is underestimated by standard laboratory tests. In these cases, ROTEM® might be a helpful device for guiding treatment.

References: 1 Rugel L, et al. Diagnosis of early coagulation abnormalities in trauma patients by rotation thrombelastography.

6AP2-5
Preoperative coagulation screening – Take a bleeding history

D. Nicolson, A. Nasr, I. Hodzovic
Department of Anaesthesia and Intensive Care, Royal Gwent Hospital, Newport, Gwent, United Kingdom

Background and Goal of Study: Guidelines on preoperative tests used as a standard are those published by NICE (National Institute for Clinical Excellence) [1]. In 2007 the British Committee for Standards in Haematology (BCSH) produced guidelines on the assessment of bleeding risk prior to surgery [2]. They state that coagulation tests are poor predictors of bleeding and should not be done unless the patient has a positive bleeding history or a clear clinical indication. We audited preoperative coagulation screening in our hospital and surveyed the anaesthetists to ascertain how they assess patients bleeding risks.

Materials and Methods: Over 5 days, details of all elective surgical patients were collected. Assessment of the appropriateness of preoperative clotting screens was made. In addition, we surveyed anaesthetists in our department in order to determine their practice of ordering coagulation tests. They were asked if they would request clotting screens on a given series of patients each with differing medical conditions or antithrombotic drug histories. Their knowledge of existing guidelines was questioned and their usual practice with regards to taking a bleeding history was examined.

Results and Discussion: Of the 178 elective surgical cases, 26% (47/178) had a coagulation screen. The appropriateness of these tests is illustrated in figure 1.

Conclusions: Preoperative screening is often unnecessary and frequently leads to the ordering of inappropriate tests.


6AP2-6
Temperature corrected thromboelastometry in hypothermic trauma patients

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Department of Anesthesiology and Reanimation, H. U. Gregorio Marañón, Madrid, Spain

Background and Goal of Study: Surgery is related to a thrombophilic state in trauma patients. The use of this technique in surgery procedures associated with a high incidence of complications. The objective of our study is to analyse the influence of different anesthetic/analgic technique have on biological procoagulatory markers during the postsurgery period after total hip or knee arthroplasty.

Materials and Methods: Randomized and prospective clinical trial. Carried out in an orthopedic unit and central laboratory of a university hospital. 45 consenting ASA II-III inpatients undergoing total hip or knee arthroplasty were randomized into three combinations of intr aoperatory anaesthesic and postoperatory epidural analgesia.

Results and Discussion: Considering demographic characteristics, surgery and postsurgery parameters, all the groups were homogeneous. No thromboembolic complications were clinically diagnosed nor mortality. We found statistically significant differences between the three groups in the parameters F1+2 fragments and APTT, in the 36h postsurgery sample, with a attenuation of the coagulopathy is underestimated by standard laboratory tests. In these cases, ROTEM® might be a helpful device for guiding treatment.

References: 1 Rugel L, et al. Diagnosis of early coagulation abnormalities in trauma patients by rotation thrombelastography.

6AP2-7
Comparison of procoagulatory markers in function of anesthetic/analgic technique used on the surgery of traumatology prosthesis replacement

B. Gutiérrez Tonal, E. de la Fuente Tomorco, I. Garutti Martinez, M. Villanueva Martinez, A. Rodríguez Huerta
Department of Anesthesiology and Reanimation, H. U. Gregorio Marañón, Madrid, Spain

Background and Goal of Study: Surgery is related to a thrombophilic state in trauma patients. The use of this technique in surgery procedures associated with a high incidence of complications. The objective of our study is to analyse the influence of the different anesthetic/analgic technique have on biological procoagulatory markers during the postsurgery period after total hip or knee arthroplasty.

Materials and Methods: Randomized and prospective clinical trial. Carried out in an orthopedic unit and central laboratory of a university hospital. 45 consenting ASA II-III inpatients undergoing total hip or knee arthroplasty were randomized into three combinations of intr aoperatory anaesthesic and postoperatory epidural analgesia.

Results and Discussion: Considering demographic characteristics, surgery and postsurgery parameters, all the groups were homogeneous. No thromboembolic complications were clinically diagnosed nor mortality. We found statistically significant differences between the three groups in the parameters F1+2 fragments and APTT, in the 36h postsurgery sample, with a attenuation of the coagulopathy is underestimated by standard laboratory tests. In these cases, ROTEM® might be a helpful device for guiding treatment.

References: 1 Rugel L, et al. Diagnosis of early coagulation abnormalities in trauma patients by rotation thrombelastography.
**6AP2-6**

**Impairment of whole blood coagulation and platelet function by hypertonic saline hydroxyethyl starch**

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Klinik für Anästhesiologie, Universitätssklinik der Heinrich-Heine-Universität, Düsseldorf, Germany

**Background and Goal of Study:** Hypertonic saline hydroxyethyl starch (HH) has been recommended for first line treatment of hemorrhagic shock (1,2). Its effects on coagulation are unclear. We studied the effects of HH and its components on whole blood coagulation and platelet function.

**Materials and Methods:** After local ethics committee approval and informed consent blood samples were taken from 10 healthy volunteers and diluted ex vivo with either HH (Hyperfaes®5, Fresenius Kabi, Germany), hypertonic saline (HT, 7.2% NaCl), hydroxyethylstarch (HA, HAES 6%, Fresenius Kabi, Germany) or NaCl 0.9% (ISO). Samples were prepared to simulate 50%, 75% and 87.5% blood loss (BL). Maximal clot firmness (MCF) was assessed by thrombelastometry (ROTEM, Pentapharm, Germany) after extrinsically activation (EXTEM). Platelet aggregation (PA, area under curve (AUC)) was assessed after TRAP activation (Multiplate, DYNabyte, Germany). Statistics: 2-way ANOVA for repeated measurements, Kruskal-Wallis post hoc test, p<0.05.

**Results and Discussion:** BL+HH significantly decreased both MCF by 12.9-97% (all values at 50-87.5% BL) in EXTEM (fig. 1) and PA-AUC by 62.4-98.6% (fig. 2) in a dose-dependent fashion. While MCF and PA-AUC were only moderately affected in BL+HA or ISO (HA MCF: 10.1-22.2%, PA: 31-50%; ISO MCF: 3.1-9.2%, PA: 29.2-39.2%) hemodilution with HT showed similar effects compared to BL+HH (MCF: 16.1-88.5%, PA: 55-98.1%). Thus, coagulation and platelet aggregation are impaired mostly by the HT component of HH.

**Conclusion(s):** HH impairs coagulation and platelet function already at 50% simulated BL. This effect can be pinpointed to the hypertonic saline component. We speculate that administration of HT dehydrates platelets. Further fluids administration might wear off these effects.

**Disclosure:** The author holds relationships to the following companies: CSL Behring, Marburg, Germany and Pentapharm, Munich, Germany.

**References:**

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**6AP2-7**

**Etodolac, a well known cyclooxygenase inhibitor with preferential COX-2 inhibition, shows no influence on platelet aggregation in healthy volunteers**

W. Korte, V. Filipin, A. Gähler
Klinik für Anästhesiologie, Universitätsklinikum der Heinrich-Heine-Universität, Düsseldorf, Germany

**Background and Goal of Study:** Etodolac (Lodine®) was identified as a preferential COX-2 inhibitor in 1999; no increased risk of bleeding or cardiovascular side effects were reported so far. This might be due to the fact that Etodolac inhibits COX-2 synthesized during the inflammatory process while leaving the preformed COX-2 unaffected. However, the influence of Etodolac on platelet aggregation has never been formally evaluated. This study wanted to determine the effect of Etodolac on platelet aggregation as compared to placebo in healthy volunteers.

**Materials and Methods:** The study was approved by the ethics committee. 19 healthy volunteers were included after written informed consent. They were randomly assigned to receive 300 mg of Etodolac q 12 h for 7 days, followed by a 7 day washout phase and 7 days of placebo medication q 12 h or to receive the study medication in reverse sequence. Platelet aggregation was performed according to the Born method on an APACT aggregometer using epinephrine, collagen and ADP (ADP: 1.25μg/ml, 5μg/ml; 10μg/ml; epinephrine and collagen: 1.25μM, 5μM, 10μM) as inducers; quantification was as % aggregation of maximal amplitude. Statistical analysis was performed using an intention to treat approach, comparisons between Etodolac and placebo were done using the signed rank test. All tests were interpreted on the 5% significance level.

**Results and Discussion:** There was no detectable influence of Etodolac on platelet aggregation as compared to placebo after 7 days at 300 mg q 12 h. The sequence of randomization (Placebo → Etodolac vs. Etodolac → Placebo) was also without influence. See figures 1 and 2 (*1* = after placebo, *2* = after etodolac).

**Conclusion(s):** Etodolac 300 mg q 12 h for 7 days does not exert a platelet inhibiting effect in healthy volunteers. Given other results on it’s use for perioperative analgetic therapy, it seems an attractive substance for perioperative use.

**Disclosure:** The study presented has been sponsored by Sigma-Tau, Zofingen, Switzerland; Sigma-Tau is the distributor of Etodolac (Lodine®) in Switzerland.

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**6AP2-8**

**Variables determining platelet aggregation on the multplate analyzer**

C. Jambor, V. Lesch, V. Filipin, T. Schneider, W. Korte
Department of Anesthesiology and Institute for Clinical Chemistry and Hematology, Cantonal Hospital St. Gallen, St. Gallen, Switzerland

**Background and Goal of Study:** The whole-blood impedance aggregometer Multiplate allows parallel platelet function testing in 5 channels with different activators. Only few data are available on the influence of platelet count (PC) and hematocrit (Htc) on the measurements. The goal of our study was to determine the influence of PC and Htc on Multiplate results.

**Materials and Methods:** After IRB-approval, blood from 3 healthy volunteers was diluted 3:4 with Ringers Lactate (RL) solution. Blood loss was imitated by removing 20%, 40%, 60% and 80% of the diluted whole blood and replac-
Background and Goal of Study:
Thromboelastometry (ROTEM®) is a viscoelastic method that offers immediate and valid assessment of hemostasis in a near patient setting, thus facilitating both prompt diagnosis and targeted therapy of coagulation disturbances. With the use of different reagents, the ROTEM analysis provides information on coagulation and fibrinolysis status. Standard reagents come in a liquid form and imply several pipetting steps. New single shot reagents have been developed, to reduce the number of pipetting steps and to increase the reagents’ stability by diminishing the risks of contamination or concentration change. The aim of the study is to assess the correlation between the two kinds of reagents.

Materials and Methods: The study was carried out in three centers. ROTEM analyses, using single shot reagents (SSR) and liquid reagents (LR) in parallel (Pentapharm, Munich, Germany), were performed on 60 patient samples with up to five different tests (EXTEM, INTEM, FIBTEM, APTEM, and HEPTEM) each. ROTEM parameters included clotting time (CT), clot formation time (CFT), alpha angle (α), and clot firmness after 5 minutes (A05) and maximum clot firmness (MCF). Data analysis (mean, sd, Pearson’s cor.coef. r) was done with MIS Excel® 2000.

Results and Discussion: Data of CT, CFT, A05, and MCF are shown in the table.

<table>
<thead>
<tr>
<th>Comparison SSR-LR</th>
<th>CT [sec]</th>
<th>alpha °</th>
<th>A05 [mm]</th>
<th>MCF [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSR</td>
<td>LR</td>
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<td>LR</td>
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<tr>
<td>Min</td>
<td>284</td>
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<td>193</td>
<td>281</td>
</tr>
<tr>
<td>Max</td>
<td>541</td>
<td>5406</td>
<td>83</td>
<td>70</td>
</tr>
<tr>
<td>Mean</td>
<td>177</td>
<td>166</td>
<td>71</td>
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</tr>
<tr>
<td>SD</td>
<td>401</td>
<td>361</td>
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<td>16</td>
</tr>
<tr>
<td>Corr. coef.</td>
<td>0.97</td>
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</table>

Conclusions: Our study found an excellent correlation between the parameters determined with the two types of reagents. SSR are easy to use. Moreover, the method has been made safer and more approachable at the same time.

6AP2-10
Impact of thrombelastometry and impedance aggregometry based point-of-care coagulation management on usage of blood products in cardiovascular surgery
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Klinik fuer Anaesthesiologie und Intensivmedizin, Universitaetsklinikum Essen, Essen, Germany

Background and Goal of Study: In April 2004 we implemented rotational thrombelastometry (ROTEM) for point-of-care (POC) coagulation management in thoracic and cardiovascular surgery. In December 2005 we complemented this management by impedance aggregometry (Multiplate) for bedside platelet function analysis. Based on our experience in POC coagulation management in liver transplantation and multiple trauma we developed an algorithm for POC coagulation management in cardiovascular surgery in 2006. The goal of our study was to prove, if our POC coagulation management is effective in reducing transfusion rate in cardiovascular surgery.

Materials and Methods: To evaluate the efficiency of our POC coagulation management we analysed in our retrospective study the transfusion rate of blood products from January 2004 to December 2006.

Results and Discussion: The number of transfused units of red blood cells (RBC) decreased from 3276 in 2004 to 2599 in 2006 (-20.7%), and the number of transfused units of fresh frozen plasma (FFP) decreased from 1986 in 2004 to 613 in 2006 (-69.1%). Apart from the absolute reduction of transfused RBC and FFP, the RBC:FFP-ratio changed from 1.6 to 8.5 reflects a pronounced for the reduction of FFP transfusion rate. This may also be important for the reduction of FFP-induced morbidity and mortality, like transfusion-related acute lung injury (TRALI) and transfusion-associated circulatory overload (TACO) (1-3). Furthermore, the change of the RBC:FFP-ratio from 1.6 to 8.5 reflects a more goal-directed therapy of coagulopathies with specific coagulation factor concentrates.

Conclusions: For interpretation of Multiplate results, the PC needs to be taken into account. Further studies are needed to clarify whether the Multiplate results can be used as a composite surrogate for platelet transfusion trigger in the perioperative setting. In contrast, this in vitro model did not reveal any influence of a moderately to severely decreased hematocrit or fibrinogen concentration on Multiplate results.

Disclosures: C. Jambor has received speaker fees from CSL Behring and IL Germany. W. Korte has received support from CSL Behring and Dade Behring.

6AP2-9
Multicentric evaluation of single shot reagents for thromboelastometry (ROTEM®)
N. Rahe-Meyer, M. Vonrweig, C. Sokolmon, S. Becker, T. Lang
Anesthesiology, Hannover Medical School, Hannover, Germany

Background and Goal of Study: Thromboelastometry (ROTEM®) is a viscoelastic method that offers immediate and valid assessment of hemostasis in a near patient setting, thus facilitating both prompt diagnosis and targeted therapy of coagulation disturbances. With the use of different reagents, the ROTEM analysis provides information on coagulation and fibrinolysis status. Standard reagents come in a liquid form and imply several pipetting steps. New single shot reagents have been developed, to reduce the number of pipetting steps and to increase the reagents’ stability by diminishing the risks of contamination or concentration change. The aim of the study is to assess the correlation between the two kinds of reagents.

Materials and Methods: The study was carried out in three centers. ROTEM analyses, using single shot reagents (SSR) and liquid reagents (LR) in parallel (Pentapharm, Munich, Germany), were performed on 60 patient samples with up to five different tests (EXTEM, INTEM, FIBTEM, APTEM, and HEPTEM) each. ROTEM parameters included clotting time (CT), clot formation time (CFT), alpha angle (α), and clot firmness after 5 minutes (A05) and maximum clot firmness (MCF). Data analysis (mean, sd, Pearson’s cor.coef. r) was done with MIS Excel® 2000.

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</tbody>
</table>

Conclusions: Our study found an excellent correlation between the parameters determined with the two types of reagents. SSR are easy to use. Moreover, the method has been made safer and more approachable at the same time.
Disclosure: The author held scientific lectures on fee basis for the following companies: CSL Behring GmbH; Novo Nordisk Pharma GmbH; DRK Blutspendezent Hagen; Pentapharm GmbH; Instrumentation Laboratory; Diagnostica Stago-Laboratoire François du Fruchet et Biotechnologie.

References:

6AP3-1
Antithrombin III concentrate in comparison with fresh frozen plasma in patients with disseminated intravascular coagulation accompanied by antithrombin III deficiency
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Anesthesiology and Intensive Care Department, Northern State Medical University, City Hospital #1, Arkhangelsk, Arkhangelsk Region, Russian Federation

Background and Goal of Study: Antithrombin II (AT) concentrate therapy although associated with increased bleeding risk may reduce mortality in disseminated intravascular coagulation (DIC) [1], while fresh frozen plasma (FFP) is likely accompanied by lesser bleeding risk but may be harmful in critically ill patients [2]. Our objective is to compare AT and FFP therapy in DIC.

Materials and Methods: 30 patients with DIC criteria by the Japanese Association for Acute Medicine (JAAM) [3] and AT activity <70% admitted to the ICU were enrolled into the randomized controlled study. Exclusion criteria were malignant neoplasms, bleeding, platelet count <50×10⁹/L, age <16, >75 years, body weight <50, >100 kg. Group A patients received AT (100% – AT activity/body weight); in B group – FFP (10ml/kg) during 4 days. When AT activity exceeded 70% the therapies were not administered. Nadroparin (95 IU AXa/kg/day) was used in both groups. Comparisons between groups were performed by independent-samples t-test and Mann-Whitney U-test, in paired observations – by paired t-test, in proportions – by chi-square or Fisher’s exact test. Bonferroni correction was used.

Results and Discussion: AT concentrate therapy was associated with AT activity growth while in FFP group we did not observe significant dynamics. Differences in oxygen index between groups were inconclusive.

Table 1. AT activity dynamics

<table>
<thead>
<tr>
<th>Groups</th>
<th>AT III activity % (Mean&lt;SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 2 hrs</td>
<td>48.6 ± 0.64</td>
</tr>
<tr>
<td>2 hrs</td>
<td>53 ± 0.85</td>
</tr>
<tr>
<td>6 hrs</td>
<td>65 ± 0.76</td>
</tr>
<tr>
<td>24 hrs</td>
<td>68 ± 0.67</td>
</tr>
<tr>
<td>48 hrs</td>
<td>71 ± 0.60</td>
</tr>
<tr>
<td>72 hrs</td>
<td>70 ± 0.56</td>
</tr>
</tbody>
</table>

*p error 0.05=0.008 (Bonferroni correction).

Table 2. Oxygen index dynamics

<table>
<thead>
<tr>
<th>Groups</th>
<th>Oxygen index (PaO2/FiO2 [mmHg]) (Mean&lt;SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 2 hrs</td>
<td>413 ± 38</td>
</tr>
<tr>
<td>2 hrs</td>
<td>381 ± 35</td>
</tr>
<tr>
<td>6 hrs</td>
<td>335 ± 34</td>
</tr>
<tr>
<td>24 hrs</td>
<td>319 ± 40</td>
</tr>
<tr>
<td>48 hrs</td>
<td>295 ± 31</td>
</tr>
</tbody>
</table>

*p error 0.05=0.008 (Bonferroni correction).

Our study did not demonstrate differences between groups in DIC (JAAM) score, ICU and hospital stay, bleeding rate and 30-day mortality.

Conclusion(s): In DIC and AT deficiency AT concentrate in comparison with FFP produces more rapid increase of AT III activity. To compare influence of both therapies on outcome in DIC further researches are necessary.

References:

6AP3-2
Recombinant activated factor VII (rFVIIa) in a thrombosis and bleeding model on rabbits treated by antplatelet agents: A randomized double-blind study
C. Hindy-Francois, C. Bachelot-Loza, A. Goder, J. Emmrich, C. Sarnama
Thrombosis: Epidemiology, Pathophysiology and New Therapeutics, Unit 765 Inserm, Paris, France

Background and Goal of Study: Combined antplatelet agents (cAPA), aspirin plus clopidogrel, increase the bleeding risk [1]. A recent ex vivo study has shown that rFVIIa was able to normalize thrombin generation in platelet rich plasma prepared from patients under cAPA, as compared with control patients [2]. We have studied the efficacy and safety of rFVIIa in a thrombosis and bleeding model in rabbits treated with aspirin plus clopidogrel versus placebo.

Materials and Methods: After full approval, 78 New-Zealand rabbits were first randomized into two groups: placebo1 rabbits (n=36) and cAPA rabbits (n=34). Then rabbits were anaesthetised, ventilated and monitored for blood pressure, temperature and carotid blood flow. The Folts’ model was applied on one of the carotid arteries: an endothelial injury was performed and followed by a stenosis inducing thrombosis with cyclic flow reductions (CFR) which were recorded over a first 20 min-period (P1). Each rabbit group was then randomized into 3 subgroups: placebo2, low (40 μg/kg) or high (160 μg/kg) rFVIIa. CCR were monitored for a 2nd 20 min-period (P2). After each period, an ear bleaching time (BT) was performed. Lastly, an hepato-splenic (HS) section was done and HS bleeding was recorded. Statistics: median [range], non parametric tests: Kruskal-Wallis, Wilcoxon and Chi-2 tests (p<0.05).

Results and Discussion:

<table>
<thead>
<tr>
<th>Placebo 1 Rabbits (n=36)</th>
<th>cAPA Rabbits (n=34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P value *</td>
<td></td>
</tr>
<tr>
<td>0.46</td>
<td>0.014</td>
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<tr>
<td>0.013</td>
<td>0.004</td>
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<tr>
<td>0.004</td>
<td>0.011</td>
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<tr>
<td>0.011</td>
<td>0.008</td>
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</table>

*p<0.05 placebo1 vs cAPA rabbits.

rFVIIa did not correct the antplatelet effect of cAPA but did not promote any thrombosis.

Conclusion(s): rFVIIa may not be the best treatment for haemorrhages in cAPA patients but did not worsen the thrombosis risk in this model.

References:

6AP3-3
Reduced allogeneic blood transfusion in neurosurgical patients with thrombelastography-guided transfusion algorithm
I. Luise, L. Andrey
Neuroanesthesiology, Bundesko Neurosurgery Institute, Moscow, Russian Federation

Background and Goal of Study: Transfusion of allogeneic blood products is associated with serious adverse outcomes. The goal of this randomized, prospective, controlled study was to evaluate effects of thrombelastography (TEG)-guided transfusion algorithm on frequency blood transfusion in neurosurgical patients.

Materials and Methods: Patients inclusion criteria was supratentorial brain tumor (d=5-6cm) with angiographic high blood supply. Exclusion criteria were anemia, severe hepatic and renal diseases, coagulopathy. Patients were assigned to either a TEG-guided (n=45, TEGG) or coagulation tests-guided transfusion algorithm therapy (n=50, control group- CG) during anesthesia. Coagulation tests were performed in all patients. Routine transfusion therapy was applied proceeding from coagulation tests results in CG. Transfusion therapy was started at coagulation index (CI)=3 by using native whole blood sample in TEGG (TEG®5000, Version 4 Software, Haemoscope, USA). Paired Student t-test or Mann Whitney test were used according to results Kolgomorov-Smirnov test.

Results and Discussion: There were no demographic or coagulation tests results differences between groups. Blood loss was 2193±5108 ml in TEGG vs. 2657±1061 ml in CG (p = .113). The proportion of patients receiving fresh frozen plasma (FFP) was 4 of 45 in TEGG compared with 16 of 50 in CG (p = .003). The volume of transfused FFP was 366±547 ml in TEGG and 312±458 ml in CG (p = .602). None of patients was received platelets in both groups. The postoperative haematoma was observed in two cases, on one in each group.

Conclusion(s): TEG-guided transfusion algorithm is four fold reduced allogeneic blood transfusion rates without deterioration of outcomes in neurosurgical patients.

References:
6AP3-4
Criteria for the successful use of recombinant factor VIIa in the treatment of major haemorrhage: A retrospective study
V. Kushakovsky, P. Prassana, N. Hutchinson
Department of Anaesthesia, Royal Sussex County Hospital, Brighton, United Kingdom

Background and Goal of Study: Off-label use of recombinant factor VIIa (rFVIIa) in the treatment of major haemorrhage is increasing. Recommendations1,2 exist suggesting that several precautions should be met to maximise the efficacy of rFVIIa in this setting. These are: Platelet: > 50 x 10^9/L; Fibrinogen > 1.0 g/L; pH > 7.20; Hematocrit > 24% (or haemoglobin > 8.0 g/dL) and body temperature > 35.0 °C. We decided to see if those with a successful outcome (survival without on-going bleeding 24 hours following rFVIIa administration) fulfilled more criteria than those who didn’t have a successful outcome.

Materials and Methods: We conducted a retrospective observational study of all patients in a major hospital who received rFVIIa between January 2002 and April 2007. Patients notes were then reviewed and data collected. Results were analysed using the Chi-squared or Fisher’s exact tests as appropriate.

Results and Discussion: 29 patients were identified according to haematology database. 9 patients were excluded from the final analyses as either administration of rFVIIa was not documented or the notes were unobtainable. A successful outcome was achieved in 14 (70%) of 20 patients. Overall, the criteria for successful rFVIIa use were achieved 64% of the time. In the successful group (haemorrhage control achieved and alive at 24 hours) 73% of preconditions were achieved versus 47% in the unsuccessful group (p=0.0003). It is likely that the sicker the patient, the less likely the criteria were to be fulfilled3, however the results begs the question as to whether such an expensive treatment might be legitimately withheld in those who fail to achieve a minimum number of criteria.

Conclusion(s): Our study shows that the successful use of rFVIIa in the treatment of haemorrhage depends upon how many of the mentioned criteria can be met prior to its use.

References:

6AP3-5
Use of recombinant factor VIIa in the treatment of acute bleeding, 2005-2007
G. Meito, M. Sendra, E. Moret, E. Vila, L. Martinez-Gimeno
Anesthesiology, University Hospital Germans Trias i Pujol, Badalona, Spain

Background and Goal of Study: Recombinant factor VIIa (rFVIIa, NovoSeven). The US FDA approved the use of rFVIIa for the treatment of hemorrhage in hemophiliac patients. Since its introduction, it has been also used off-label to enhance haemostasis in patients who experience acute bleeding refractory to conventional therapy. The aim of this study was to review the off-label use of rFVIIa in our tertiary care hospital.

Materials and Methods: This retrospective, observational study included all non-cardiac surgery patients who were treated with rFVIIa from January 2005 to December 2007. Recorded variables were gender, age, ASA class, indication for treatment, surgical procedure, arterial embolization rate, transfusion of blood products before and after rFVIIa, laboratory monitoring, pH and axillary temperature, dose of rFVIIa, repeating dose, recovery rate, thromboclonic complications, allergic events and hospital mortality. Data are presented as mean ± SD or percentage.

Results and Discussion: Eighteen patients (7 women and 11 men) received rFVIIa as compassionate treatment. The patients’ mean age was 41.8±17.7 years (19-72) and the ASA classification was II/IV (5/13). Indications for treatment were trauma management (8 patients), obstetric bleeding (3) and surgical bleeding (7). No medical indication was involved. Pre-rFVIIa administration laboratory data were hematocrit 19.1±5.4%, platelet count 120.000±96/mL. Quick value 35.6±13%, fibrinogen 167±131 mg/dL, arterial pH 7.3±0.1 and temperature 35.5±1.2 °C. The mean dose of rFVIIa was 77.4±23 μg/kg; dose repetition was necessary in 4 cases; no antifibrinolytic agents were given. The total transfusion of blood products (units) prior to rFVIIa was 12.7±6.3 packed red blood cells, 7.6±7 fresh-frozen plasma, 3±3 pools of platelets, 2±2 g of fibrinogen (1). One obstetric patient achieved complete cessation of bleeding with arterial embolization. Four patients were treated with radiologic and surgical methods. Thirteen patients received surgical treatment and only one was reoperated due to bleeding. No thromboembolic or allergic complications were found. Ten patients died (10/18), 5 of the deaths were bleeding related.

Conclusion(s): In our hospital we applied an “acute bleeding management protocol”. The high mortality rate due to bleeding among our patients may be attributed to improper timing of rFVIIa administration. Larger randomized studies are needed before the optimal dose, definitive indications, safety and timing of this acute bleeding treatment option can be recommended.

6AP3-6
Influence of FFP on dilutional coagulopathy – An in vitro model
C. Jambor, W. Korte, V. Lesch, T. Schneider, G. Krennbihl
Department of Anesthesiology and Institute for Clinical Chemistry and Hematology, Cantonal Hospital St. Gallen, St. Gallen, Switzerland

Background and Goal of Study: A mathematical model was published for the dilution of coagulation factors during fluid resuscitation[1].Theory suggests that it is not feasible to increase coagulation factor concentrations (back to baseline) with “FFP only” in a clinical setting[2].The aim of this study was to describe the influence of “FFP only” on coagulation factors in a simplified and idealized in vitro model of dilutional coagulopathy (DCP).

Materials and Methods: After IRB approval, 50mL of whole blood was drawn from 4 healthy volunteers.6ml blood was diluted with 2 ml Ringers Lactate (RL), limiting blood loss and replacement with FFP thereafter, 20%, 40%, 60% and 80% of the diluted whole blood was removed and replaced with FFP. Levels of fibrinogen, FII, FVIII, FX, AT and Protein C were analyzed with routine assays. ANOVA with Bonferroni’s correction procedure was performed to detect differences, considered significant at p<0.05.

Results and Discussion: All coagulation factors decreased significantly after dilution with RL. Using FFP to replace blood loss did not improve the magnitude of modeled DCP, rather, a trend to a further decrease of fibrinogen/coagulopathy factors was seen.

Coagulation factor and natural inhibitor levels

<table>
<thead>
<tr>
<th></th>
<th>Un</th>
<th>B</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fg Clasis</td>
<td>2.9 (0.7)</td>
<td>1.0 (0.7)</td>
<td>1.0 (0.7)</td>
<td>1.0 (0.7)</td>
<td>1.0 (0.7)</td>
<td>1.0 (0.7)</td>
</tr>
<tr>
<td>Fg Fase</td>
<td>3.1 (0.8)</td>
<td>2.1 (0.4)</td>
<td>2.2 (0.3)</td>
<td>2.1 (0.2)</td>
<td>2.1 (0.1)</td>
<td>2.2 (0.1)</td>
</tr>
<tr>
<td>FII</td>
<td>104 (17.4)</td>
<td>68 (16.1)</td>
<td>76 (9.7)</td>
<td>71 (6.1)</td>
<td>68 (6.0)</td>
<td>65 (12.9)</td>
</tr>
<tr>
<td>FVII</td>
<td>84 (19.2)</td>
<td>60 (21.3)</td>
<td>62 (17.6)</td>
<td>55 (10.0)</td>
<td>55 (10.0)</td>
<td>48 (13.8)</td>
</tr>
<tr>
<td>FX</td>
<td>73 (15.5)</td>
<td>60 (15.5)</td>
<td>66 (11.0)</td>
<td>62 (2.2)</td>
<td>64 (5.1)</td>
<td>60 (12.9)</td>
</tr>
<tr>
<td>AT</td>
<td>96 (6.3)</td>
<td>58 (9.3)</td>
<td>69 (4.7)</td>
<td>71 (4.1)</td>
<td>73 (8.4)</td>
<td>73 (15.9)</td>
</tr>
<tr>
<td>FII</td>
<td>96 (7.9)</td>
<td>75 (20.3)</td>
<td>79 (16.5)</td>
<td>79 (6.1)</td>
<td>70 (8.2)</td>
<td>68 (11.4)</td>
</tr>
</tbody>
</table>

Mean (SD). Un: undiluted, B: baseline, 20, 40, 60, 80% of volume replaced with FFP, ns: non significant vs. control.

Given that a further dilution and/or consumption is not recognized in this model it can be anticipated that factor levels will further decrease in a clinical setting.

Conclusion(s): Limited dilutional coagulopathy can be stabilized but not reversed with FFP in this in vitro model. Factor consumption and additional dilution through the use of crystalloids or colloids are likely to occur in vivo. In case of bleeding with dilutional coagulopathy, coagulation factor concentrations seem necessary to actively increase coagulation factor activities.

Disclosure: C. Jambor has received speaker fees from CSL Behring. W. Korte has received support from CSL Behring and Dade Behring.

References:

6AP3-7
Intraoperative coagulation management in thoracoabdominal aortic replacement with fibrinogen concentrate
Anaesthesiology, Hannover Medical School, Hannover, Germany

Background and Goal of Study: The purpose of our trial was to assess the efficacy of intraoperative coagulation management with fibrinogen concentrate in elective surgery for thoracoabdominal aortic replacement (TAAR).

Materials and Methods: A retrospective group (A) (n=12) with elective TAAR in our center in 2006 was compared with a prospective group (B) (n=6) in 2007. The coagulation therapy in A was done with FFP and Platelets (PC) and in B primarily with ROTEM targeted fibrinogen concentrate (Haemocomplettan P).

Results and Discussion: Coagulation therapy in group B consisted of 7.83±2.71 g fibrinogen concentrate. This was associated with a significant reduction of the allogeic blood products use and of the 24 hours postoperative bleeding.

Conclusion(s): Our results show that therapy with fibrinogen concentrate
(Haemocomplettan P) was associated with a significant reduction of allogeneic blood products use and of the 24 hours postoperative bleeding.

Disclosure: Industrial grant (CSL Behring).

6AP3-8
Intraoperative coagulation management in aortic valve operation with ascenders replacement by fibrinogen concentrate (Haemocomplettan P)
Anaesthesiology, Hannover Medical School, Hannover, Germany

Background and Goal of Study: In cardiac surgery intraoperative coagulation disturbances are common and require coagulation therapy. It is normally done with platelet concentrates (PC) or fresh frozen plasma (FFP) - sometimes supplemented by factor concentrates. But in acquired coagulation deficiency exists no proof neither for the efficacy of allogeneic blood products nor of concentrates. We wanted to develop a method to assess the efficacy of intraoperative coagulation therapy with fibrinogen concentrate in elective aortic valve and ascending aortic operation (AV-AAO).

Materials and Methods: Analysis of data from a retrospective group A (n=42) with elective AV-AAO in our center in 2006 led to the definition of a transfusion algorithm for this type specific of operation which was then applied to the prospective groups. The prospective group B (n=5) was just treated with allogeneic blood products as group A but with the strict algorithm. This also applied concentrate (Haemocomplettan P) as first step of therapy before potentially no proof neither for the efficacy of allogeneic blood products nor of concentrate therapy leads to satisfactory intraoperative management of bleeding and was associated with a considerable reduction in the usage of allogeneic blood products and with a reduction of the 24 hours postoperative drainage volume.

Results and Discussion: The groups were comparable regarding patient and operative characteristics. Coagulation therapy in group C consisted of a mean of 5.7±0.67 g Haemocomplettan P. The transfusion of blood products (intraoperative after CPB and within the first day on ICU) and 24 hours drainage volume were significantly lower (p<0.05 U-test) in group C.

Comparison blood transfusion and drainage volume

<table>
<thead>
<tr>
<th>Group</th>
<th>Intraoperative post CPB and 24-hours ICU transfusion</th>
<th>24-hours drain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RBC (units)</td>
<td>FFP (units)</td>
</tr>
<tr>
<td>A</td>
<td>4.1</td>
<td>9.1</td>
</tr>
<tr>
<td>B</td>
<td>16.4</td>
<td>1032</td>
</tr>
<tr>
<td>C</td>
<td>2.6</td>
<td>440</td>
</tr>
</tbody>
</table>

*Groups A and B are significantly different (p<0.05, Mann Whitney U-test).

Conclusion(s): The method we developed could be integrated in preoperative procedures and was appropriate to assess the efficacy of peroperative coagulation therapy with fibrinogen concentrate. Furthermore, fibrinogen fibrinogen concentrate therapy leads to satisfactory intraoperative management of bleeding and was associated with a considerable reduction in the usage of allogeneic blood products and with a reduction of the 24 hours postoperative drainage volume.

Disclosure: Industrial grant (CSL Behring).

6AP3-9
Incidence of thrombocytopenia, hypofibrinogenemia and F. XIII deficiency in relationship to clot firmness in a surgical intensive care unit – A prospective cohort study
W. Korte, C. Hinren, P. Dietlmaci, B. Ulrich, R. Lussmann
Inst. f. Clin. Chemistry and Hematology and Surgical Intensive Care Unit, Kantonsspital, St. Gallen, Switzerland

Background and Goal of Study: We have identified (relative) F. XIII deficiency as a relevant contributor to intraoperative blood loss in high risk patients. We have now shown that F. XIII substitution in these patients is beneficial (see abstract 451501). Given results observed in these studies, we were interested in evaluating the relative contribution of F. XIII, fibrinogen and platelets to clot firmness in a surgical intensive care unit (SICU).

Materials and Methods: Consecutive patients transferred to the SICU from the OR were enrolled in this cohort study approved by the ethical committee. Blood was obtained from routine blood draws. F. XIII (Bertichrom and Clauss fibrinogen (Multifibrin U) were determined on a BCS analyzer. Clot firmness was evaluated in whole blood using the Extren assay (extrinsic activation) on a ROTEM thrombelastograph (Pertharimm).

Results and Discussion: We enrolled 272 patients; data were available in 271 patients for platelet count, in 262 patients for fibrinogen concentration, in 265 patients for F. XIII activity and in 268 patients for clot firmness. Platelet counts < 150 G/l were present in 31.8% of the patients, < 50 G/l in 1.5%. Fibrinogen < 1.5 g/l was present in 6% of the patients, < 1 g/l in 0%. F. XIII activity < 70% was present in 45.3% of the patients, < 60% in 29.4%. Incidence data on F. XIII and fibrinogen were confirmed by a 2 year look back of 1053 F. XIII and 9527 fibrinogen measurements. In a multivariate analysis (n=124) with the most important clinical variables (age, BMI, ASA classification, duration of surgery, temperature, pH, hemoglobin concentration, platelet count, fibrinogen concentration, F. XIII activity, crystalloids (volume) infused, coloids (volume) infused), only platelet count (p<0.001) and F. XIII activity (p<0.025) were predictors of decreased clot firmness (volume of coloids infused had borderline significance, p=0.07).

Conclusion(s): In patients admitted to the SICU in a tertiary care hospital, haemostaseologically relevant thrombocytopenia (=50 G/l) and hypofibrinogenemia (<1 g/l) are rare findings. In contrast, haemostaseologically relevant decrease in F. XIII activity (<60%) is a very frequent finding (roughly 1/3 of all patients). Only platelet count and F. XIII activity were predictors of reduced clot firmness. Together with our other findings (abstract no. 451501), this suggests that acquired F. XIII deficiency is an underestimated recognition for complications in the SICU.

References:

6AP4-1
Comparative retrospective review of the transfusion status in a centenarian vs. a “normal” hip fracture population
A. Pelavski, M. Colomina, M. De Miguel, M. Aranda, J. Roige
Anaesesthesia Department, Vall d’Hebron Hospital, Barcelona, Spain

Background and Goal of Study: Descriptive retrospective review to compare the transfusion status of centenarians operated for a hip fracture, to a sample of patients within the “typical” age range (75-83) for that surgery.

Materials and Methods: We identified all eligible centenarians -17 admitted between 2001-2005 with a hip fracture - who were compared to a randomly selected control group of 17 patients aged 75-83, with the same pathology. Exclusion criteria: pathologic, multiple or bilateral fractures, terminal disease and non-surgical treatment. We recorded demographic data; comorbidity conditions; haemoglobin (Hb) levels registered; delay to surgery; complications; blood use and hospital length of stay. A comparative statistical analysis was performed.

Results and Discussion: see table.

Table 1. Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Centenarian (n=17)</th>
<th>Control (n=17)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>102 (100-105)</td>
<td>77 (75-83)</td>
<td></td>
</tr>
<tr>
<td>Male/Female</td>
<td>4:13(3.5-76.5%)</td>
<td>4:13(3.5-76.5%)</td>
<td></td>
</tr>
<tr>
<td>ASA I</td>
<td>6(47.1%)</td>
<td>12(70.6%)</td>
<td></td>
</tr>
<tr>
<td>ASA II</td>
<td>9(62.9%)</td>
<td>5(29.4%)</td>
<td></td>
</tr>
<tr>
<td>Subcapital</td>
<td>9(47.1%)</td>
<td>7 (41.2%)</td>
<td>0.11</td>
</tr>
<tr>
<td>Prechotocarin</td>
<td>9529%</td>
<td>10 (58.8%)</td>
<td></td>
</tr>
<tr>
<td>Days of delay II surgery</td>
<td>47±2.21</td>
<td>4:12±5.36</td>
<td></td>
</tr>
<tr>
<td>Days of hospital stay</td>
<td>20±10,85</td>
<td>21±9.06</td>
<td>0.54</td>
</tr>
<tr>
<td>Transfused patients</td>
<td>13 (76.5%)</td>
<td>10 (58.8%)</td>
<td>0.27</td>
</tr>
<tr>
<td>General Transfusion Index (units of RBC/patients)</td>
<td>2.24±0.2</td>
<td>1.06±1.2</td>
<td>0.03</td>
</tr>
<tr>
<td>Real transfusion Index (units/transfused patients)</td>
<td>2.92±1.84</td>
<td>1.8±1.79</td>
<td>0.09</td>
</tr>
<tr>
<td>Number of comorbidities</td>
<td>2 (1-5)</td>
<td>1 (1-5)</td>
<td>0.08</td>
</tr>
<tr>
<td>Baseline Hb (g/dl)</td>
<td>12.2±1.49</td>
<td>11.1±1.62</td>
<td>0.89</td>
</tr>
<tr>
<td>Pre-surgery Hb (g/dl)</td>
<td>12.0±1.47</td>
<td>11.1±1.67</td>
<td>0.82</td>
</tr>
<tr>
<td>Post-surgery Hb (g/dl)</td>
<td>10.3±1.33</td>
<td>10.3±1.33</td>
<td>0.07</td>
</tr>
<tr>
<td>Trigger Hb (g/dl)</td>
<td>8.7±0.81</td>
<td>7.6±0.58</td>
<td>0.018</td>
</tr>
<tr>
<td>Discharge Hb (g/dl)</td>
<td>10.1±2.01</td>
<td>10.6±1.67</td>
<td>0.27</td>
</tr>
<tr>
<td>Pre-operative mortality</td>
<td>9 (52.9%)</td>
<td>3 (17.7%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Mortality</td>
<td>2 (11.8%)</td>
<td>0</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Transfusion and haemostasis 89
Though there is a trend towards higher comorbidity rates and transfusion indexes among centenarians, a statistically significant difference could only be found in post-operative and trigger Hb levels, and in the incidence of post-operative complications.

**Conclusion(s):** Despite intuitive beliefs, centenarians are similar to our younger control population. With the data available, we can only assure that their complication rate is higher. Though important trends have been noted in comorbidity prevalence and transfusion requirements towards a higher risk, no conclusive differences could be demonstrated. Larger samples and prospective studies are needed to confirm it.

**6AP4-2**

**Intraoperative blood loss and transfusion requirements for radical laparoscopic vs. radical retropubic prostatectomy**

Anaesthesiology, Fundación Puigvert, Barcelona, Spain

**Background and Goal of Study:** The aim of this study was to compare intraoperative blood loss, perioperative haematocrit, and transfusion requirements in patients undergoing radical retropubic prostatectomy versus laparoscopic prostatectomy.

**Materials and Methods:** From January 2003 to December 2008, 879 patients were prospectively enrolled in this comparative study. Of the 879 patients, 302 underwent laparoscopic technique and 577 underwent open surgery. The serum haematocrit was obtained preoperatively and 72 hours postoperatively in all patients. The intraoperative blood loss was estimated, and transfusion requirements were noted. U-Mann-Whitney Test was performed to compare means.

**Results and Discussion:** Patients in the laparoscopic group had significantly less intraoperative blood loss compared with the retropubic group (median 827 ml versus 537 ml, P < 0.001). Additionally, the difference in the mean perioperative change in haematocrit (9.6% decrease versus 13.5% decrease, P < 0.001) was significant between the laparoscopic and retropubic groups.

<table>
<thead>
<tr>
<th>Laparoscopic vs. Retropubic prostatectomy patients characteristics</th>
<th>Laparoscopic</th>
<th>Retropubic</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>302 (34.4%)</td>
<td>577 (65.6%)</td>
</tr>
<tr>
<td>Age*</td>
<td>62 (54-69)</td>
<td>63 (55-69)</td>
</tr>
<tr>
<td>BMI</td>
<td>27.3 (26.2-28.2)</td>
<td>28.3 (28.1-28.6)</td>
</tr>
<tr>
<td>ASA physical status [I/II/III]</td>
<td>14/70/416/6</td>
<td>11/767/1520/3</td>
</tr>
<tr>
<td>Haemoglobin before surgery*</td>
<td>153.4 (151.7–157.1)</td>
<td>153.1 (151.5–154.2)</td>
</tr>
<tr>
<td>Haemoglobin after surgery**</td>
<td>121.9 (118.9–124.2)</td>
<td>107.9 (106.7–109.3)</td>
</tr>
<tr>
<td>Haematocrit before surgery*</td>
<td>45.8 (45.2–46.1)</td>
<td>45.6 (45.3-45.9)</td>
</tr>
<tr>
<td>Haematocrit after surgery**</td>
<td>35.9 (35.3–36.6)</td>
<td>32.1 (31.7–32.5)</td>
</tr>
<tr>
<td>Calculated blood loss (mL)*</td>
<td>537.7 (267.4–838.2)</td>
<td>827 (466.3–928.6)</td>
</tr>
<tr>
<td>Blood transfusion (%)</td>
<td>9 (3%)</td>
<td>149 (25.8)</td>
</tr>
<tr>
<td>Duration of procedure (min)</td>
<td>290 (238–363)</td>
<td>225 (165–290)</td>
</tr>
<tr>
<td>Stay in hospital (days)*</td>
<td>6 (4–7)</td>
<td>19 (16–23)</td>
</tr>
</tbody>
</table>

Note: *Median (10–90th percentile); **Mean (95% CI).

**Conclusion(s):** These results suggest that ULIT may therefore have been more beneficial than withholding transfusion in our 3 successful cases. However, only minimal data are available to guide clinicians in the optimal management of emergent hemorrhagic shock. Further data are required to establish appropriate guidelines for safe transfusion practice when treating such patients.

**6AP4-4**

**Predictive models for preoperative transfusion risk evaluation in elective primary cardiac valvular surgery and elective primary off-pump coronary artery bypass surgery**

A. Martínez, A. Font, A. Fernandez de Gamara, B. Martin, J. Galan
Anaesthesiology, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain

**Background and Goal of Study:** Anaemic blood is a scarce resource and has risks. Its efficacy as an oxygen carrier is sometimes questionable and some studies have shown higher mortality rates with its use. Early identification of transfusion risk is needed in order to correctly assign multimodal blood saving techniques.

**Goal:** To design two predictive indexes: (1) Pr Vs for the preoperative evaluation of transfusion needs in primary elective cardiac valvular surgery of 1 or 2 valves and (2) Pr OPs for elective first-time, off-pump bypass graft surgery (CABG).

**Materials and Methods:** A specific database was developed for the cardiac anaesthesia unit. During 2005 and 2006 the following data were prospectively collected: EuroScore variables (patient demographics and co-morbidities), preoperative haemoglobin (Hb) and transfusion needs were analyzed with logistic regression models. Blood transfusions were given under a restrictive protocol: patients with Hb < 8 g dL−1 or higher in cases of cardiac or respiratory insufficiency, multiple organ failure or oxygen extraction ratio <0.4.

**Results and Discussion:** Transfusion incidence in valve replacement (n=197) was 54.8 percent, (95CI: 48 to 62), 65.9 percent of the sample had Hb ≤ 13.5 g/dL. Variables included in the Pr Vs model were: Hb (g/dL), OR 0.56, p=0.001, body mass index (OR 0.88, p=0.011), women (OR 3.28, p=0.014), age (OR 1.05, p=0.048). Each more g/dL of Hb decreased the transfusion risk by 0.56, (95CI: 0.4 to 0.8, p=0.001) therefore playing a protective role. Receiver operating characteristic= 0.81, p=0.0002: Sensitivity = 0.84, Specificity = 0.7. Blood needs in CABG (n=131) were 40.5 percent, (95CI: 32 to 49), 45.7 percent of the sample had Hb ≤ 13.5 g/dL. Variables included in the Pr OPs index were: preoperative Hb (OR 0.6, p=0.019), body mass index (OR 1.05, p=0.2), women (OR 5.1, p=0.039), age (OR 1.18, p=0.003). Each more 0.19 g/dL of Hb decreased the transfusion risk by 0.61, (95CI: 0.4 to 0.9, p=0.017). Receiver operating characteristic= 0.82, p=0.0001: Sensitivity = 0.72, Specificity = 0.91.

**Conclusion(s):** Both indexes showed good sensitivity and specificity and were valid for detecting transfusional risks. Application in the preoperative setting could help in early identification of high-risk candidates who should be treated using multimodal blood conservation strategies.

**References:**

**6AP4-5**

**Red cell transfusion and gender**

G. Hars, R. Peter, H. Axel
Dept. of Anaesthesiology and Intensive Care, General Hospital Luz, Linz, Austria

**Background and Goal of Study:** Female gender is an independent risk factor in the transfusion of allogeneic red blood cells (RBC). The aim of this post-hoc study was to highlight gender specific variables associated with allogeneic blood transfusions.

**Materials and Methods:** Using data from the Austrian benchmark study 1739 women and 958 men undergoing unilateral primary hip (THR) and knee replacement (THR) were analyzed [1]. Main outcome variables were prevalence of preoperative anaemia, blood loss and postoperative haemoglobin value as well as the number of allogeneic packed red blood cells (RBC) transfused. ANOVA, t-test and fishers exact test were used for statistics. p<0.05 was accepted as significant.
Results and Discussion: The mean relative total perioperative lost RBC volume (% of circulating RBC volume) was 37.2% vs. 33.6% (f/m, p<0.001). 48.4% of women and 30% of men were transfused with allogeneic RBCs (p<0.001). On average, females received 1.13±1.45 RBCs, males 0.80±1.46 RBCs (p<0.001). Out of preoperatively anemic patients (women 16.9%, men 16.8%) RBCs were administered in 76.9% of women and in 64.6% of men. On average, the same amount of RBCs was transfused in anemic patients of both sexes (women 2.00±1.72, men 1.96±2.04). Among non-anemic patients, women were transfused more often than men (42.6% vs. 23.1%, p<0.001). On average, non-anemic females received 0.95±1.32, non-anemic males 0.56±1.19 RBC units (p<0.001). Absolute hemoglobin values in females were significantly lower throughout the perioperative course, whereby relative hemoglobin values (expressed as percentage of the WHO anemia cut-off values) were nearly identical before surgery but considerably higher on postoperative day 5 (p<0.001, Figure).

Women are at a special risk of receiving RBC transfusion because of higher blood loss as compared to men in relation to their circulating blood volume and also because nearly the same transfusion trigger as in men is used.

Conclusion(s): Women are significantly more frequently transfused than men. This can only partly be explained by gender specific variables like less RBC volume.

References:

6AP4-7
Increased mortality and morbidity after red blood cell transfusion in surgery patients. Data analysis from ARISCAT study
E. Bisbe, M. Basona, M. Colomina, J. Castillo, J. Carret
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Background and Goal of Study: Blood transfusion can both benefit and harm. The association between blood transfusion and worse outcome has been attributed to suppression of the recipient’s immune function. Goal of study: To investigate the impact of transfusion on postoperative morbidity and mortality.

Materials and Methods: Data from a prospective multicenter cohort study (ARISCAT) performed in 59 hospitals during 7 randomly selected days in 2006, were analyzed. Perioperative sample from patients undergoing major surgical procedures were compiled and analyzed according to the use of allogeneic blood transfusion (ABT). Associations were estimated by regression modeling with adjustment for potential confounding.

Results and Discussion: Two hundred and seventy-four of 2458 surgery patients included received allogeneic blood transfusion (ABT) (11%). Patients with ABT had a significantly higher incidence of postoperative complications (39% vs. 6.8%), in-hospital mortality (7.3% vs. 0.5%), and 3-month mortality (10.4% vs. 1.3%) than those who were not transfused. In addition, transfusion was associated with a significantly higher rate of postoperative infections (13.5% vs. 1.9%). Logistic regression analysis revealed that each unit of red cells transfused is associated with increased risk for postoperative infection (OR 1.6, 95%CI 1.4–1.8), Predictive factors for postoperative infection included neoplastic disease in the previous 5 years (OR 2.4), urgent intervention (OR 2.3), ASA PS ≥ (OR 2), complex surgery (OR 1.8), and transfusion (OR 1.4). The predictive value of the model was 81%.

Conclusion(s): Red blood cell transfusion in surgery patients is associated with increased risk for major postoperative complications specially infections, and for increased postoperative and 3-month mortality.

Acknowledgements: Supported by Fundacio La Marato TV3 Grant 041610-2003.

6AP4-8
A new bedside pretransfusion ABO compatibility device to improve transfusion safety
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Background and Goal of Study: ABO incompatibility can lead to death. The incidence of cases of blood being transfused to wrong patients has changed little over the last years, between 1/150 000 and 1/30 000 units (1). The aim of this study was to test a new method of bedside pretransfusion ABO compatibility, the DiaMed-BeSTT®.

Materials and Methods: The DiaMed-BeSTT® kit is a novel test-strip immunoassay to determine the ABO group of the donor and the receiver. The device is made of two paper strips on which monoclonal antibodies (anti-A, anti-B, anti-red cells) have been embedded on three zones. The contact between the blood and the antibodies leads to the apparition of a red line. 88 tests were realised on 88 different patients of an ICU and an operative room, transfused with red cells units. The results were compared with one of the usual bedside check used in France (Safety Card AB®, Diagast).

Results and Discussion: The mean haemoglobin rate before transfusion was 7.4±1.0 g/dL. 100% of the BeSTT tests were concordant with the usual tests. In three cases (3.4%), the results were easier to read than with the usual tests. In only one case (1.1%), the red line was difficult to see (low intensity in front of anti-A antibody).

Conclusion(s): The DiaMed-BeSTT® test seems to be easy to use, rapid (1 minute), with reliable interpretation, out of critical errors, and could improve transfusion safety.

References:

6AP4-9
Conservative transfusion, SAPS-II scores and 28 day mortality in a surgical level 1 care facility
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Background and Goal of Study: Conservative transfusion has been shown to improve outcome in Intensive Care patients and is widely adopted outside this setting. This audit looked at SAPS-II scores, 28 day mortalities and adherence to conservative transfusion in surgical level 1 care patients.

References:
Materials and Methods: Demographic data, SAPS-II and transfusion practice were prospectively audited from November 2006-November 2007. Mortality was recorded at 28 days. Audit standards: transfusion trigger of Hb < 8, post transfusion Hb 8.0-9.0 g/dl, blood transfused 1 unit at a time.

Results and Discussion: A total of 506 patients were admitted, with 274 (54.2%) staying >24 hours and being SAPS-II scored. 47 patients (9.3%) received transfusion. No transfusions until Hb >8 g/dl occurred in 69.7%.

Table 1. Adherence to audit standards

<table>
<thead>
<tr>
<th>Pre-transfusion (Hb &lt; 9 g/dl)</th>
<th>Posttransfusion (Hb &lt; 9 g/dl)</th>
<th>1 Unit Transfused (Hb &lt; 8 g/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemorrhage (n=30)</td>
<td>20 (66.7)</td>
<td>10 (33.3)</td>
</tr>
<tr>
<td>Non-haemorrhage (n=33)</td>
<td>26 (78.8)</td>
<td>12 (36.4)</td>
</tr>
<tr>
<td>All Episodes (n=63)</td>
<td>46 (89.7)</td>
<td>22 (34.9)</td>
</tr>
<tr>
<td>p-values</td>
<td>0.2833</td>
<td>0.8011</td>
</tr>
</tbody>
</table>

1 unit transfusions were given in just 19%. Post transfusion Hb overshoot audit standard in 34.9%. Transfused patients had higher SAPS-II scores (33.45 v 26.07) [p < 0.05] and longer 1 care stays (5.7 v 4.2 days) [p = 0.01] than non-transfused patients.

Neurosciences

7AP1-1
Cerebral effects of racemic, S(+)- and R(-)-ketamine at increased intracranial pressure

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Background and Goal of Study: Conflicting results have been published about the influence of ketamine and its enantiomers on cerebral hemodynamics at increased intracranial pressure (ICP) but in recent reports racemic and S-ketamine have shown beneficial effects. Direct comparisons are lacking. This study was designed to compare cerebrovascular responses, with particular respect to ICP, to bolus injections of racemic, S(+)- and R(-)-ketamine in an experimental model of increased ICP.

Materials and Methods: General anesthesia was induced in nine pigs and maintained during mechanical normoventilation. ICP was raised with extradural pressure until it was recorded at 28 days. Audit standards: transfusion trigger of Hb < 8, post transfusion Hb 8.0-9.0 g/dl, blood transfused 1 unit at a time.

Results and Discussion: No significant changes in BP and HR during the study period were recorded. The remifentanil-propofol co-sedation regimen significantly decreased ICP (<0.05). Furthermore, HRV was enhanced and LF/HF was higher after remifentanil-propofol infusion (1.7 vs 1.2). These results suggest that the remifentanil-propofol association may induce a better sympatovagal modulation, and improves the inhomogeneity of repolarization via a significant decrease in QTD.

Conclusion(s): The lack of increase in ICP in response to iv bolus injections of racemic, S- or R-ketamine in this model of experimential intracranial hypertension indicates that administration of racemic or S-ketamine is safe in patients with intracranial hypertension. The ICP-lowering effect indicates that racemic ketamine may offer a therapeutic advantage over S-ketamine.

7AP1-2
Changes in heart rate variability and QT interval dispersion during remifentanil-propofol co-sedation in neurosurgical patients

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Background and Goal of Study: Sedation in the post-anaesthesia care unit (PACU) is specifically indicated for airway management and mechanical ventilation, postoperative anxiety and agitation, protection against myocardial ischaemia, and intracranial hypertension control (1). Spectral analysis of heart rate variability (HRV) and QT interval dispersion (QTD) are widely used for the assessment of cardiovascular autonomic control (2,3). The aim of this study was to evaluate the effects of remifentanil-propofol co-sedation on blood pressure (BP), heart rate (HR), QTD and HRV in neurosurgical patients.

Materials and Methods: 20 neurosurgical patients admitted to an intensive care unit were studied in a prospective, single-blind study. HRV was measured by spectral analysis in the frequency domain to calculate the low frequency component (LF), which reflects both the cardiac sympathetic and parasympathetic activity, the high frequency component (HF), which reflects the cardiac parasympathetic activity, the total power (TP), calculated by the addition of LF and HF, and the LF/HF ratio, which reflects the balance between the cardiac sympathetic and parasympathetic nervous activity. Patients receiving propofol at 2.5 mg.kg\(^{-1}\).h\(^{-1}\) as sedation regimen were studied, and the parameters described above were measured by a computerized ECG (12 leads) (NORAV Medical Ltd, Israel). Then, remifentanil was started at 0.05 mcg.kg\(^{-1}\).min\(^{-1}\) and propofol infusion was reduced to 1.5 mg.kg\(^{-1}\).h\(^{-1}\). All parameters were evaluated after 20 min of this co-sedation regimen. Data were statistically calculated by ANOVA for repeated measures. P < 0.05 was considered significant.

Results and Discussion: No significant changes in BP and HR during the study period were recorded. The remifentanil-propofol co-sedation regimen significantly decreased QTD in comparison with propofol alone (56 vs 69 ms; P<0.05). Furthermore, HRV was enhanced and LF/HF was higher after remifentanil-propofol infusion (1.7 vs 1.2). These results suggest that the remifentanil-propofol association may induce a better sympatovagal modulation, and improves the inhomogeneity of repolarization via a significant decrease in QTD.

Conclusion(s): In conclusion, HRV may assess the autonomic cardiac modulation and may provide useful information for analgo-sedation management in PACU.

References:

7AP1-3
Xenon anaesthesia in neurosurgery

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Background and Goal of Study: Xenon (Xe) is known to have several unique beneficial properties, one of them being neuroprotection, which could be useful during neurosurgical operations. The aim of this study was to evaluate the clinical effectiveness, tolerance and adverse effects of Xe in neurosurgery.

Materials and Methods: After local ethical committee approval Xe was used as the basic anaesthetic agent in 11 pts. (M=5, F=6; aged 47.4±15.1; ASA

Table 2. Illness Severity, Length of Stay and Predicted and Observed Mortality

<table>
<thead>
<tr>
<th>Mean SAPS-II (sd) [range]</th>
<th>Mean Days on Unit (sd) [range]</th>
<th>Predicted % Mortality*</th>
<th>Actual % Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-transfused (n=227)</td>
<td>26.1 (9.8) [5-56]</td>
<td>4.2 (2.1) [1-13]</td>
<td>7.9</td>
</tr>
<tr>
<td>All transfused (n=47)</td>
<td>33.4 (12.7) [7-72]</td>
<td>5.7 (3.8) [6-19]</td>
<td>15.3</td>
</tr>
</tbody>
</table>

*Calculated using SAPS-II.

Transfusing 1 unit at a time was expected in non-haemorrhage patients and not expected in haemorrhage. There was no difference between these groups suggesting transfusion practice is not based on acute blood loss. Patients requiring transfusions were significantly more unwell than those not requiring transfusion.

Conclusion(s): The lower transfusion trigger has reasonable compliance but the traditional practice of giving at least 2 units of blood at a time continues. The finding that transfused patients are significantly sicker and require higher level care for longer was unexpected. Further work is needed in this area.

Acknowledgements: Thanks to Gemma Dignam, Alison Rybiki and Stuart Gold for their contribution to this audit.

Table 2. Illness Severity, Length of Stay and Predicted and Observed Mortality
II-M) during intracranial operations. Mean duration of surgery and anesthesia was 2.97±1.54 h and 4.09±1.9 h respectively. Anaesthesia was induced with thiopental and fentanyl and followed by administration of cisatracurium. Xe anaesthesia was maintained and controlled using a closed-circuit anaesthesia system (AxeomaTM, Alfa-Impex Oy, Finland) with minimal-flow technique (FiXe 60 vol%). BP, ECG, HR, etCO2, SatO2, FiO2 and FiXe were monitored.

Results and Discussion: BP increased in all cases of Xe anaesthesia and this BP increase required infusion of hypotensive drug infusion in 2 pts. Brain conditions after dura mater incision was estimated by surgeons as “satisfactory” (without swelling and prolapse). The wake up time was 18.1±5.99 minutes after the Xe flush out with O2 flow began and at FiXe 14.26±10.81. Mental status was good, there was no postanaesthesia depression. In the early postoperative period there were shivering in 4 pts., vomiting in 2, 1 case of laryngospasm. Four patients had a BP increase up to 20% from baseline and tachycardia (hypotensive drug infusion required) and 1 patient had complications from atrial fibrillation.

Conclusion(s): Using Xe during neurosurgical operations enables a well-controlled anaesthesia without BP suppression, fast recovery and good conditions for surgical interventions. There were certain side effects during early postoperative period. More investigations are needed for detailed evaluation of the safety and perspectives of Xe anaesthesia during neurosurgical operations and to establish the cause of adverse effects.

References:

7AP1-4
Computational modeling of regional variation of cerebral metabolism and blood flow
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Background and Goal of Study: Increasing use of position emission tomography (PET) to measure cerebral blood flow (CBF) and cerebral oxygen consumption (CMRO2) in well defined areas of the brain is resulting in more refined information about flow metabolism coupling based on regional variation as well as the effects of neural activation. Classical descriptions describe this relationship as a simple exponential relationship. We aimed to test different models of coupling using the Nottingham Cerebral Simulator (NCS), a computational model of cerebral blood flow which has recently been developed and validated [1].

Materials and Methods: The NCS was configured to simulate cerebrovascular behavior of a healthy adult. Two mathematical coupling relationships were modeled. Model 1: a linear relationship exists between CMRO2 and CBF (CBF = a*CMRO2). Model 2: an exponential relationship exists between CMRO2 and CBF (CBF = a*exp(b*CMRO2)). Published data from healthy volunteers where a range of CBF and CMRO2 were reported from different anatomical regions were used to test the simulation.

Results and Discussion: As previously reported, regional CBF is lower and CMRO2 is higher with thiopental and fentanyl and followed by administration of cisatracurium. Xe anaesthesia was induced with thiopental and fentanyl and followed by administration of cisatracurium. Xe anaesthesia was maintained and controlled using a closed-circuit anaesthesia system (AxeomaTM, Alfa-Impex Oy, Finland) with minimal-flow technique (FiXe 60 vol%). BP, ECG, HR, etCO2, SatO2, FiO2 and FiXe were monitored.

Results and Discussion: BP increased in all cases of Xe anaesthesia and this BP increase required infusion of hypotensive drug infusion in 2 pts. Brain conditions after dura mater incision was estimated by surgeons as “satisfactory” (without swelling and prolapse). The wake up time was 18.1±5.99 minutes after the Xe flush out with O2 flow began and at FiXe 14.26±10.81. Mental status was good, there was no postanaesthesia depression. In the early postoperative period there were shivering in 4 pts., vomiting in 2, 1 case of laryngospasm. Four patients had a BP increase up to 20% from baseline and tachycardia (hypotensive drug infusion required) and 1 patient had complications from atrial fibrillation.

Conclusion(s): Using Xe during neurosurgical operations enables a well-controlled anaesthesia without BP suppression, fast recovery and good conditions for surgical interventions. There were certain side effects during early postoperative period. More investigations are needed for detailed evaluation of the safety and perspectives of Xe anaesthesia during neurosurgical operations and to establish the cause of adverse effects.

References:

7AP1-6
Cerebral haemodynamic changes during sevoflurane or propofol anaesthesia for patients undergoing craniotomy
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Background and Goal of Study: Propofol (PROP) or sevoflurane (SEVO) could be recommended as an ideal hypnotic during neurosurgical procedures. These hypnotics have different effects on the cerebrovascular system. The aim of the study was to compare the effects of SEVO and PROP on cerebral circulation at surgical levels of anaesthesia under EEG spectral entropy monitoring.

Materials and Methods: 64 patients ASA I-III, aged 18-75 years, scheduled for elective intracranial tumors surgery were enrolled into the prospective study and randomly allocated into equal groups to receive SEVO or PROP for the anesthesia maintenance. Anaesthesia was induced with propofol, fentanyl, pancuronium for both groups. The mean flow velocity (Vmca) and pulsatility index (PI) in the obverse middle cerebral artery were continuously measured with transcranial Doppler. Data were recorded with SS Collect when patients were arrived in operating room (1), after i/v premedication (2), after intubation (3), after craniotomy (4), after tumor resection (5), at the end of surgery (6), after awakening (7) and 2 hour after operation (8). Statistical analysis was performed using Student’s t test, χ² test and multivariate analysis for repeated measurements. p<0.05 was defined as significant.

Results and Discussion: There were no significant differences between the groups with respect to demographic characteristics and intraoperative variables. Data are presented as mean±SD. Results of the mean flow velocity (cm/s) are shown in table 1.

Table 1. Mean flow velocity (Vmca) during anaesthesia in SEVO and PROP groups

<table>
<thead>
<tr>
<th>Vmca</th>
<th>SEVO</th>
<th>PROP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Vmca</td>
<td>±12.9</td>
<td>±12.6</td>
</tr>
<tr>
<td>2 Vmca</td>
<td>±15.8</td>
<td>±16.2</td>
</tr>
</tbody>
</table>

p<0.01.

Changes of pulsatility index (PI) during anaesthesia are shown in table 2.

Table 2. Pulsatility index (PI) during anaesthesia in SEVO and PROP groups

<table>
<thead>
<tr>
<th>PI</th>
<th>SEVO</th>
<th>PROP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>±0.75</td>
<td>±0.76</td>
</tr>
<tr>
<td>2</td>
<td>±0.76</td>
<td>±0.79</td>
</tr>
<tr>
<td>3</td>
<td>±0.77</td>
<td>±0.77</td>
</tr>
<tr>
<td>4</td>
<td>±0.74</td>
<td>±0.74</td>
</tr>
<tr>
<td>5</td>
<td>±0.77</td>
<td>±0.83</td>
</tr>
<tr>
<td>6</td>
<td>±0.09</td>
<td>±0.12</td>
</tr>
<tr>
<td>7</td>
<td>±0.11</td>
<td>±0.13</td>
</tr>
<tr>
<td>8</td>
<td>±0.12</td>
<td>±0.12</td>
</tr>
<tr>
<td>9</td>
<td>±0.09</td>
<td>±0.14</td>
</tr>
</tbody>
</table>

p<0.05.

Conclusion(s): There were no significant differences of cerebral haemodynamic changes during sevoflurane or propofol anaesthesia for patients undergoing craniotomy.

7AP1-7
Pharmacoeconomic analysis of xenon anesthesia in neurosurgery
A. Rytova, A. Lubnin
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Background and Goal of Study: Xenon has many characteristics of an ideal anesthetic in neuroanesthesiology. But with a high cost (6.8 €/h) the question is whether it is cost acceptable. We analyzed the cost of xenon closed circuit anesthesia of different duration and compared it to the cost of TIVA with propofol.

Materials and Methods: 51 anesthetics were carried with AXXOMA machine (Alfa-Impex Oy, Finland). Xenon and oxygen concentrations in the circuit were obtained with GKM-03 Insolv gas analyzer (Insolv, Russia), and xenon expenditure – with DKM-02 batcher (KseMed, Russia). We divided all cases into 6 white matter (CMRO2 < 2.5 ml/O2/100g/min) and grey matter (CMRO2 > 2.5 ml/O2/100g/min). Results from one data set are shown in figure 1.

Conclusion(s): These results suggest that the NCS can be used to investigate the effects of disturbances of flow-metabolism coupling associated with disease and drugs. Flow-metabolism coupling at a regional level is best described using a simple exponential relationship.

References:
groups by duration: less than 2 hr, 2 to 3 hr, 3 to 4 hr, 4 to 5 hr, 5 to 6 hr and 6 to 7 hr. We calculated xenon expenditure per hr, per anesthesia, and cost of anesthesia (Table 1). The cost of TIVA anesthesia with propofol in our institution is 12.8 €/hr (95% CI 8.57 – 17.14 €). We compared it to the cost of xenon anesthesia (Figure 1).

Results and Discussion: Our data confirmed a correlation between cost and duration of xenon anesthesia: longer is anesthesia, less is the cost of anesthesia per hour. The maximal expenditure corresponds to the circuit filling (the first hour of anesthesia), then remains stable and low. Hence, for a 6-hour anesthesia the cost of xenon is comparable to that of propofol, and for longer anesthesia it becomes lower.

Conclusion(s): In a closed circuit system, the cost of xenon anesthesia per hour diminishes with time. If longer than 6 hours its cost is lower than that of TIVA. Xenon anesthesia is cost acceptable in neurosurgery.

7AP2-2
Craniosynostosis and assessment of blood loss: An audit over 15 months
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Background and Goal of Study: Craniosynostosis, related to premature closure of skull sutures, has an incidence of one per 2000 live births. The most important risk during primary craniosynostosis repair is blood loss. This report presents the estimates of blood loss in patients undergoing surgery.

Materials and Methods: From June 2006 until October 2007 surgical procedures were performed in 10 children. The following data were collected: age, body weight, preoperative and postoperative haematocrits (%), duration of surgery, volume of products transfused and number of days in the hospital. Blood loss was assessed based on the method of Kearney (Table 1).

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>&lt;2</th>
<th>2–3</th>
<th>3–4</th>
<th>4–5</th>
<th>5–6</th>
<th>6–7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration, hr</td>
<td>Mean</td>
<td>1.41±0.16</td>
<td>2.24±0.18</td>
<td>3.27±0.30</td>
<td>4.31±0.24</td>
<td>5.16±0.28</td>
</tr>
<tr>
<td>Mean expenditure per anesthesia, l/hr</td>
<td>7.96±1.93</td>
<td>8.99±2.36</td>
<td>10.80±1.52</td>
<td>11.23±1.87</td>
<td>12.09±2.08</td>
<td></td>
</tr>
<tr>
<td>Mean expenditure, l/hr</td>
<td>5.61±1.21</td>
<td>4.02±1.57</td>
<td>3.40±1.94</td>
<td>2.83±1.28</td>
<td>2.83±1.04</td>
<td></td>
</tr>
<tr>
<td>Mean cost of anesthesia, euro</td>
<td>54.12±12.92</td>
<td>61.13±22.16</td>
<td>73.44±10.33</td>
<td>76.36±12.71</td>
<td>83.84±14.14</td>
<td></td>
</tr>
</tbody>
</table>

Results and Discussion: Patients were grouped according to the suture involved as it implied different surgical techniques. Mean age and body weight were 10.1±5.6 (mean±SD) months and 9.35±2.1 kg, respectively.

Conclusion(s): The majority of studies report losses between 50 and 100% [1], which is in favour with the results obtained (ERCVL/ERCV = 42.1±16.5). According to Meyer et al the amount of blood loss correlated better with the suture involved and surgical technique than with the patient’s age or operating time, associating sagittal and metopic cranioectomies with the highest estimated blood losses [1–3]. In this report, contrary to what has been described in the literature, mean operating time and estimated blood loss were higher for unicoronal cranioectomy.

References:

7AP2-3
Catheter contamination in epidural analgesia: When, how and how many?
M. Paños Gozalo, A. Biamés Suñé, Y. Díez Remesal, A. González Tallada, J. Roige Sole
Anaesthesiology and Reanimation, Valle de Hebron Hospital, Barcelona, Spain

Background and Goal of Study: Epidural catheter (EC) contamination is not risk exempt. EC tip colonization is up to 28.8% in some series [1] and may be associated with significant clinical infection[2]. The aim of this study was to evaluate the safety of this technique and the relationship between microbiological EC contamination and the duration of catheterization in surgical patients.

Materials and Methods: Bacteriological analysis of 120 triple EC cultures was carried out after removal in surgical patients: exit site swabs (CS), semi-cultivable culture of 3 cm of intradermis portion (IC) and 3 cm of tip (TC). We recorded the duration of catheterization. Descriptive statistical analysis and Mantel-Haenszel Chi-Square tests were performed.

Results and Discussion: ECs were kept in place for 69.8±33 hours (range 24–264). A significant correlation was found between the incidence of positive cultures and the duration of catheterization (CS p=0.001, IC p=0.019, TC p=0.016), 65% of positive CS had also a positive IC and TC (decreasing number of colonies forming units from the skin to the tip). Coagulase-negative staphylococci (CNS) was the most prevalent micro-organism cultured.

Table 1. Bacteriological results

<table>
<thead>
<tr>
<th>CS (%)</th>
<th>IC (%)</th>
<th>TC (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS</td>
<td>39 (65%)</td>
<td>31 (79.5%)</td>
</tr>
<tr>
<td>Enterobacter</td>
<td>6 (10%)</td>
<td>2 (5.1%)</td>
</tr>
<tr>
<td>Corynebacterium</td>
<td>7 (11.6%)</td>
<td>2 (5.1%)</td>
</tr>
<tr>
<td>E. coli</td>
<td>2 (3.2%)</td>
<td>–</td>
</tr>
<tr>
<td>Bacillus s.p.</td>
<td>1 (1.7%)</td>
<td>2 (5.1%)</td>
</tr>
<tr>
<td>Str. viridans</td>
<td>–</td>
<td>1 (2.6%)</td>
</tr>
<tr>
<td>Str. marcescens</td>
<td>1 (1.7%)</td>
<td>–</td>
</tr>
<tr>
<td>Others</td>
<td>4 (6.8%)</td>
<td>1 (2.6%)</td>
</tr>
</tbody>
</table>

Results and Discussion: Patients were grouped according to the suture involved as it implied different surgical techniques. Mean age and body weight were 10.1±5.6 (mean±SD) months and 9.35±2.1 kg, respectively.

Conclusion(s): In surgical patients, ECs have to be removed when no longer in use, as the risk of contamination is not risk exempt. The spread of contaminants is related to the same described route of infection, and they can be associated with significant clinical infection.

References:
Haemodynamic response to cerebral application of hydrogen peroxide

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Background and Goal of Study: Hydrogen peroxide (H2O2) is commonly administered on surgical field to improve haemostasis or to remove any contaminant. It has been shown experimentally that systemic vascular resistance and blood pressure may increase possibly due to local venous oxygen embolism and vessel contraction (1). Since good control of cerebral perfusion pressure is mandatory during cranioectomy we examined the effect of H2O2 on systemic haemodynamics in patients undergoing neurosurgery.

Materials and Methods: Twenty patients scheduled for cranioectomy were included in the study. 10 ml of 1% H2O2 was locally administered during the end phase of surgery to promote haemostasis. Anaesthesia was standardized. Invasive systemic blood pressures and heart rate were registered before and after the local administration of H2O2 at predetermined intervals. The maximum changes in systolic and diastolic blood pressures were also calculated. The results were analyzed by ANOVA.

Results and Discussion: The mean (range) patient’s age was 48.4 (24-73) years. Fourteen patients underwent clipping of nonruptured cerebral arterial aneurysm, five resection of a brain tumor and one patient closure of cerebral arterio-fistula. In 16 patients systolic blood pressure increased (increase between 8-66 mmHg) and in three it decreased (decrease between 11-25 mmHg) after administration of H2O2. One patient had a short-lived cardiac arrest 40 seconds after administration of H2O2. Mean systolic blood pressure (n=20) increased during the study period (P<0.05, compared to Pre) reaching a maximum of 106.9 mmHg at 4 minutes.

Corresponding changes were seen in diastolic blood pressure. Heart rate, oxygen saturation and end-tidal CO2 did not change (P=0.567, 0.40 and 0.445 respectively).

Conclusion(s): Cerebral application of H2O2 causes unpredictable major changes in systemic blood pressures and heart rate. The most frequent response was increase in systemic blood pressures which may counteract the desired effect of H2O2 on local haemostasis.

References:

Effect of thymic peptide α1 on perioperative cellular immune function of brain tumor

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Background and Goal of Study: Many investigators have reported that surgical stress and anesthetic drug induce immunosuppression. Major operations are associated with postoperative infection, wound healing, tumor metastasis. This research was designed to study the effect of thymic peptide α1 on perioperative cellular immune function of brain tumor.

Materials and Methods: Thirty patients of brain tumor were randomly divided into experimental group (n=15) and control group (n=15). Thymic peptide α1 was used in experimental group before anesthesia. Peripheral venous blood samples were taken after anesthesia, 1h after incision, postoperation and 5th day after operation. The expressions of CD3+, CD4+, CD8+ and NK cells were measured by flow cytometer as the percentages of total lymphocytes.

Results and Discussion: One hour after incision, CD3+, CD4+, CD4-CD8+ and NK cells ratio in experimental and control group were significantly decreased (P<0.05). The extent of decrease in experimental group was smaller than in control group (P<0.05). The ratio recovered at the postoperation in two groups. The extent of the recovery in experimental group was larger than in control group. The ratio at the 5th day after operation recovered to the level before anesthesia in experimental and control group (Table1).

The change of CD3+, CD4+, CD8+, CD4+CD8+ NK cells in two groups

<table>
<thead>
<tr>
<th>Time &amp; Group</th>
<th>CD3+</th>
<th>CD4+</th>
<th>CD8+</th>
<th>CD4+CD8+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before anesthesia</td>
<td>87.3±6.71</td>
<td>39.7±6.54</td>
<td>24.5±6.75</td>
<td>7.1±1.31</td>
</tr>
<tr>
<td>Experimental group</td>
<td>67.38±6.71</td>
<td>38.68±5.38</td>
<td>23.03±6.28</td>
<td>1.68±1.10</td>
</tr>
<tr>
<td>1h after incision</td>
<td>48.32±5.23</td>
<td>20.92±4.53</td>
<td>26.92±7.89</td>
<td>0.97±0.53</td>
</tr>
<tr>
<td>Experimental group</td>
<td>58.37±6.71</td>
<td>38.35±5.67</td>
<td>23.76±6.85</td>
<td>1.75±1.05</td>
</tr>
<tr>
<td>Postoperation</td>
<td>53.48±6.71</td>
<td>25.47±4.51</td>
<td>27.86±5.6</td>
<td>1.33±0.68</td>
</tr>
<tr>
<td>Experimental group</td>
<td>62.34±6.89</td>
<td>35.56±7.52</td>
<td>23.76±6.85</td>
<td>1.75±1.05</td>
</tr>
<tr>
<td>5th day after operation</td>
<td>65.78±6.31</td>
<td>38.63±6.32</td>
<td>24.65±7.89</td>
<td>1.67±1.22</td>
</tr>
</tbody>
</table>

Conclusion(s): Thymic peptide α1 can reduce the decrease of T-lymphocytes subsets and NK cells, thus improve the cellular immune function in the postoperation of brain tumor.

Magnetic resonance imaging of cerebral edema during experimental pneumococcal meningitis

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Background and Goal of Study: The aim of this study was to evaluate on cerebral edema, including the effect of changes in mean arterial blood pressure (MAP), during Streptococcus pneumoniae meningitis in rats.

Materials and Methods: Rats underwent MRI at 26, 27, 28 and 29 hours after inoculation with S. pneumoniae (n=15) or saline (n=15). T1- and quantitative T2-weighted imaging and apparent diffusion coefficient (ADC) mapping were acquired at 4.7T. After imaging at 26 hours, all animals underwent interventions to clamp the MAP at a low (hypotensive), intermediate (normotensive), or high (hypertensive) level within the normal limits of cerebral blood flow autoregulation (N=5 in each group). Brain water content was measured by magnetic resonance imaging (MRI) and the wet-to-dry (WTD) method.

Results and Discussion: The MAP of cortex and white matter was lower at all time points in meningitis compared to control rats (P<0.05). Cortical ADC increased in hypertensive meningitis rats at 28 and 29 hours post-infection (P<0.001) compared to baseline, while white matter ADC remained unchanged. In cortex and white matter T2 decreased in hypertensive and normotensive meningitis rats at 29 hours compared to baseline (P<0.05). T2 remained constant in cortex and white matter of control groups. Ventricle size increased in meningitis rats over time (P<0.05) and remained constant in controls. The mean WTD water content was increased (P<0.029) and WTD weight variances between groups were unequal (P<0.0001).

Conclusion(s): Rats with early pneumococcal meningitis show features consistent with cytotoxic brain edema. Blood pressure manipulation may influence the degree of edema during meningitis. The ventricle size was increased in all meningitis compared to control animals and did not change with changes in MAP.

B-type natriuretic peptide is not always coming from the heart

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Background and Goal of Study: BNP dosing, far easier to obtain in emergency department than cardiac echography, is proved to be useful in difficult differential diagnosis of acute dyspnoea. It is increasingly becoming a diagnostic, risk stratification and prognostic tool in heart failure patients (1). Previous result showed that BNP level is not increased in medically treated patients with brain diseases (2). The aim of this study was to assess the value of BNP dosing in patients with brain surgery.

Materials and Methods: 20 consecutive elective patients operated for brain surgery (meningioma, glioblastoma, aneurismal clipping or epilepsy) have been included. Serum BNP has been measured before surgery (basal value), and in the next morning. The second dosage was not performed immediately after
Correlations to the age of patients meaning that the increase is less related to the procedure length, but it is inversely (r = -0.51) and very well (p < 0.0012) correlated to the age of patients meaning that the increase is less important in older patients.

Cardiac function has not been objectively evaluated, but none of the patients included had signs of acute heart failure, pre or postoperatively. This increase, even if statistically significant, is not clinically relevant. A higher cut-off value should eventually be proposed, at least for the early postoperative period for detection of heart failure.

Conclusion(s): The heart is not the only source of Brain Natriuretic Peptide. It also exists in human brain. But the increase during brain surgery is unlikely to alter its role in diagnostic and therapeutic decision for heart failure patients.

References:

7AP3-2
Recovery and cognitive function of elderly patients after carotid endarterectomy: A comparison of desflurane versus sevoflurane anaesthesia
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Background and Goal of Study: It is known that recovery from desflurane anaesthesia is more rapid than sevoflurane anaesthesia. This could be important after carotid endarterectomies where we desire fast recovery from anaesthesia in order to check the patient’s neurological status. The purpose of this study is to evaluate the postoperative recovery and cognitive function of elderly patients comparing desflurane versus sevoflurane anaesthesia.

Materials and Methods: Forty patients (men and women), of average age 72±6, undergoing carotid endarterectomy were studied. The patients were divided into two groups: in the first group (n = 20) desflurane anaesthesia was used and in the second group (n = 20) sevoflurane anaesthesia was used. In all cases apart from the volatile agents all the other pharmacokinetic parameters of anaesthesia were the same. The MAC of both volatile agents was 1.0 with oxygen/air mixture 1:1 (FiO2 = 50%) and fresh gas flow at 3 L/min. During recovery the following factors were assessed: 1) time of spontaneous breathing; 2) time to verbal command; 3) extubation; 4) orientation (place and time) and 5) postanaesthesia recovery score (Aldre score > 6). The evaluation of the cognitive function was done with the use of the Mini Mental State Examination test (MMSE) before premedication and 30, 60 minutes and 24 hours postoperatively. Visual Analog Scale scores for pain and nausea were recorded at those times. Statistically significant were considered values of p < 0.05 (use of the independent t-test).

Results and Discussion: Early recovery times are given as mean ± standard deviation. The times of the spontaneous breathing were 7±4.1 min and 10±4.19 min in desflurane and sevoflurane group respectively. Times of verbal command were 8±1.4 min vs 13±6.09 min, times of extubation 11±1.2 min vs 14±5.14 min and orientation 12±3.09 min vs 15±3.16 min (desflurane vs sevoflurane). Postanaesthesia recovery score > 8 was achieved at 19±3.5 min with desflurane and at 25±3.5±2 min with sevoflurane. There were no statistically significant differences in cognitive function between the two groups as assessed with the MMSE test.

Conclusion(s): Desflurane use for maintenance of anaesthesia in carotid endarterectomy in elderly patients reduces the times of early recovery compared to the use of sevoflurane, without important differences in postoperative mental status between both inhaled anaesthetics.

References:
recorded with SS Collect after induction, craniotomy, tumor removal and at the end of operation. Awakening and extubation times were compared in the two groups.

Results and Discussion: There were no significant differences between the groups with respect to demographic characteristics and intraoperative variables. Data are presented as mean±SD. Anesthesia time in group ISO was 253.3±83.6 min and 232.2±66.4 min in group SEVO (p=0.17). Operating time ISO – 203.7±11.2 min, SEVO – 183.1±64.5 min (p=0.10). Relative consumption (μg/kg/h) of fentanyl was 2.29±0.55 and 2.19±0.50 (p=0.32) and pipercuronium 27.26±0.74 and 26.59±0.65 (p=0.60) respectively. Requirement of sevoflurane for maintenance of anesthesia was 0.5±0.2 – 1.1±0.3% and of isoflurane 0.7±0.5 – 0.8±0.2%. The data indicate that awakening and extubation times were shorter for patients receiving SEVO (10.52±4.5 min) than for those receiving ISO (14.31±5.05 min) (p=0.001).

Conclusion(s): Perioperative consumption of anaesthetics (hypnals as well as analgesics) can be reduced and therefore optimized with the use of SEVO; and group 3 (58 patients) received 8 mg of lornoxicam immediately after craniotomy. We measured the visual analogue scale (VAS) scores, mean blood pressure (MBP) and heart rate (HR) at 6, 18, 30, 42 and 54 hours after operation and compared differences in these parameters amongst groups and subgroups.

Results and Discussion: No significant differences in age, sex, weight and height between groups and subgroups were observed. Patients receiving preemptive analgesia with lornoxicam showed significantly lower pain scores than patient in other groups (Mann-Whitney p<0.05). Patients after infratentorial craniotomy who received lornoxicam on request showed significantly higher VAS scores than patients after supratentorial craniotomy (Mann-Whitney p<0.05). HR during the first 24 hours post-operative was significantly higher in the group 3 than in other groups (Mann-Whitney p<0.05). No significant differences in MBP between groups and subgroups were observed. Patients receiving preemptive analgesia with lornoxicam immediately after craniotomy showed significantly lower VAS scores, MBP and HR were found in any group (Spearman p>0.05). Perioperative haematomas, renal failure or peptic ulcers weren’t observed.

Conclusion(s): Perioperative analgesia with lornoxicam is more effective for treating postoperative pain in patients after craniotomy than analgesia with morphine, optimized with the use of SEVO; and group 3 (58 patients) received 8 mg of lornoxicam immediately after craniotomy. We measured the visual analogue scale (VAS) scores, mean blood pressure (MBP) and heart rate (HR) at 6, 18, 30, 42 and 54 hours after operation and compared differences in these parameters amongst groups and subgroups.

Results and Discussion: No significant differences in age, sex, weight and height between groups and subgroups were observed. Patients receiving preemptive analgesia with lornoxicam showed significantly lower pain scores than patient in other groups (Mann-Whitney p<0.05). Patients after infratentorial craniotomy who received lornoxicam on request showed significantly higher VAS scores than patients after supratentorial craniotomy (Mann-Whitney p<0.05). HR during the first 24 hours post-operative was significantly higher in the group 3 than in other groups (Mann-Whitney p<0.05). No significant differences in MBP between groups and subgroups were observed (Mann-Whitney p>0.05). Perioperative haematomas, renal failure or peptic ulcers weren’t observed.

Conclusion(s): Preemptive analgesia after craniotomy using lornoxicam is more effective for treating postoperative pain in patients post craniotomy than analgesia with morphine, optimized with the use of SEVO; and group 3 (58 patients) received 8 mg of lornoxicam immediately after craniotomy.
Materials and Methods: From 2004 to half 2007, 694 pts admitted to the ICU after brain surgery were monitored for blood glucose concentrations. 368 pts had received 15mg/kg BW methylprednisolone in the early peroperative phase.

Results and Discussion: Within the first hours after surgery, 129 pts (18.44%) revealed a blood glucose level higher than 190mg/dl, while 249 pts (35.87%) revealed blood glucose levels between 120-180mg/dl. There was no significant difference in blood glucose level between pts having received corticoids peroperatively (20.4% >180mg/dl and 33.5% 120-180mg/dl) or not. Increased blood glucose concentration was significantly correlated to urgent intervention, prolonged postoperative ICU stay, intracranial bleeding (SAH or head injury), pre-existing diabetes. Increased blood glucose concentrations were significantly more observed in pts newly administered the medication during concomitantly compared to pts already receiving preoperative corticoids.

Conclusion(s): Postoperative hyperglycemia is a well known result of peroperative stress conditions and is related to outcome after prolonged ICU stay. Therefore, anesthetic emergency should guarantee stable systemic (cardiovascular and respiratory) parameters. This prospective study was performed to compare early postoperative systemic complications after emergence of anesthesia in pts awakened either in the operating room at end of surgery or on the ICU (max 4 hours after end of surgery).

Materials and Methods: Over a 2-years period, 142 pts scheduled for brain tumor surgery were randomised into early awakening (71pts) or long-term sedation (71pts). All pts were monitored for 12hrs after extubation. We compared the incidence of respiratory events (PaCO2 <35mmHg, PaCO2 >45mmHg) and cardiovascular events (art pressure increase above 30% of baseline, systart pressure < 90mmHg) in both groups.

Results and Discussion: In pts awakened in the operating room, we observed a 5.3% incidence of arterial hypoxia, while 27.3% of all arterial blood gas values revealed hypercapnia. None of these pts developed respiratory depression necessitating reintubation. In late awakening pts, incidence of arterial hypoxia was 18%, while incidence of hypercapnia was 8.3%. Analysis of cardiovascular complications revealed no pt in the early awakening group with postoperative arterial hypertension necessitating administration of vasopressors. In the late awakening group, 4.3% of all postoperative arterial pressure revealed hypotensive values. In the early awakening group, incidence of arterial hypertension (necessitating medication) was 14.3%, while for the long term sedation pts, incidence of arterial hypertension (with antihypertensive medication) was 21.5%.

We observed no difference in duration of postoperative ICU stay between both groups and no difference of incidence of major neurological complications (post-operative hemorrhage or cerebral edema).

Conclusion(s): Pts allowed to early awakening after brain tumor surgery revealed an increased incidence of hypercapnia, while pts submitted to long term sedation appeared to be more vulnerable to arterial hypoxemia and arterial hypertension. Therefore, both choices of anesthetic regimen require adequate close hemodynamic and respiratory monitoring.

7AP3-9

Use of standing orders for the management of postoperative arterial hypertension after elective brain tumor surgery

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Background and Goal of Study: Standing orders in the early postoperative management of brain tumor surgery could increase the quality of postoperative outcome, as arterial hypertension is one of the major causes of postoperative intracerebral hemorrhage. Therefore, adequate management of arterial hypertension is of utmost importance. We want to illustrate how the use of specific standing orders – to the level of intervention and the specific administration of antihypertensive drugs – managed postoperative arterial hypertension after elective brain tumor surgery.

Materials and Methods: At our institution, specific standing orders for arterial pressure after brain tumor surgery were instructed to the ICU nurses. Ex. act instructions as to the definition of arterial hypertension, the level of intervention and the step-up protocol for administration of antihypertensive drugs were implemented. Antihypertensive treatment consisted in urapidil as first step, nicardipine as second step and association of beta-blockade as third step. All postoperative instructions were prefetched by patient history and course of neurosurgical intervention and became electronically available at end of surgery. We retrospectively analysed all postoperative data of elective brain tumor surgery pts between jan 2005 and dec 2007.

Results and Discussion: 220 pts were included. In 58 pts (26.4%), arterial hypertension was observed (in 2.9hrs after ICU admission). Referring to the standing orders, arterial hypertension necessitated medication in 37 pts (83.8% of hypertensive pts). In 10 pts, administration of urapidil normalized arterial pressure, while in 27 pts administration of nicardipine was necessary. In 7 of these 27 pts, associated beta blockade finally normalized arterial pressure. In all pts, arterial pressure remained well within the defined ranges, no adverse events of arterial hypertension were observed. In 2 pts, surgical reintervention was necessary, without any clear correlation to postoperative arterial hypertension.

Conclusion(s): Standing orders succeeded in a safe and adequate management of postoperative arterial hypertension in neurosurgical pts.

7AP4-1

Does irrigation system (Pulsavac™plus) lead to intravascular passage of irrigation fluid during major spine surgery?

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Background and Goal of Study: Irrigation systems are frequently used during major spine surgery for the prevention of postoperative surgical site infection. Aim of this study is to evaluate the passage of irrigation fluid during irrigation with (Pulsavac™plus) and its effect on whole blood count and blood electrolytes level.

Materials and Methods: After anaesthesia induction, prone position was given to the patients. Under sterile condition midline incision was performed, paravertebral muscles were dissected. Following dissection, decompression of spinal cord and roots; irrigation system was used for 5 minutes irrigation. Patients were randomized by using sealed envelopes, selected by patients, into 2 groups (20 patients in each group); during irrigation 1000ml of 0.9% NaCl plus 40cc 10% povidon-iodine followed by 1000ml of lactated ringer in Group L were used as an irrigation fluid. Blood samples for whole blood count and sodium were taken just before and after the instrumentation.

Results and Discussion: It was seen that there were significant decrease at both haemoglobin and haemotocrit values in both groups. In Group L, potassium ions were increased significantly after irrigation.

Table. Changes at whole blood counts and plasma electrolytes

<table>
<thead>
<tr>
<th>Sodium (mEq/l)</th>
<th>Potassium (mEq/l)</th>
<th>Haemoglobin (g/dl)</th>
<th>Haemotocrit (%)</th>
<th>Thrombocytes (1/μl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group S</td>
<td>before irrigation 138.0±3.2</td>
<td>3.96±0.4</td>
<td>10.45±0.11</td>
<td>33.07±3.77</td>
</tr>
<tr>
<td></td>
<td>after irrigation 138.31±2.11</td>
<td>3.96±0.4</td>
<td>10.07±0.18*</td>
<td>31.03±4.16**</td>
</tr>
<tr>
<td>Group L</td>
<td>before irrigation 138.74±1.83</td>
<td>4.22±0.33</td>
<td>10.92±1.11</td>
<td>34.42±4.52</td>
</tr>
<tr>
<td></td>
<td>after irrigation 138.5±2.47</td>
<td>4.30±0.47</td>
<td>10.61±1.52*</td>
<td>32.77±4.46**</td>
</tr>
</tbody>
</table>

Probability values for comparison with before irrigation values: *p<0.05, **p<0.001, ***p<0.001.

Conclusion(s): These data shows that irrigation fluid passes into the intravascular space leading to the decrease in whole blood count. Lactated ringer irrigation leads to increase in potassium level, but not sodium.

7AP4-2

Does irrigation system (Pulsavac™plus) used during major spine surgery prevent postoperative surgical site wound infection?

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Background and Goal of Study: Aim of this study is to evaluate the effectivity of irrigation with Pulsavase™ plus at the prevention of postoperative surgical site wound infection in major spine surgery patients.

Materials and Methods: After IRB approval and patient’s informed consents were obtained study was conducted. 194 patients undergone major spine surgery due degenerative spine date between Jan 2005-Dec 2006 were included in the study retrospectively. Standard anaesthesia technique was used for all patients by same anaesthesiologist: anaesthesia was induction with propofol and remifentanil and maintenance was achieved with remifentanil in fusion and 1 MAC isoflurane in 50% nitrous oxide in oxygen. After then prone position was given to the patients. Under sterile condition midline incision was performed, paravertebral muscles were dissected. In Group I (n=72), old cases in which irrigation system was not used, in Group II (n=122), new cases in which irrigation system was used for five minutes irrigation. During irrigation 1000ml of 0.9% NaCl plus 40cc 10% povidon-iodine followed by 1000ml of 0.9% NaCl in Group S were used as an irrigation fluid.

After instrumentation irrigation was repeated. Skin stitches were performed with stapler. Antibiotic prophylaxis was done with oxacillin 2 g at the induction and continued 1 g twice a day three days. Wound heating was evaluated until stapler taken off.

Results and Discussion: Demographic features of two groups were similar. There were no differences at the duration of operation, the amount of blood transfusion, changes at the body temperature and value of blood pressures between the two groups. The incidence of postoperative surgical site wound infections in Group 1 (1 patient out of 122; 0.82%) were significantly lower than in Group 2 (8 patients out 72; 8.3%) (Odds ratio:11.0).

Conclusion(s): In the light of this study, we concluded that irrigation of surgical site with irrigation system before and after instrumentation was very effective at the prevention of the postoperative surgical site infection.

7AP4-3
Is surgical readjustment or a wake up test necessary following a reduction in the motor evoked potential during scoliosis surgery
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Background and Goal of Study: A retrospective anecdotal review of intraoperative neuromonitoring (IOM) and conducting the wake up test when abnorma-rities are seen in the motor evoked potentials (MEP).

Materials and Methods: IOM was performed for 25 patients with idiopathic thoracic scoliosis. All were neurologically normal and underwent correction. 8 female patients had significant MEP changes. All 8 patients had total intravenous anesthesia (TIVA), with propofol infusion, 45 minutes post-induction, after the muscle relaxant had worn off, cortical stimulation commenced. This was alternated with monitoring of the somatosensory evoked potentials. MEP from the tibialis anterior (TA) were recorded bilaterally from the lower limbs. Peak to peak amplitude changes occurring together are highly suggestive of neurological dysfunction during IOM.

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (y)</th>
<th>Right cortical stimulation</th>
<th>Left cortical stimulation</th>
<th>Wakeup test</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>Decrease</td>
<td>Decrease</td>
<td>Decrease</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>Decrease</td>
<td>Decrease</td>
<td>Decrease</td>
<td>Abnormal Normal*</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>Decrease</td>
<td>Decrease</td>
<td>Decrease</td>
<td>Abnormal Normal*</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>No change</td>
<td>No change</td>
<td>Decrease</td>
<td>Decrease Normal Normal</td>
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<td>No change</td>
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<td>Decrease Normal Normal</td>
</tr>
<tr>
<td>6</td>
<td>14</td>
<td>Decrease</td>
<td>No change</td>
<td>No change</td>
<td>Normal Normal</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>Decrease</td>
<td>No change</td>
<td>No change</td>
<td>Normal Normal</td>
</tr>
<tr>
<td>8</td>
<td>19</td>
<td>No change</td>
<td>No change</td>
<td>Decrease</td>
<td>Normal Normal</td>
</tr>
</tbody>
</table>

were seen in any of the patients. Thus sole reduction of the ipsi or contralateral MEPs may not cause significant reduction of the motor tracts to cause visible neurological damage.

Conclusion(s): The present findings show that ipsilateral and contralateral MEP amplitude changes occurring together are highly suggestive of neurological dysfunction during IOM.

7AP4-4
Brain-friendly teaching in postgraduate neuroanaesthesia: A new model for a sample lecture on management of brain arteriovenous malformations
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Background and Goal of Study: Neuroanaesthesists’ performance may be crucial in cerebral tissue-threatening periods during interventions on brain arteriovenous malformations (AVM). To provide quality education, we have developed an innovative lecture on management of AVM oriented at “brain-friendly”, neuroscientific learning principles (1).

Materials and Methods: Core components of best neuroanaesthesia practices and neuroprotective approaches to AVM management incorporating evidence and expert-related recommendations shall be taught (2,3). As didactic foundation, a structure based on advances in neurocognitive information gain has been used (1).

Results and Discussion: An introduction to AVM disease and endovascular, radiosurgical, or surgical treatment considering AVM grading is first presented. Participants are then asked to complete an alphabetic list [A-Z] of key words on anaesthesia tasks with AVM. Next, neuroprotective approaches to prevent intracranial haemorrhage and brain oedema during and after procedures on AVM are reviewed. Multiple choice questions follow, and are directly answered. Principles, advantages and pitfalls of anaesthesia regimen chosen for AVM are inter-actively discussed: before and after presenting entities, one participant is asked to briefly tell her/his experience with this practice. A (neuro-) monitoring part follows. Multiple choice questions with emphasis on brain protective monitoring are again asked; correct responses are given. Over 5 min, participants are requested to discuss what they consider as special challenges for brain relaxation during AVM resection. Controversies with different therapies such as hypocapnia or hypotonic solutions are then reviewed. Each participant is re-asked to complete a new ABC key word list, alone. Eventually, the lecturer develops a simple algorithm together with the group for blood pressure management during surgical AVM resection and for the time before surgical completion. After presentation of selected research topics and concluding summary, educational hand-outs are provided.

Conclusion(s): This learner’s brain-friendly seminar of about 90-min duration has been met with great enthusiasm in pilot sessions. Style, ready usability of information, and knowledge acquisition were most appreciated. Further advantages include its easy applicability with a large audience or multidisciplinary teams to improve communication and expand contents.

References:

7AP4-5
Preliminary results of a non invasive anaesthetic approach for endovascular treatment of cerebral aneurysms
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Background and Goal of Study: The endovascular management of the intracranial aneurysms by using detachable coils is actually the treatment of choice. This technique can be performed under local anaesthesia, sedation...
or general anaesthesia. Little data support any specific procedure, but is general anaesthesia the most widely used. The goal of our study is to analyse the results of the anaesthetic management of endovascular treatment of cerebral aneurysms using a non-invasive protocol.

Materials and Methods: From October 2006 to August 2007 we prospectively studied patients with cerebral aneurysms (ruptured or not) under endovascular treatment. For the anaesthetic management we follow a protocol where in patients with good clinical status a sedation technique was chosen and general anaesthesia only if patients were in bad clinical condition. We used remifentanil to achieve the correct level of sedation in the first group of patients (0.01-0.1 microgram/kg/min). Importantly in all cases we monitored the transcranial cerebral oximetry to detect intraprocedure ischemic events. We analysed demographic data, aneurysm location and size, anaesthetic technique, complications and final results of the procedure. Data are expressed as mean ± standard deviation.

Results and Discussion: The most important results are shown in the next table:

| Anaesthetic technique results for the endovascular treatment of cerebral aneurysms |
|---------------------------------|-----------------|-----------------|
|                                  | Ruptured (n=9)  | Unruptured (n=4) |
| Age, years, mean (SD)           | 56±7.6          | 56±216.0        |
| Sex M/F                         | 4/5             | 2/2             |
| Aneurysm location               |                 |                 |
| Anterior circulation            | 8               | 3               |
| Posterior circulation           | 1               | 1               |
| Anesthetic technique            |                 |                 |
| General                         | 6               | 0               |
| Sedation                        | 3               | 4               |
| Procedure-related complications | 0               | 0               |
| Outcome (GOS at 3 months)       |                 |                 |
| Dead                            | 2               | 0               |
| Moderate disability             | 1               | 0               |
| Good recovery                   | 6               | 4               |

Coling was successful in both groups in all cases. Treatment was early performed in the ruptured group (2.2 days after the hemorrhagic event, range 1-7 days). Patients with subarachnoidal hemorrhage (SAH) classified as WFNS 1 and 2 or with unruptured cerebral aneurysms were treated under a sedation technique without any complication in the procedure, allowing to perform the treatment using a less invasive monitoring and more importantly with an evaluation of the patient’s neurological status during the procedure.

Conclusion(s): The anaesthesia for the endovascular treatment of cerebral aneurysms can safely be performed using a sedation technique, with remifentanil as a principal drug, in patients with good clinical condition.

7AP4-6

Effects of induced hypotension on cerebral oxygenation measured by near infrared spectroscopy in patients undergoing lumbar spinal fusion surgery

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Background and Goal of Study: In order to reduce surgical bleeding and transfusion, spine fusion surgery can be performed with induced hypotension. The effect of this method on cerebral oxygenation is examined by means of Near Infrared Spectroscopy.

Materials and Methods: We examined 60 patients, age 51±7 years old, 34 females 26 males, ASA II scheduled for spine fusion. Exclusion criteria were CNS disease, carotid artery disease, diabetes mellitus and uncontrolled hypertension. Propofol 2 mg/kg, remifentanil 1 mcg/kg, cis-atracurium 0.15 mg/kg were administered for induction of anaesthesia and endotracheal intubation. Anaesthesia and controlled hypotension was maintained with sevoflurane 1 MAC and remifentanil 1-10 mcg/kg/min in order to achieve a Mean Arterial Pressure (MAP) of 60 mmHg. O2/air mixture was utilized with FIO2: 0.4. We maintained hypotension: ETCO2: 35-40 mmHg, Hb≥9 g/dL. Body Temperature: 36-37°C. Cerebral oxygen saturation (rSO2) was measured bilaterally using NIRS and desaturation was defined as a 20% decline of the baseline for more than 15 seconds. rSO2 and MAP were measured: before induction of anaesthesia (baseline), immediately after induction, every five minutes during hypotension, after the end of the main procedure. Mean values and standard deviation were calculated.

Results and Discussion: One patient was excluded because of Hemoglobin decrease <9g/dL. In two patients events of more than 20% decline of unilateral rSO2 were reported, but the duration was less than 15 seconds. There was no significant cerebral desaturation as measured by NIRS during induced hypotension with sevoflurane and remifentanil when MAP was maintained ≥60 mmHg.

Conclusion(s): Cerebral oxygen saturation was not impaired during induced hypotension under close monitoring and the use of sevoflurane and remifentanil in patients undergoing Lumbar spinal fusion surgery.

7AP4-7

Hypothermia during interventional neuroradiology: Local incidence and a survey of national practice in prevention

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Background and Goal of Study: Hypothermia is a risk during interventional neuroradiology procedures under general anaesthesia as these tend to be lengthy and conducted in a cooled angiography room. We conducted a local audit of patient temperature during INR procedures to determine the incidence of hypothermia followed by a national survey to establish current practice in its prevention in the UK.

Materials and Methods: Local audit: data were collected prospectively over six weeks from all patients undergoing INR procedures using a standardised form. Patient temperature was recorded using a tympanic membrane thermometer. National Survey: a questionnaire was sent by email to the members of the Neuroanaesthesia Society of Great Britain & Ireland (NASGBI) at all UK centres providing neurosurgical services.

Results and Discussion: Local audit: 66 procedures analysed, 19 under general anaesthesia (GA) and 47 under local anaesthesia (LA). Mean procedure length was 50.6 mins (20-120) under LA and 165 mins (60-300) under GA. In LA procedures, the mean temperature drop was 0.1°C (-1 to 0.9) and in GA procedures 1.1°C (-2.3 to 1.3). 68% of patients had a post-procedure temperature below 36°C, the threshold for hypothermia.

Mean room temperature was 20.1°C. National survey: Responses were received from 22/30 institutions (73%). 65% of respondents always monitor patient temperature and 92% use active warming devices always or sometimes.

Mean temperature of angiography rooms was 19.5°C.

Conclusion(s): Hypothermia does occur during prolonged INR procedures and may delay neurological recovery at a crucial time. If active warming devices are not used, a majority of patients become hypothermic. Although most UK anaesthetists employ warming devices, the lack of routine temperature monitoring is unlikely to comply with the recommendations of the National Institute for Clinical Excellence which we eagerly await publication of in April 2008.

Table 1. Results

<table>
<thead>
<tr>
<th>Procedure-related complications</th>
<th>Baseline values</th>
<th>After induction</th>
<th>During hypotension</th>
<th>End of main procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right rSO2 (%)</td>
<td>70±6.8</td>
<td>+14.6±2.2</td>
<td>-5.4±2.3</td>
<td>+2.7±5.1</td>
</tr>
<tr>
<td>Left rSO2 (%)</td>
<td>68±6±1</td>
<td>+15.3±3.1</td>
<td>-6.3±3.4</td>
<td>+2.3±6.4</td>
</tr>
<tr>
<td>MAP (mmHg)</td>
<td>87±2±8.7</td>
<td>91±3±6.3</td>
<td>62±3.1</td>
<td>62±4±2.8</td>
</tr>
</tbody>
</table>

* or – % change of baseline rSO2.
7AP4-9

Hemodynamic aspects of the endovascular treatment of cerebral arterio-venous malformations and their perioperative care (preliminary study)

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Background and Goal of Study: Occlusion of cerebral arterio-venous malformations (AVM) by endovascular techniques is becoming more common but has the possibility of severe complications (intraocular or subarachnoidal bleeding, focal vascular occlusion followed by ischemia) (1). There is no sufficient data on the haemodynamic features caused by the AVM during the development of these complications (2). The aim this study is to describe arterial and venous pressures and oxygen extraction in the AVM.

Materials and Methods: Total intravenous anaesthesia accompanied with routine monitoring (EKG, SpO2, ET CO2, IBP) was applied in patients above the age 18 treated for AVM. Blood pressure and blood gas analysis were performed from the radial artery and through microcatheters inserted into the arterial (feeding artery) and venous side (collecting vein) of the AVM for measuring pressures, pO2 and pCO2.

Results and Discussion: In the 8 patients there were no significant differences between the pO2 and pCO2 values between the arterial and venous side of the AVM. The mean intravascular pressure decreased significantly along the direction of the blood flow (RAD: 86.12±2.66, AVMArt: 54.84±7.4, AVMVen: 25.38±3.55 mmHg, p < 0.05).

Conclusion(s): To our knowledge this is the first study on the haemodynamic characteristics of AVM during endovascular procedures. The preliminary results suggest that there is no oxygen consumption in the AVM. The intravascular pressure decreases as a consequence of the accelerated blood flow and exerts a stealing effect on the surrounding brain tissue which may be responsible for ischemic damage of the surrounding brain tissue.

References:

7AP5-1

The influence of traumatic spinal cord injury on expression of transforming growth factor-TGF-β1, and platelet-derived growth factor (PDGF)-A in cutaneous wound healing in rats

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Background and Goal of Study: The aim of this study was to investigate the effects of inflammatory response associated with spinal cord injury (SCI) on expression of TGF-β1, and PDGF-A in cutaneous wound healing in rats.

Materials and Methods: After approval by IRB the study was conducted. Under sterile conditions, a dorsal midline incision between 5th and 10th thoracic vertebrae was performed. After paravertebral dissection of the muscle, laminectomy was performed on the 8th thoracic vertebra. In Group L (n=7), only laminectomy was performed. Group T (n=7) SCI was inflicted with weight-dropped technique. At the 14th day, histological features and levels of TGF-β1, and PDGF-A expressions were assessed.

Results and Discussion: Compared to group L, group T had significantly lower mean scores for epidermal and dermal regeneration, but higher mean scores for granulation tissue thickness, and similar scores for angiogenesis. The mean TGF-β1 score in trauma group (T) was significantly lower than that in control group (L) (p < 0.05). The mean score for PDGF-A expression in group T was similar to the corresponding value in group L (p > 0.05). The dermal layer contains diffuse deposition of collagen fibres that are not organized as in control rat skin, and intradermal and subepidermal vasocongestion is distinct.

Conclusion(s): In conclusion, we observed that experimental SCI in rats results in low intensity of TGF-beta1 expression in the dorsal wound-tissue specimens. We believe that in spite of macroscopic perfect healing, low intensity of TGF-beta1 results in the impaired epidermal and dermal regeneration and low quality of thick granulation tissue.

7AP5-2

Mitochondrial permeability transition as a drug target in the central nervous system – Evaluation of putative inhibitors using direct and integrative analytical approaches

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Background and Goal of Study: The mitochondrial permeability transition (mPT) is a feasible target for neuroprotection and its definition includes an increase in permeability of the inner mitochondrial membrane leading to loss of electrochemical gradients, uncoupling of oxidative phosphorylation and release of calcium and proapoptotic proteins to the surrounding cytosol. Several clinically available drugs have been proposed to afford cytoprotective effects through direct mPT inhibition. Here, we reevaluate the effects of putative inhibitors of calcium-induced mPT in brain-derived mitochondria in an attempt to address two basic and important questions: (i) how should mPT inhibition be defined? and (ii) how can mPT-modulation reliably be detected in vitro?

Materials and Methods: Isolated brain mitochondria were analysed in two complementary mPT assays in which mitochondria are highly sensitive to mPT modulation by endogenous and pharmacological compounds, incl. cyclophilin-D inhibition: (i) de-energized mitochondrial swelling, (ii) energized mitochondria exposed to a continuous infusion of calcium. Further, high-resolution analysis of respiratory function with and without concomitant infusion of calcium was employed to detect possible respiratory inhibition. Drugs included were: 2-APB, Allopregnanolone, Melatonin, Metformin, Minocycline, Nortriptyline, Progesterone, Promethazine, Propofol, Tamoxifen, Topiramate, Trifluoperazine and Trimetazidine.

Results and Discussion: None of the tested compounds were able to inhibit de-energized swelling or increase calcium retention capacity to an extent comparable to the cyclophilin-D inhibitor MeAla3EtVal4-cyclosporin-A (Debio-025) at the tested concentrations. 2-APB and propofol displayed partial mPT inhibition in de-energized brain mitochondria which did not translate into increases in calcium retention. Topiramate increased calcium retention without an effect in the de-energized assay. Several drugs displayed dose-dependent reduction of calcium retention and respiration, effects that can interfere and confound the interpretation of common mPT assays.

Conclusion(s): We conclude that uncoupling and inhibition of respiration are important possible confounding factors when screening for mitochondrial mPT inhibitors with clinical relevance. An integrative approach, which includes mitochondrial bioenergetic function and calcium transport, is advantageous in order to identify valid mitochondrial neuroprotective agents.

Acknowledgements: We are grateful to Professor Nagao Ishii for his continued support of our collaboration.
Results and Discussion: Both DHCA-groups showed an impaired postoperative function. Data were analyzed using one way ANOVA with post hoc Bonferroni test.

Neuronal COX2 protein was detected using an immunohistochemical double staining. With IRB approval, 50 rats were randomly assigned to one of three groups: rats of the DHCA group were connected to CPB, cooled to one of three groups: rats of the DHCA group were connected to CPB, cooled and surgically cannulated accordingly but not connected to CPB. Untreated animals served as control.

Materials and Methods: With IRB approval, 50 rats were randomly assigned to one of three groups: rats of the DHCA group were connected to CPB, cooled and surgically cannulated accordingly but not connected to CPB. Untreated animals served as control. Groups were further subdivided into an MXF and a Vehicle group (n=10) receiving either MXF (6 mg/ml) or NaCl every 2 hours postoperatively as time balanced on a beam. The number of eosinophilic neurons was counted in the hippocampus and motorcortex using HE staining. Neuronal COX2 protein was detected using an immunohistochemical double staining. Data were analyzed using ANOVA with post hoc Bonferroni test.

Results and Discussion: Both DHCA-groups showed an impaired postoperative function without any difference between the MXF and Vehicle group (p < 0.05). The impact of MXF on hippocampus related neurocognitive performance should be further elucidated.

Disclosures: This study was supported by a grant from Bayer Vital GmbH, Germany.

7AP5-5
The mechanism of tianeptine’s neuroprotective effect on hippocampal neuron
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Background and Goal of Study: Tianeptine is a clinically effective antidepressant that has been found capable of preventing and reversing stress- and glucocorticoid-induced changes in hippocampal morphology that result in cognitive impairment. Therefore, tianeptine has a potential neuroprotective effect. However, whether tianeptine promote the neurite growth or synaptic formation has never been studied on a cultured hippocampal model. In addition, the mechanism of its neuroprotective effect remains unknown.

Materials and Methods: On hippocampal neuron primary culture, we investigated whether Tianeptine, as compared with vehicle or nerve growth factor (NGF), could enhance neurite arborization, outgrowth and synaptic formation. The signaling pathway of the neuroprotective effect of tianeptine on the structural plasticity of the motorcortex was comparable between both DHCA groups. The impact of MAF on hippocampus related neurocognitive performance should be further elucidated.

Results and Discussion: We found that tianeptine dose dependently (at 100, 0.3, 0.05, and 50 μM) enhanced the dendritic arborization and synaptic formation. The neuroprotective effects as effective as nerve growth factor (NGF). At the same time, tianeptine dose dependently up regulated the expression of cytoskeletal protein MAP 2, Neuro filament L and synaptophysin. Tianeptine inhibited the phosphorylation of eukaryotic initiation factor 2 alpha (p-eIF2α) and activated the mTOR pathway.

Conclusion(s): Tianeptine dose dependently (0, 0.3, 0.05, and 50 μM) enhanced the dendritic arborization and synaptic formation. The neuroprotective effects as effective as nerve growth factor (NGF). At the same time, tianeptine dose dependently up regulated the expression of cytoskeletal protein MAP 2, Neuro filament L and synaptophysin. Tianeptine inhibited the phosphorylation of eukaryotic initiation factor 2 alpha (p-eIF2α) and activated the mTOR pathway.
Treat patients with tianeptine at 10μg/ml significantly phosphorylated CaMK II, and pretreating with CaMK II antagonist (KN93) decreased the neurotic effect of tianeptine.

Conclusion(s): Tianeptine had neurotrophic effects as effective as nerve growth factor II by activation of CaMK II phosphorylation.

7AP5-6

Dynamics of matrix metalloproteinase-9 after brain trauma – Preliminary results
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Background and Goal of Study: Prognosis of a patient after traumatic brain injury is worsened by secondary brain injury. This could be mediated, among others, by matrix metalloproteinases. These enzymes degrade components of extracellular matrix and thus cause blood-brain barrier dysfunction. Experiments in animal models demonstrate the importance of matrix metalloproteinase-9 (MMP-9) for brain injury in various pathological conditions, but there are only few human studies monitoring the levels of MMP-9. Aim of our study was to describe dynamics of MMP-9 after brain trauma and to identify its importance for development of secondary brain injury.

Materials and Methods: Study performed in Dept. of Anesthesiology and CCM of Teaching Hospital Kralovske Vinohrady, Prague, Czech Rep., included patients who sustained a severe brain injury and required intensive care (GCS ≤8 at the time of admission). Catheter into the dominant jugular bulb was inserted at the time of admission. Blood samples were taken from the jugular bulb immediately after insertion of the jugular catheter, then 18 hrs after trauma and then every 4 hrs till the 8th posttraumatic day. Noncoagulant blood was centrifuged and the plasma was stored at –30 °C. Levels of MMP-9 were assessed using ELISA kits by Amersham Bioscience.

Results and Discussion: Using ELISA kits by Amersham Bioscience. In 5 patients, a repeated increase of MMP-9 (to levels exceeding normal ≤328.4 ng/mL, mean ± SD), followed by a gradual decrease until the 3rd day when the MMP-9 levels in all patients did not exceed physiological levels. In 5 patients, a repeated increase of MMP-9 (to levels exceeding normal values more than twice) was observed between days 4 to 6.

Conclusion(s): Elevated levels of MMP-9 in early posttraumatic period, with a subsequent decrease, were observed in patients sustaining a severe brain trauma. The increase of MMP-9 levels in the 4th to 6th day observed in 5 patients can be related to a secondary brain injury. Thus MMP-9 can contribute to the development of a secondary brain injury by increasing the blood-brain barrier permeability. It will be therefore important to determine whether this secondary increase of MMP-9 correlates with the patient’s outcome. In this case, MMP-9 might be used as a marker for the development of secondary brain injury or as a target for therapeutic intervention.

7AP5-7

Critical role of S465 in the increased rat glutamate transporter type 3 activity after protein kinase C activation
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Background and Goal of Study: Glutamate transporters, also called excitatory amino acid transporters (EAATs), uptake glutamate from extracellular space into cells and regulate synaptic neurotransmission. It has been shown that activation of protein kinase C (PKC) increases the activity of EAAT type 3 (EAAT3), the major neuronal EAAT. We designed this study to determine which amino acid residue(s) in the EAAT3 molecule may be involved in the PKC-increased EAAT3 activity.

Materials and Methods: Site-directed mutagenesis was performed on selected potential PKC phosphorylation sites and these EAAT3 mutants were expressed in the Xenopus oocytes. Oocytes were injected with 40 ng of cRNA of EAAT3 or its mutants by using an automated microinjector. Oocytes were then incubated at 16°C in modified Barth’s solution for 3 days before voltage-clamping experiments. Oocytes were voltage-clamped and sampled inward current. L-glutamate-induced inward currents were sampled at 125 Hz for 1 min. We used 30 μM of L-glutamate in this study. The effects of PKC activation on the activity of EAAT3 or its mutants were examined by pre-incubating oocytes with a PKC activator, 100 nM PMA for 2 days. We designed this study to determine which amino acid residue(s) in the EAAT3 molecule may be involved in the PKC-increased EAAT3 activity.

Results and Discussion: Preincubation of the oocytes with 100 nM PMA increased wild type EAAT3 activity (1.28±0.40 fold of control) significantly compared to the control. When serine 465 was replaced by alanine (S465A) or by aspartic acid (S465D), preincubation with 100 nM PMA did not significantly change the activity of these mutants. However, when threonine 5 was replaced by alanine (T5A), phosphorylation with 100 nM PMA increased the activity of this mutant (1.23±0.47 fold of the corresponding control without PMA incubation). Isouflurane significantly increased the activity of wild type EAAT3. However, isoflurane did not change the activity of S465A EAAT3 activity.

Conclusion(s): We have shown that the mutation of serine 465, but not the mutation of threonine 5, in rat EAAT3 abolished the increased activity after PKC activation. Our results suggest that serine 465 in rat EAAT3 plays a critical role in the increased EAAT3 activity by PKC activation.

7AP5-8

Comparison of the effects of sevoflurane and propofol on spontaneous in vitro field potential activity
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Background and Goal of Study: Sevoflurane and propofol are both known to act on the GABAA receptor, most probably via different mechanisms. Spontaneous local field potential (LFP) activity and exclusive down-state sequences were analyzed with different analysis methods to evaluate drug-dependent LFP signal changes.

Materials and Methods: Cultured brain slices of rat neocortex were washed with sevoflurane at increasing concentrations [0 - 1.5 MAC] or propofol [0.2, 0.4 μM]. LFP was recorded at all drug concentrations. Approximate Entropy (ApEn), measuring signal complexity [1] and Detrended Fluctuation Analysis (DFA), a fractal analysis method [2] were used for analyzing the down-states. Signal power was calculated over the frequency bands (α = 8-12Hz; β = 12-25Hz; γ = 25-50Hz; δ = 0.5-4Hz; θ = 4-8Hz) of the entire signal.

Results and Discussion: With increasing concentrations of sevoflurane, ApEn of the down-states increased. With propofol, ApEn did not change. DFA decreased with sevoflurane given but did not detect any signal changes in the propofol experiments (figure 1).

Conclusion(s): It has been shown previously, that sevoflurane depresses the spiking activity [3,4], whereas propofol does not decrease the number of spike patterns [3], but their duration. Our analysis of the down-states also showed that both drugs might act very differently. It is proposed, that propofol is mostly affecting the GABAA receptor. The fact that sevoflurane induces changes in the
CREased in all frequency bands. Bands followed by a strong decrease at higher concentrations. Using propofol the power de-

mined in all frequency bands.

Materials and Methods: Measurements were performed in 25 patients (ASA I and II, 7 male, 18 female, age 43±12) undergoing general anesthesia. After routine preoxygenation (FO2 1.0) anesthesia was induced with Thiopental (THIO 4-6 mg/kg, n = 15) or Propofol (PROP 2-3 mg/kg, n = 10) at the anesthetist’s discretion. Peak cerebral oxygen saturation was measured non-invasively with near infrared absorption spectroscopy (NIRS 730- and 805-nm wavelengths, INVOS™, Somanetics, Troy, MI, USA) before preoxygenation, during preoxy-
genation and after induction of anesthesia with an electrode attached on the forehead. Statistics: mean ± SD, two-way repeated measures ANOVA.

Results and Discussion: With preoxygenation, we observed a slight increase in cerebral oxygen saturation which however only reached statistical significance in the PROP group (THIO: baseline 71±6%, during preoxygenation 73±8%, p > 0.05; PROP: baseline 71±6%, during preoxygenation 76±8%, p < 0.01). Induction of anesthesia significantly increased cerebral oxygenation in both groups as compared to baseline values and as compared to values during pre-
oxgenation (THIO: 92±3%; PROP 89±6%; p < 0.001 in both groups). Differences between the groups were not significant.

Conclusion(s): Thiopental and Propofol both improve cerebral oxygen satura-
tion, possibly through a reduction of the metabolic cerebral oxygen demand. This may support previously postulated neuroprotective effects of these agents.

References:

7AP6-3

“Pressure inside the neuroendoscope” is more reliable than epidural intracranial pressure during neuroendoscopic procedures

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Background and Goal of Study: Intracranial pressure (ICP) recording dur-
ing neuroendoscopic procedures is mandatory in order to detect CBF abrupt changes (1,2). Pressure inside the endoscope (PIN) by connecting a fluid-filled catheter from the irrigation lumen of the neuroendoscope to a pressure trans-
der is an easy way to control ICP. Intraoperative epidural ICP recording (EICP) can be thought as a more rigorous alternative to PIN. Our aim was to compare EICP and PIN during neuroendoscopies.

Materials and Methods: After ethics committees’ approval, patients sched-
uled for a neuroendoscopic procedure were prospectively studied. EICP values (Neurodur epidural, Rehau. Germany) and PIN values during neuronavigation time were recorded at 2Hz. Brand-Altman test was used to assess agreement between pressures.

Results and Discussion: 17 consecutive patients were included: 8 men/9 women, age 49.2±17.3. Secondary Hydrocephalus was the most frequent di-
agnosis. Mean neuronavigation time was 22.3±14.5 min. Correlation between EICP-PIN was strong in 15/17 patients (range R2 =0,57-0,93).

The mean differences between EICP-PIN were 20±4 mmHg. EICP were sys-
tematically higher than PIN values in 15/17 patients. Using Bland-Altman anal-
ysis, PIN-ECP methods showed a good agreement in 6 patients. However, in 11 patients discrepancies were greater with higher ICP values.

No intra or postoperative complication was related to monitoring.

**Conclusion(s):** A mild correlation was found between absolute ECP and PIN, but ECP values were systematically higher than PIN values, this drift being more marked at higher pressures. These intraoperative results correlate with previous studies outside the operating room comparing epidural and intraventricular pressures (3.4).

**References:**

**7AP6-4**

Auditory evoked potential amplitudes and EEG beta band power increase with increasing subanesthetic propofol Concentrations

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**Background and Goal of Study:** Electroencephalogram (EEG) and middle latency auditory evoked potentials (MLAEPs) show specific changes with general anesthesia. In particular some EEG parameters (e.g. SEF95) show a biphasic reaction during induction [1]. In the present investigation, this biphasic effect was analysed with respect to the EEG power for different frequency bands and MLAEPs.

**Materials and Methods:** As approved from the university’s ethics committee, 15 consenting adult, male volunteers were enrolled in the study. Subjects were instructed to close eyes and received propofol via target controlled infusion at two anesthetic concentrations: 0.5 μg/ml at level II and 1.0 μg/ml at level III. At level I, no drug was applied. Each concentration was maintained for 10 minutes to reach near steady state conditions. Standard monitoring parameters (EEG with a sampling rate of 5 kHz were recorded at TP10 (reference Fcz). The power of the EEG delta (0.5-4 Hz), theta (4-8 Hz), alpha (8-12 Hz), beta (12-30 Hz) and gamma (30-60 Hz) band was calculated on signal segments of 10 s length at the end of each level [I, II, III]. MLAEPs were generated by binaural clicks (70 dB above hearing threshold, repetition rate 8.3 Hz, ±10% interstimulus variability) using a band-pass filter (26-600 Hz) and an averaging between 4194 and 5000 artefact-free sweeps/level. Amplitude values and latencies of the peak Nb were above hearing threshold, repetition rate 8.3 Hz, ±10% interstimulus variability, and 169 μV. Therefore, the values at 0 MAC were used to identify significant changes between the parameter values at different propofol concentrations.

**Results and Discussion:** The results are displayed in table 1.

**Table 1**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Level I</th>
<th>Level II</th>
<th>Level III</th>
<th>Significant Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power 0.5-4 [Hz]</td>
<td>48.12</td>
<td>44.74</td>
<td>108.65</td>
<td>*</td>
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<tr>
<td>Power 4-8 [Hz]</td>
<td>6.66</td>
<td>4.44</td>
<td>4.41</td>
<td>*</td>
</tr>
<tr>
<td>Power 8-12 [Hz]</td>
<td>19.23</td>
<td>7.92</td>
<td>5.53</td>
<td>*</td>
</tr>
<tr>
<td>Power 12-30 [Hz]</td>
<td>4.64</td>
<td>7.79</td>
<td>15.20</td>
<td>*</td>
</tr>
<tr>
<td>Power 40-60 [Hz]</td>
<td>11.59</td>
<td>10.34</td>
<td>12.80</td>
<td>*</td>
</tr>
<tr>
<td>MLAEP-Amplitude [μV]</td>
<td>0.18</td>
<td>0.34</td>
<td>0.40</td>
<td>*</td>
</tr>
<tr>
<td>MLAEP-Latency [ms]</td>
<td>46.85</td>
<td>45.46</td>
<td>46.69</td>
<td>*</td>
</tr>
</tbody>
</table>

Mean values at each Level are shown and significant differences are labelled with *1→11, *1→111 and *1→1111.

**Conclusion(s):** The results indicate that the increase of the beta band power may be responsible for the biphasic response of the SEF95. Furthermore, the increase of the MLAEP amplitudes indicates that this biphasic effect may also be present in auditory evoked potentials.

**References:**

**7AP6-6**

Relationship between effect-site concentration of propofol at loss of consciousness and cerebral blood flow velocity in neurosurgical patients

F. Lobo, A. Beiras, D. Cunha, P. Amorim
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**Background and Goal of Study:** Factors that may change anesthetics pharmacokinetic and pharmacodynamic may explain variability in anesthetic requirement, and be incorporated in PK models. Since propofol effects on cerebral blood flow (CBF) velocity were described, we analyzed the influence of velocity of CBF at medial cerebral artery (VMCA) in the effect-site concentration (ESC) of propofol needed to cause loss of consciousness (LOC).

**Materials and Methods:** Following IRB approval and informed consent, patients submitted to brain surgery were prospectively studied. Induction of general anesthesia (GA) was started at the effect-site Target Controlled Infusion (TCI) of remifentanil of 2.5 ng/ml. One minute after the remi ES target was achieved, a 1% propofol infusion was started at a rate of 200 ml/hr until LOC. LOC was defined as eye opening in response to name calling and to a tap on the forehead. At the moment of LOC, the ESC of propofol was recorded. Schneider’s PK model was used. The right middle cerebral artery was insonated using a Transcranial Doppler and blood flow velocity (VMCA) was continuously measured since the awake state prior to induction until 1 minute after LOC. Data are expressed in mean±SD; correlation analysis between Propofol ESC and VMCA with linear regression was performed; a p-value of 0.05 indicated statistical significance.

**Results and Discussion:** There were 44 patients, 25 male, 53±18 years, ASA 1-3, GCS of 15. Propofol ESC at LOC was 3.4±1.1 μg/ml. VMCA awake was 53±16.1 cm/sec and at LOC 41±13.9. Predicted propofol ESC at LOC was significantly correlated with awake VMCA (r=0.4738, p<0.01); the lower the VMCA awake the higher the ESC of propofol required for LOC and the same relationship for VMCA verified at LOC.

**Conclusion(s):** Our results show a significant inverse correlation between the CBF velocity and the amount of propofol required for LOC, suggesting that a lower CBF before induction of GA requires more propofol to induce LOC. Time for propofol delivery to the brain may be an explanation and these covariates parameters may be incorporated in physiological PK models 2. From these results, GA induction can also be modulated in those patients with known changed CBF velocity.

**References:**

**7AP6-7**

The effect of volatile anesthetics on cortical networks: An analysis with Cross-Approximate Entropy

M. Bretschneider, C. Schwarz, H. Hentschke, E. Kochs, G. Schneider
Klinik für Anesthesiologie, Technische Universität München, München, Bayern, Germany

**Background and Goal of Study:** Cross-Approximate-Entropy (XApEn) provides an estimate of synchrony between time series [1]. Other groups used XApEn to analyze synchrony [2] or spike shape [3] of spike trains. We focussed on local field potential activity (LFP) recorded from neocortical electrode arrays in vivo when no spike trains were visible.

**Materials and Methods:** Electrode arrays were implanted into the “barrel”-cortex of three Sprague Daviey rats. LFP was recorded from 3, 8 or 14 channels at increasing concentrations and after recovery of isoflurane [0–0.75 MAC], halothane [0–1.05 MAC] and enflurane [0–1.2 MAC] [3]. Each rat was treated with all three volatiles. LFP sequences of 2s length were extracted and analyzed with XApEn. XApEn quantifies asynchrony between different channels, i.e. signals from different sites within the neural network.

**Results and Discussion:** During control conditions, XApEn values for all combinations of recording sites within each animal revealed varying degrees of neuronal synchrony in the LFPs between the sites. With all three volatiles, XApEn decreased dose-dependently with increasing concentrations of the anesthetic (Figure 1), indicating lower complexity and higher synchrony in the LFPs. Despite the global reduction of XApEn the pattern of relative inter-channel synchrony did not change.

**References:**

Figure 1. XApEn (± SD) for enflurane (□), isoflurane (–) and halothane (□). The values at 0 MAC were normalized to 1.
Conclusion(s): With increasing concentrations of volatile anesthetics the functional structure of connections within the network does not appear to change, indicating a constant inter-site relationship between the cells. This observation may reflect a process of shutting down network activity without influencing the network's connectivity at increasing drug concentrations. The XαPEn seems to be a valid method to evaluate changes in (i) the signal complexity and (ii) the degree of synchronization in cellular networks caused by volatile anesthetics. This method could be promising for the evaluation of neural communication at different anesthetic concentrations independent of spike train analysis.

References:
1. PNAS; 93: 14100–14105; 1996.

7AP6-8
The effects of combined nitrous oxide and sevoflurane anaesthesia on cerebral vascular tone as estimated by zero flow pressure
I. Dorais, J. Mamatha, R. Mahajan
University Department of Anaesthesia, Queens Medical Centre, Nottingham, United Kingdom
Background and Goal of Study: Previous work suggests that the cerebrovascular effects of nitrous oxide (N\textsubscript{2}O) in awake volunteers result in decreased vascular tone as assessed by zero flow pressure (ZFP) [1]. It is not known whether these effects prevail in clinical practice when N\textsubscript{2}O is used along with other anaesthetic agents. We aimed to investigate the effects of using N\textsubscript{2}O with sevoflurane on ZFP and estimated cerebral perfusion pressure (eCPP) in routine clinical practice using transcranial Doppler ultrasonography (TCD).

Materials and Methods: 13 ASA I and 2 patients undergoing non-neurological surgery were studied. The middle cerebral artery (MCA) was insonated using a 2 MHz Doppler ultrasound probe via the temporal acoustic window and MCA flow velocity (FV) was recorded as were end tidal carbon dioxide (ETCO\textsubscript{2}) and beat to beat heart rate (HR), blood pressure and SpO\textsubscript{2}. Anaesthesia was induced with propofol (10 μg kg\textsuperscript{-1}) and intubation was performed using suxamethonium. After tracheal intubation, patients were ventilated with 60% N\textsubscript{2}O and sevoflurane. Anaesthesia was maintained with sevoflurane decreased to maintain a combined MAC of 1. Observations were made at three points: prior to anaesthesia, with sevoflurane in oxygen and after N\textsubscript{2}O had been added. Minuten were made when predicted propofol blood concentration was -1 μg ml\textsuperscript{-1}. ZFP and eCPP were calculated using established formulae. Results were analysed using Wilcoxon’s signed-rank test.

Results and Discussion:

<table>
<thead>
<tr>
<th>Sevoflurane (1 MAC)</th>
<th>Nitrous oxide (1 MAC)</th>
<th>p-value (Wilcoxon signed-rank test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR (bpm)</td>
<td>63 [52-76]</td>
<td>64 [52-67]</td>
</tr>
<tr>
<td>Mean Arterial Pressure (mmHg)</td>
<td>64 [54-71]</td>
<td>70 [62-75]</td>
</tr>
<tr>
<td>ETCO\textsubscript{2} (μPa)</td>
<td>4.3 [4.1-4.45]</td>
<td>4.3 [4.1-4.35]</td>
</tr>
<tr>
<td>Time averaged mean MCA FV (cm s\textsuperscript{-1})</td>
<td>32 [22-38]</td>
<td>37 [28-41]</td>
</tr>
<tr>
<td>eCPP (mmHg)</td>
<td>32 [27-43]</td>
<td>34 [31-54]</td>
</tr>
<tr>
<td>ZFP (mmHg)</td>
<td>36 [28-39]</td>
<td>27 [16-36]</td>
</tr>
</tbody>
</table>

Values are median [interquartile range]; p<0.05 considered significant.

Nitrous oxide when used with sevoflurane (combined MAC of ~1), significantly decreased ZFP, compared with -1 MAC of sevoflurane in oxygen.

Conclusion(s): In clinical practice, use of N\textsubscript{2}O with sevoflurane may be associated with significant decreases in ZFP. This reduction in cerebral vascular tone and thus effective downstream pressure of cerebral circulation, may have implications in maintenance of cerebral perfusion pressure, regulation of cerebral blood flow and tissue oxygenation.

References:

7AP6-9
BIS values are able to predict dream recall and implicit memory during blended anaesthesia
L. Levantesi, P. Aceto, E. Congedo, M. Oggiino, G. De Cosmo
Anesthesiology and Intensive Care, A. Gemelli Hospital, Rome, Italy
Background and Goal of Study: Few studies investigated the effect of blended anaesthesia on awareness phenomena. The aim of this study was to estimate the relations between Bispectral Index (BIS) values and explicit or implicit memory or dreams during two different minimal alveolar concentration (MAC) of sevoflurane in patients undergoing blended anaesthesia for major abdominal surgery.

Materials and Methods: 30 patients, aged 20-70 years, with American Society of Anesthesiologists physical status I-III, undergoing major abdominal surgery were enrolled. Intraoperative analysis was carried out with levobupivacaine (0.125%) and sufentanil (1 μg/ml) administered in continuous infusion -after loading doses- through an epidural catheter placed before anaesthesia induction. Anaesthesia was induced with propofol 2 mg/kg and cis-atracurium 0.08 mg/kg. Anaesthesia was maintained by using sevoflurane. An audiotape containing two stories was presented to patients during anaesthesia. The first story was administered at 0.5 MAC of sevoflurane. Then, the MAC was switched from 0.5 to 1 and the second story was presented to patients. Cardiovascular parameters and BIS were continuously recorded during anaesthesia. Patients were interviewed on dream recall immediately upon emergence from anaesthesia. Declarative and nondeclarative memories for intraoperative listening were assessed 24 h after awakening. Pearson correlation and linear regression were used, p<0.05 was considered statistically significant.

Results and Discussion: Two patients reported dream recall after anaesthesia and another patient had implicit memory at 0.5 MAC. Mean BIS values registered after anaesthesia induction (p<0.05) and during all anaesthesia (p<0.001) period were correlated to presence of such types of memory. Only mean BIS values registered during all anaesthesia duration predicted recall after anaesthesia (<0.001). BIS values were always below 60.

Conclusion(s): Mean BIS values registered throughout anaesthesia, even if below 60, were able to predict dream recall and implicit memory.

References:

7AP6-10
Prognostic value of extracellular cerebral glutamate, measured by peroperative cerebral microdialysis, during cerebral aneurysm surgery
V. Vanasseche, C. De Dyne, J. Wyts, M. Vercauteren, R. Heylen
Department of Anaesthesia, Ziekenhuis Oost-Limburg (ZOL), Genk, Belgium
Background and Goal of Study: Cerebral microdialysis (MC) monitors local cerebral metabolism and ischemia. In the present study, we evaluated whether peroperative use of MD revealed changes in local cerebral metabolism that might have any immediate postoperative prognostic significance after cerebral aneurysm surgery.

Materials and Methods: With IRB approval, 64 patients scheduled for cerebral aneurysm clipping were included. After opening of the dura, a MD catheter was inserted in the cortex of the vascular territory of the aneurysm. The catheter might have any immediate postoperative prognostic significance after cerebral aneurysm surgery.

Results and Discussion: 45 pts were scheduled for elective cerebral aneurysm surgery, while 19 pts underwent urgent intervention (with preceding acute subarachnoid hemorrhage). Decreases in extracellular cerebral glucose were frequently observed, without any clear outcome correlation. Increases in extracellular lactate/pyruvate and extracellular glycerol could be related to peroperative events, such as brain retraction or temporary artery clipping. Nor lactate/pyruvate, nor glycerol could be related to any outcome variable. In 56 pts, we observed no or only a modest (less than 2-fold) increase in extracellular glутamate. In 9 other pts, there was a huge increase (4- to 10-fold) in glutamate. This increase was observed in urgent craniectomy for aneurysm clipping, during in-fraoperative bleeding, during temporary clipping or during peroperative brain bulging. In all 9 pts, postoperative CT scanning and immediate postoperative neurological condition confirmed severe neurological insults. All 9 pts necessitated intensive neuro-ICU management and in 6 of these 9 pts, a bad neurological outcome was observed.

Conclusion(s): Use of peroperative MD confirmed the deleterious and prognostic role of increased extracellular cerebral glutamate.

References:
Local and Regional Anaesthesia

8AP1-1
Pain and anxiety assessment in topical vs. peribulbar anesthesia in cataract surgery
W. Soliman, S. Al Gehedan, A. Mansour, A. Al-Toweri, A. Assiri
Department of Anaesthesia, King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia

Background and Goal of Study: Topical Anaesthesia is an acceptable technique for clear corneal incision phacoemulsification cataract surgery. Researchers reported that the use of topical anaesthesia for phacoemulsification generates pain levels comparable with sub-Tenon’s and peribulbar techniques. Another evidences proved that, topical anaesthesia was associated with higher incidence of pain compared to regional block. However pain perception is a subjective feeling and it differs from one culture to another. Per-operative anxiety is influenced by type of anaesthesia, surgery, post operative pain and fear of death. The aim of this study was to compare topical with peribulbar anaesthetic technique as regards pain and anxiety in patients undergoing phacoemulsification cataract surgery.

Materials and Methods: Approval of the hospital Research and Human ethics committees was obtained as well as informed patient consent. Hundred patients undergoing phacoemulsification cataract surgery were enrolled in the study. Patients were divided into two groups; topical and peribulbar anaesthesia was used for Group I and II respectively. Pain assessment was done using visual analogue pain scale [0–10] following administration of the local and topical anaesthesia, immediately after surgery, 2 hours postoperatively and overall pain experience. The Hamilton Anxiety Rating Scale (HARS) was used to assess the overall level of anxiety postoperatively in the two studied groups.

Results and Discussion: Table 1 shows Anxiety and pain assessment. Pain score was significantly higher for Peribulbar group immediately after the block and over all pain experience (P value < 0.01). The two groups did not show any significant difference in the level of pain during the surgery and in the early post operative period. Both groups showed mild anxiety.

8AP1-2
Transcutaneous periorcular anaesthesia for phacoemulsification surgery
W. Soliman
Anesthesia, King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia

Background and Goal of Study: Despite the increase in popularity of topical anaesthesia, peribulbar blockade continue to be an acceptable technique for phacoemulsification surgery. Potential complications of this technique include central spread, globe perforation and retrobulbar hemorrhage. The one inch needle is the most common needle used to perform the block. The aim of this study was to demonstrate the efficacy of half inch needle length in performing peribulbar blockade for phacoemulsification surgery.

Materials and Methods: After obtaining hospital research and Human ethics committee approval, and informed patient consent, one hundred fifty patients undergoing the phacoemulsification technique as regards pain and anxiety in patients undergoing phacoemulsification cataract surgery. Researchers reported that the use of topical anaesthesia for phacoemulsification generates pain levels comparable with sub-Tenon’s and peribulbar techniques. Another evidences proved that, topical anaesthesia was associated with higher incidence of pain compared to regional block. However pain perception is a subjective feeling and it differs from one culture to another. Per-operative anxiety is influenced by type of anaesthesia, surgery, post operative pain and fear of death. The aim of this study was to compare topical with peribulbar anaesthetic technique as regards pain and anxiety in patients undergoing phacoemulsification cataract surgery.

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Table 1. Anxiety and pain assessment

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group I Topical [n=50]</th>
<th>P value</th>
<th>Group II Peribulbar [n=50]</th>
</tr>
</thead>
<tbody>
<tr>
<td>HARS score</td>
<td>14.2 (2.9)</td>
<td>0.64</td>
<td>18.1 (3.3)</td>
</tr>
<tr>
<td>Pain after block</td>
<td>0.6 (1.0)</td>
<td>0.001</td>
<td>2.92 (2.7)</td>
</tr>
<tr>
<td>Pain after surgery</td>
<td>0.64 (1.2)</td>
<td>0.30</td>
<td>0.66 (1.2)</td>
</tr>
<tr>
<td>Two hours postoperatively</td>
<td>0.84 (1.1)</td>
<td>0.01</td>
<td>0.34 (1.2)</td>
</tr>
<tr>
<td>Total pain</td>
<td>1.79 (2.2)</td>
<td>0.001</td>
<td>3.92 (3.6)</td>
</tr>
</tbody>
</table>

Data expressed as a mean value (SD).

Conclusion(s): Patients undergoing phacoemulsification procedure under topical anaesthesia experience less pain than patients received peribulbar blockade. Both techniques produce mild level of anxiety.

8AP1-3
Propofol deep sedation safety for peribulbar anaesthesia
J. Balaguer, J. Soliveres, M. Estrich, J. Sanchez, C. Solaz
Anesthesia and Critical Care, University Hospital Dr Peset, Valencia, Spain

Background and Goal of Study: Patient sedation for peribulbar anaesthesia improves quality and decreases pain and anxiety. Many sedatives have been used, including low propofol doses with a conscious patient. Peribulbar injection pain could be avoided by unconscious sedation. Our objective is to evaluate whether a higher single dose of intravenous propofol (0,5-1mg.kg⁻¹) is safe for sedation during peribulbar injection.

Materials and Methods: After local ethics committee approval, 60 consecutive ASA-II patients scheduled for cataract surgery were enrolled. Non invasive blood pressure, 3 lead ECG and pulse oximetry were monitored. All patients fasted for at least 6 hours and none were premedicated. 0.5-1 ml.kg⁻¹ of iv propofol was administered during 10 seconds. When the patient fell asleep (unarousable), a gently neck extension was carried out and a standard peribulbar anaesthesia with 1% plain ropivacaine (8-10ml) with hyaluronidase (15 U.ml⁻¹) was performed. If the patient didn’t fall asleep, a second 0,5mg.kg⁻¹ propofol bolus were administered. If oxygen saturation fell under 92%, supplementary 50% oxygen in air was started with a face mask. If apnea was observed, a gently mandibular traction was performed. If apneas and desaturation were observed, manual ventilation was started. If the head or hands movement were observed, the patient was gently secured during the procedure. If the patient was presumed to sneeze, the needle was quickly retired and the puncture started again. The patient was observed until awakening. Basal and post-peribulbar anaesthesia blood pressure, heart rate (HR) and maximum oxygen desaturation were recorded and evaluated by paired samples t test and Wilcoxon test. A p<0,05 was considered statistically significant.

Results and Discussion: 59 patients were included. One was excluded because of fear to anaesthesia. Mean age was 68 yr (SD=11,1). ASA II/III/IV1/11 patients. The procedure could be performed in all patients. One patient sneezed. Data are shown in tables.

Table 1. Clinical data

<table>
<thead>
<tr>
<th>Observation</th>
<th>Blockade using ½ inch needle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Volume injected (ml)</td>
<td>9.6±0.75</td>
</tr>
<tr>
<td>Total Volume injected (ml)</td>
<td>10.5±2.9</td>
</tr>
<tr>
<td>Acceptable akinesia after first injection</td>
<td>136 (90.6%)</td>
</tr>
<tr>
<td>No. of patients requiring supplementary injection</td>
<td>14 (9.4%)</td>
</tr>
<tr>
<td>Total No. of supplementary injections</td>
<td>16</td>
</tr>
</tbody>
</table>

Data expressed as a mean value and standard deviation or number and percentages.

Conclusion(s): Using half inch needle length for peribulbar blockade showed satisfactory results. This technique is effective for phacoemulsification surgery. Larger studies are needed to prove the safety of the technique.

8AP1-4
0.5% levobupivacaine in modified cervical superficial block for carotid endarterectomy (CEA)
I. Segotic, T. Zah, D. Tonkovic, S. Sostaric, V. Majeric Kogler
Department of Anesthesiology and Intensive Care, University Hospital Center Zagreb, Zagreb, Croatia

Background and Goal of Study: There are still controversies which type of anesthesia is better for CEA to avoid neurological complications and maintain hemodynamic stability. Regional anesthesia (RA) and general anesthesia (GA)

Results and Discussion: Table 1 presents the data of this descriptive study. Adequate anaesthesia after the first injection was reported in 90.6% of the patients while 9.4% required supplementary anesthesia. There were no major sight or life threatening complications.

Table 1. Clinical data

<table>
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Data expressed as a mean value and standard deviation or number and percentages.

Conclusion(s): Using half inch needle length for peribulbar blockade showed satisfactory results. This technique is effective for phacoemulsification surgery. Larger studies are needed to prove the safety of the technique.
are both acceptable options. Setting for the regional anesthesia, decision has to be made whether to use superficial cervical block, deep cervical block or both. We used modified superficial cervical block and achieved satisfactory level of anesthesia for CEA, while diminished chance for deep cervical block complications (phrenic nerve blockade, local anesthetic toxicity, spinal anesthesia) at the same time. Our aim was to compare shortterm (intra- and 48 hours post-operatively) hemodynamic and neurological complications of RA (modified superficial cervical block) with GA in our settings.

Materials and Methods: We conducted clinical, cohort study from October 2006 to October 2007. All who have signed informed consent approved by our ethical committee, were divided in two groups: GA and RA. GA group included induction with sufentanil, etomidate and vecuronium; maintenance with sevoflu- rane. The RA group had modified superficial cervical block (the landmarks and needle insertion point are the same as for, but local anesthetic is injected 0.5-1 cm underneath cervical fascia) superficial cervical block with up to 40 ml (maximum dosage of 2 mg/kg) 0.375% levobupivacaine + 2 ml epinephrine (1:10 000).

Results and Discussion: In the GA group 38 and in the RA group 20 patients. We found no statistically significant difference between GA and RA group according to patients age, gender, ASA status, comorbidities, need for vasoactive therapy, length of stay in intensive care unit and postoperatively developed neurological deficit. The statistically significant difference between the two groups was found only related to hemodynamic stability (blood pressure maintained within 20% of the baseline value). Patients in RA group were more hemodynamically stable (p<0.05). In 2 patients in RA group we recognized a neurological injury intraoperatively and they were intubated in order to allow a surgeon to place a shunt. They had no neurological deficit post-operatively. While operating on patients in GA group, the shunt wasn’t placed to any one of them.

Conclusion(s): In our settings RA was safe alternative for patients undergoing CEA. Patients in RA group were more hemodynamically stable, furthermore clinical significance of RA was that we were able to witness neurological injury at the time it was still reversible by placing a shunt.

8AP1-5
Efficacy of 0.75% levobupivacaine with or without hyaluronidase for peribulbar block in cataract surgery
J. Balaguer, M. Estruch, M. Richart, J. Solveres, C. Solaz
Anaesthesia and Critical Care, University Hospital Dr Peset, Valencia, Spain

Background and Goal of Study: Mixing hyaluronidase to a local anesthetic enhances peribulbar block and reduces the incidence of reinjection (1). Levobupivacaine, with better safety profile than bupivacaine, is a good choice for peribulbar block (2), but the effect of hyaluronidase addition is not well studied yet. The aim of this study is to compare peribulbar block quality and reinjection frequency with 0.75% plain levobupivacaine with or without hyaluronidase.

Materials and Methods: After local ethics committee approval, written informed consent was obtained from 100 ASA I-II patients scheduled for outpatient cataract surgery with peribulbar block in a double-blind study. Patients with history of allergic reaction to local anesthetics or hyaluronidase were excluded. Patients were randomly allocated to receive either 10 mL of 0.75% levobupivacaine (L Group) or 0.75% levobupivacaine with 10 UI mL⁻¹ of hyaluronidase (LH Group). After standard monitoring and an intravenous line placed, the study solution was administered by the same anesthesiologist with a standard double-injection technique. Honan’s balloon was placed to 30 mmHg pressure for 20 minutes. Complete akinesia, adequacy of surgical conditions and need for reinjection were compared. Complete akinesia was defined as the absence of ocular movement and absence of palpable movement. Good surgical conditions were defined as no movement or less than 2 mm ocular movement in each direction of gaze and no movement or small eyelid movement. If ocular movement higher than 2 mm in any direction of gaze or normal eyelid movement were observed after 20 minutes, a 6-8 mL of the study solution was reinjected with the same technique. Chi square test or Fisher’s exact test and Student’s T test for independent samples were used for statistical analysis. A p<0.05 was considered statistically significant.

Results and Discussion: Two patients in the L group and 3 in the LH group were excluded. Results are shown in table 1.

<table>
<thead>
<tr>
<th></th>
<th>L group</th>
<th>LH group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>70.1 (12.3)</td>
<td>72.2 (10.8)</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>25/23</td>
<td>21/26</td>
</tr>
<tr>
<td>ASA I/II/III</td>
<td>11/16/21</td>
<td>9/18/20</td>
</tr>
<tr>
<td>Surgical Block</td>
<td>38 (79%)</td>
<td>45 (96%)</td>
</tr>
<tr>
<td>Complete akinesia</td>
<td>34 (71%)</td>
<td>37 (79%)</td>
</tr>
<tr>
<td>Rejections*</td>
<td>16 (33%)</td>
<td>48 (95%)</td>
</tr>
</tbody>
</table>

Data show mean (SD) or number (percentage). *p<0.05.

Conclusion(s): The addition of UI mL⁻¹ hyaluronidase to 0.75% plain levobupivacaine is more effective than no hyaluronidase addition. Although surgical block was not achieved in all cases, phacoemulsification could be performed in all patients.

References:

8AP1-6
Evidence of sufficient anaesthetic spread after single injection technique at the cervical plexus by radiographic 3D-imaging
S. Finkruh
Anaesthesiologie und Intensivmedizin, Dietrich-Bonhoeffer-Klinikum, Neubrandenburg, Germany

Background and Goal of Study: Cervical plexus block, using the paravertebral triple injection technique is a widely accepted method of regional anesthesia in carotid endarterectomy. The single injection technique, inaugurated by Winnie in 1975 is lacking to gain currency, despite its reported efficacy and superior safety. This Study was engaged to visualize the spread of local anaesthetics in the interscalene space and the appropriate spinal nerves of the cervical plexus.

Materials and Methods: After IRB-approval and written informed consent a patient received a cervical plexus block using the interscalene single injection technique at C3, containing 7.5 ml Ropivacaine and 5 ml of radiopaque dye (Imeron®). The patient than underwent a helicoidal scan including the scull base down to the T1 vertebra. The imaging was reconstructed as a three dimensional scan using a volume rendering technique.

Results and Discussion: The Patient presented a sufficient sensory block to the segments of C2 down to C5, the surgical procedure went uneventful. The scanographic cross section analysis in 2mm increments displayed a spread of the local anesthetic from the scull base, C1 down to C6 including the sensory roots. The spread filled a room defined by the borders of the anterior and middle interscalene mussels and the cervical vertebral column, as described by AP Winnie.

Conclusion(s): The interscalene single injection technique provides a sufficient spread of the local anesthetic, using a volume of 12.5 ml to block the complete cervical plexus. By reducing the needed volume, the amount of needed neede-
8AP1-7
Infra-nasal peribulbar block: Where is the needle? – A view using neuronavigation
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Background and Goal of Study: The authors have been using the infra-nasal approach to perform single injection peribulbar block. Our experience shows a high rate of akynesia, which is confirmed by many studies published on the matter. The purpose of this work was to study the location of needle’s tip at the injection. We used a 3D image method such as neuronavigation, which has been used to perform head and neck surgery and is available at our institution.

Materials and Methods: Peri-nasal CT scan is a prerequisite for neuronavigation. During 6 months we searched for ophthalmologic patients who, for reasons other than this study, had a previous CT scan. During this period we found 5 patients who consented to take part on the study. We used a 25G, 2,5 cm needle on a 5 ml syringe prefilled with 5 ml of 1% ropivacaine solution. After carrying out the standard procedures of the Kolibri cranial/ENT™ machine, peribulbar block was executed using the infra-nasal approach. The trajectory and final position of the needle’s tip was observed and recorded by snapshots.

Results and Discussion: In all five patients needle’s tip was located inside the muscular cone.

The akynesia score varied from 9 to 12 points. There were not any complications. The authors wanted to give a better insight into the location of the injection during the infra-nasal approach of the peribulbar blockade. The risks of radiation exposure and the high costs of submitting a great number of patients to a CT scan prevented the authors to design a study with the sufficient number of cases that would allow accurate statistical analysis. Instead, we decided to study the patients already eligible for the neuronavigation. The purpose of this work was to evaluate the efficacy and safety of episcleral single-sharp injection (Sub-Tenon) anaesthesia in patients receiving antplatelet therapy.

Materials and Methods: We studied prospectively 149 patients scheduled for anterior chamber ophthalmic surgery receiving antplatelet therapy under single injection medial canthus low volume episcleral anaesthesia. The success rate of the block was rated according to akynesia and comfort of patients and surgeons scales. The study parameters included demographic data, surgical procedure, haemostatic parameters, anaesthetic management and ocular complications. Patients were followed up until postoperative day 8.

Results and Discussion: A total of 149 patients were included. Age 74.6±9.8 years. ASA 2 (46%), ASA 3 (54%). Indication for antplatelet therapy was: 75 patients ischemic Cardiopathy 11 of them with coronary stents, 18 atrial fibrillation, 26 stroke, Diabetes mellitus with hypertension and vasculopathy 19, other 10 patients. Antplatelet therapy was: aspirin 142 (95%), Aspirin plus clopidogrel 3 (2%), clopidogrel 4 (3%). Cataract surgery was performed in 143 (98%) and keratoplasty in 6 (4%). Successful block was obtained in all of them with a mean local anaesthetic volume of 4.72±0.55 (3-6 ml) with a latency period of 3.1±0.8 minutes (2-6). No major complication (retrobulbar haemorrhage, optic nerve lesion or eye perforation) was observed. Minor incidence were chemosis (3,87%), conjunctural hematoma (2,58%) and subconjunctival haemorrhage (1,29%). No single procedure was cancelled or delayed due to any complication. Total akynesia was obtained in 130 patients (87%). Patients and surgeons satisfaction with this technique was 9-10 (in a 0-10 scale) in all patients.

Conclusion(s): Episcleral single-sharp injection (Sub-Tenon) anaesthesia is a safe technique in patients receiving antplatelet therapy. Complications are similar to those found for our group in patients without antplatelet therapy.

References:

8AP2-1
The safe depth of coracoid infraclavicular brachial plexus block in Chinese population
K. Chu, C., Tsai, H. Wang, I. Lu, C. Chu
Anesthesiology, Chung-Ho Memorial Hospital, Kaohsrung Medical University, Kaohsurung, Taiwan

Background and Goal of Study: Pneumothorax is a major complication caused by too deep puncture while performing infraclavicular block. The coracoid block provides a safer and easier approach than classic infraclavicular block. Our purpose was to design a prospective study in volunteers to evaluate the safe depth of the coracoid block by ultrasound guidance.

Materials and Methods: Ultrasound examinations were performed in 41 volunteers in bilateral infraclavicular regions. The center of ultrasound probe was placed at the landmark puncture point 2 cm below and 2 cm medial to coracoid process. After identifying the neurovascular bundle, we try to identify pleura. Measured distances including skin to upper periphery of brachial plexus and skin to pleura were recorded. Safe depth was defined as vertical distance from skin to pleura. Demographic data was applied to correlate with the safety depth.

Results and Discussion: Our results revealed that the mean depth from skin to plexus was 1.88±0.51cm. Pleura were identified in 84% ultrasound examinations. The mean safe depth was 3.49±0.63cm and positively correlated to both body weight and body mass index (both r<0.001).

Conclusion(s): The safe depth of coracoid block was 3.49 cm within our demographic range and too deep puncture may result in pneumothorax. Ultrasound guidance is suggested whenever performing coracoid infraclavicular block.

References:

8AP5-2
Auxiliary brachial plexus block: Bupivacaine versus bupivacaine+dexalgin mixture
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Background and Goal of Study: Auxiliary block is a technique of anaesthesia for trauma hand surgery which requires high volume anaesthetic for adequate spread across the arm, increasing the risk of systemic toxicity. This study compares the effects of bupivacaine 0.5% and mixture of bupivacaine 0.25% with dexalgin (ketoprofen trometamol) 2.5% for axillary block.
Materials and Methods: After informed consent, 54 ASA I-II physical status patients, ages 18-55 years, undergoing trauma hand surgery, were randomly divided in two groups. A group (n = 27) received bupivacaine 0.50% 40 ml. B group (n = 27) received bupivacaine 0.25% 40 ml + dexalgan 2.5% 1 ml. Nerve block was placed using 22 Gauge 5 cm needle connected to a peripheral nerve stimulator Stimuplex® HINS 11 (0.3-1 mA, frequency of 2 Hz, 0.3 m/s) with the single bolus injection technique. Onset of sensory and degree of analgesia (pin-prick test) was recorded. Motor block and resolution of motor block (modified Bromage scale) [2] was recorded. Systolic, diastolic and mean arterial pressure, ST segment elevation, heart rate, oxygen saturation, respiratory rate, sedation and pain degree were recorded before, during and after surgical procedure. Analysis of variance and t tests were used for statistical comparisons. Visual analogue pain scores were recorded at the post operative period every hourly.

Results and Discussion: The two groups were similar with regard to demographical variables and duration of surgery. The duration of post-operative analgesia was significantly longer in group B (1600 ± 120 min) than group A (800 ± 120 min). Onset of block, degree of analgesia, grade of motor block and complications is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset of block (min)</td>
<td>25 ± 5</td>
<td>30 ± 5</td>
</tr>
<tr>
<td>Degree of analgesia</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Grade of motor block</td>
<td>IV</td>
<td>III</td>
</tr>
<tr>
<td>Postoperative analgesia (min)</td>
<td>900 ± 2 to 1600 ± 120 min</td>
<td></td>
</tr>
<tr>
<td>Bradycardia (no. of patients)</td>
<td>5 ± 2</td>
<td>2 ± 2</td>
</tr>
</tbody>
</table>

Conclusions: Adding of dexalgan as adjuvant to bupivacaine 0.25% gives sufficient quality of surgical analgesia and degree of motor block. This allows for intraoperative assessment of tendon contractility while decreasing the risk of systemic intoxication by decreasing the dose two-folds. The mixture prolongs the duration of post-operative analgesia significantly.

References:

8AP2-2

Ultrasound-guided block of the brachial plexus at the humeral canal

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Background and Goal of Study: The brachial plexus block through the humeral canal, indicated for the hand and forearm surgery, is described using a multi-stimulation technique. The aim of this study is to assess the feasibility and the efficiency of this block under ultrasound guidance.

Materials and Methods: Randomly one of the two first authors performed the blocks on 20 successive patients. The ultrasound imaging (Micromaxx, Sonosite) is used to locate the nerves, visualize the needle and the spread of local anaesthet (LA). The ultrasound beam is located at the junction of the proximal and the middle third of the arm; nerves are imaged in short axis. The needle (Polymedic®, 22 G, 50 x 0.7 mm) is inserted using an out-of-plane approach: radial nerve (RN) is first blocked. After repositioning the beam above the point of puncture, the ulnar nerve (UN) is blocked through an in-plane approach. Then, through a second needle insertion above the beam, an in-plane approach is used to successively block the musculo-cutaneous nerve (MCN) and the median nerve (MN). Skin to nerve distance, volume of injected LA (volume of LA necessary to surround the nerve), sensory and motor onset times and the period of time necessary to perform the block are recorded. Results expressed as mean ± SEM are compared using an ANOVA-test (p < 0.05, significant).

Results and Discussion:

<table>
<thead>
<tr>
<th></th>
<th>RN</th>
<th>UN</th>
<th>MCN</th>
<th>MN</th>
</tr>
</thead>
<tbody>
<tr>
<td>nerve dist.</td>
<td>2.1±0.20</td>
<td>1.04±0.08</td>
<td>1.45±0.08</td>
<td>1.03±0.08</td>
</tr>
<tr>
<td>injected vol.</td>
<td>9.75±0.26</td>
<td>9.06±0.40</td>
<td>7.60±0.38</td>
<td>9.35±0.36</td>
</tr>
<tr>
<td>negative cold</td>
<td>6.50±0.67</td>
<td>6.50±0.67</td>
<td>5.50±0.38</td>
<td>7.75±1.08</td>
</tr>
<tr>
<td>negative pin</td>
<td>7.25±0.82</td>
<td>7.94±1.05</td>
<td>5.59±0.38</td>
<td>11.76±1.70</td>
</tr>
<tr>
<td>motor block</td>
<td>10.75±1.16</td>
<td>13.68±1.98</td>
<td>13.56±7.19</td>
<td>7.63±2.23</td>
</tr>
</tbody>
</table>

Blocks were performed in 6.8±0.37 minutes. The RN is deeper compared to the other nerves (p < 0.05). Injected volume is lower on the MCN compared to the other nerves (p < 0.05). Sensory block onset times are similar for the 4 nerves (p > 0.05). Motor block onset time is shorter for the MCN compared to the MN and the UN and longer for the MN compared to the RN (p < 0.05). Complete sensory and motor blocks were obtained for 19 patients. No patient reported pain during the procedure.

Figure 1. Box plots of verbal analog pain scores (VAS) obtained from the two groups at 6, 8, 12 and 24 hours postoperatively. The horizontal black bars represent the medians. The box depicts the 25th–75th percentiles, and the extended bars the 10th–90th percentiles. P < 0.05 automated bolus group compared to continuous infusion group.

Conclusions:

1. Adding of dexalgan as adjuvant to bupivacaine 0.25% gives sufficient quality of surgical analgesia and degree of motor block. This allows for intraoperative assessment of tendon contractility while decreasing the risk of systemic intoxication by decreasing the dose two-folds. The mixture prolongs the duration of post-operative analgesia significantly.

References:

8AP2-3

Clonidine as an adjuvant to local anaesthetics for peripheral nerve blocks – Meta-analysis

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Background and Goal of Study: Clonidine is often added to local anaesthetics (LA) to improve the quality of peripheral nerve blocks. We performed a meta-analysis to quantify beneficial and harmful effects of these regimens.

Materials and Methods: Systematic search for relevant trials (up to 8.2007, any language). Inclusion criteria were: (1) randomised comparison of a LA alone (bolic or continuous) with clonidine added to the same LA-regimen; (2) adults undergoing surgery with a peripheral nerve or plexus block with or without a general anaesthetic; (3) reporting on duration or onset of analgesia, intra- or postoperative pain intensity, or adverse effects. Data were combined using classical methods of meta-analysis.

Results and Discussion: We analysed data from 37 RCTs (1,862 patients), published 1992-2006. Settings were brachial plexus (n=17 trials), eye (6), sciatica and femoral nerves (4), cervical plexus (2), paravertebral nerves (2), and metatarsal, iliouinguinal-hypogastric, psaos compartment, midhumeral, and intercostal nerves and for wound infiltration (1 each). Clonidine dose range, 30-150 μg prolonged the duration of postoperative analgesia (weighted mean difference [WMD] 128 min, 95% confidence interval [CI] 124-132), and the time until first analgesic request (WMD 117 min, 95%CI 86-149). Duration of motor and sensory blockade remained unchanged. The risk of arterial hypotension was increased (number-needed-to-harm 11, 95%CI 8-16).

Conclusions: Clonidine as an adjuvant to LA for peripheral nerve or plexus blockade, prolongs postoperative analgesia by about 2 hours without evidence of dose-responsiveness. Adverse effects are minor.

8AP2-4

A “new” automated regular bolus technique for continuous popliteal block. A prospective, randomized comparison with the “conventional” continuous infusion

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Background and Goal of Study: No information is currently available using a dosing regimen of automated intermittent regular bolus doses for continuous peripheral nerve blockade. The present, prospective, randomized, double-blind study was designed to investigate a new dosing regimen for postoperative analgesia in continuous popliteal sciatic nerve blockade; to compare the administration of an automated intermittent regular bolus dose with a conventional technique of continuous infusion of local anesthetic.

Materials and Methods: After local ethics committee approval, 44 ASA I-II patients scheduled for elective foot surgery under continuous popliteal block. A prospective, randomized comparison with an "new" automated regular bolus technique for continuous popliteal block. A prospective, randomized comparison with the "conventional" continuous infusion.

Conclusions(s): Ultrasound imaging is an efficient technique to perform a brachial plexus block at the level of the humeral canal.

References:
Ultrasound guidance reduces phrenic nerve paresis after interscalene plexus block

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Background and Goal of Study: Diphaphagic paresis appears to be an inevitable consequence of interscalene plexus block (ISPB) [1]. Ultrasound (US) guidance has been shown to reduce the minimal effective dose of local anesthetic (LA) [2]. We analyzed if this reduction of LA volume is correlated to a lower incidence of phrenic nerve paresis with the same quality of block.

Materials and Methods: With ethical committee approval and written informed consent, 22 outpatients presenting for arthroscopic shoulder surgery were randomized to receive ISPB either with nerve stimulator (NS) or US guidance. The volume of ropivacaine 0.5% with epinephrine injected was 20 ml in the NS group (deltoide or bicep motor response at or below 0.5mA) and 10 ml in the US group out of plane approach, LA spread between CS and O at the cricoid level preventing diffusion above the anterior scalene muscle, Sonosite MicroMaxx 6–13MHz linear probe). Standardized general anesthesia with intubation was used in all patients upon request of the surgeon. Ipsilateral hemidipaphagic motion was evaluated with US (2-5 MHz curved probe) [1] before the block and after surgery. Block duration was defined as the time from the block to the first requirement of oral postoperative analgesic. Statistics: student t-test (age, BMI, LA dose, block duration) and χ² test (phrenic paresis). A value of p < 0.05 was considered significant (*).

Results and Discussion: All patients had complete sensorimotor upper trunk block and non required supplementary analgesics in the hospital. Phrenic nerve paresis was present in 10 of the 11 patients (91%) in the NS group and 2 of the 11 patients (18%) in the US group. Block duration was not significantly different (814 min for NS vs 715 min for US). Results in table are in mean ± SD.

<table>
<thead>
<tr>
<th>NS group</th>
<th>US group</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (y)</td>
<td>49 ± 11</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.7 ± 4.5</td>
</tr>
<tr>
<td>rSI (ml/kg)</td>
<td>1.99 ± 0.28</td>
</tr>
<tr>
<td>Phrenic paresis</td>
<td>19/11 (91%)</td>
</tr>
<tr>
<td>Block duration</td>
<td>814 ± 170 min</td>
</tr>
</tbody>
</table>

* = p < 0.05.

Conclusion(s): ISPB is an effective block after arthroscopic shoulder surgery. Phrenic nerve paresis is significantly lower when US-guidance is used with lower volumes of LA. This reduction in volume seems not to influence the quality and the duration of the block.

References:

Ultrasound guided lateral femoral cutaneous nerve block: An evaluation of a sub-inguinal ligament approach

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Background and Goal of Study: Lateral femoral cutaneous nerve (LFCN) block is useful in a variety of surgery involving the anterolateral aspect of the thigh and can be combined with femoral and sciatic nerve blocks for surgery on the knee joint. However, the efficacy of the conventional technique based on anatomical landmarks is suboptimal. Recently we have used ultrasound to perform LFON block, in which anesthetic is injected immediately under the inguinal ligament. We describe the technique and evaluate the time required to perform and the efficacy of the block.

Materials and Methods: With IRB approval and informed consent, we performed ultrasound-guided LFON block in 174 patients who underwent knee surgery with ultrasound-guided femoral and sciatic nerve blocks. With a linear ultrasound transducer (8-13 MHz) we visualized the inguinal ligament and the anterior superior and inferior iliac supine. A needle was inserted 1-1.5 cm medial to the anterior superior iliac spine with the out-of-plane approach and advanced until the needle tip is immediately under the inguinal ligament. We injected a volume of 1 to 15 ml of 1% mepivacaine while visually confirming the spread. Measurements included the time required to perform and the efficacy of the block. The success of the block was defined as obtaining loss of pinprick sensation within 10 min after the block.

Results and Discussion: Nine were required to perform the block was 1.6 min, and in about 89% of the cases the injection was completed within 2 min. The block was successful in 85%. Nine required more than 10 min to obtain anesthesia, and 11 required additional propofol and/or fentanyl. In three patients, LFON block was repeated.

Conclusion(s): The results of the present observational study have suggested that LFON block using the technique described is easy and reliable. Although LFON itself is rarely visible, ultrasound images of surrounding structures help perform LFON block.

Ultrasound guidance in regional neural blockade

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Background and Goal of Study: We have performed a Cochrane systematic review of the effectiveness and safety of ultrasound (US) guidance for the insertion of regional blocks. Our interim results were presented previously [1].

Materials and Methods: We searched for RCTs studying the use of US, in comparison with another method of nerve location, in regional blockade in adults as sole anesthetic technique for surgery or for postoperative analgesia. We searched Medline (1996 on), EMBASE (1974 on), CENTRAL, CINAHL, ILACS and IS Web of Science, handsearched 8 journals and abstract supplements of 3 major international anaesthesia conferences and contacted leading researchers in the field.

Results and Discussion: We identified 10 full reports of RCTs, including 735 patients. Blocks studied were brachial plexus (8), ‘3-in-1’ (2), femoral (1) and sciatic (1). Comparisons were US vs. peripheral nerve stimulation (PNS) (6), US + PNS vs. PNS alone (3) - one trial being in both groups-, US vs. surface landmarks (1) and US vs. transarterial technique (1). Our outcomes include insertion time, onset time, block duration, volume of local anaesthetic, quality/extent of block, conversion to general anaesthesia and complications. No single trial reported on all outcomes. Level of experience of practitioner varied but each study compared like with like. In view of the diversity of techniques, outcomes and comparisons, we have not applied statistical meta-analysis. Block success rate with US (83-97%) is generally higher than PNS (77-93%) although only one study reaches statistical significance. US reduces insertion time by between 2 and 5 minutes and onset time of sensory block by between 4 and 14 minutes. There were no differences in block duration. Complications were minor and rates were comparable (US: 0-20%, PNS: 0-21%) although US reduces vascular puncture and haematoma formation. US allows a 42% reduction in local anaesthetic (LA) dose to block the femoral nerve.

Conclusion(s): Ultrasound guidance for peripheral nerve blockade reduces insertion and onset times. It may improve block success, allow a reduction in LA dose and reduce complications.

Acknowledgements: We would like to thank the Cochrane Anaesthesia Review Group for their help.

References:

Resident teaching model for interscalene brachial plexus block

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Background and Goal of Study: Regional anesthesia has become a useful alternative to general anesthesia in many situations. In the field of orthope-
dic surgery regional anesthesia is a well-suited method to provide intraopera-
tive anesthesia, as well as postoperative pain relief. Interscalene brachial plexus block (ISB) has become an accepted method of anesthesia/analgnesia for shoul-
der surgery. However, interscalene catheter insertion is technically challenging with 
failure rates and complications. The challenge is mainly due to a lack of
appropriate training. Careful attention to technique and anatomy is critical to
successful practice.2

Materials and Methods: A pilot study was performed for evaluating the effi-
cacy of seven residents training in ISB. An intubation model with lines drawn
to identify the posterior border of the sternocleidomastoid and anterior sca-
lene muscles. The interscalene groove and cricoid cartilage were identified and
marked. An electrical wire was wired through an incision along the interscalene
groove at 2cm of depth which was sealed and connected to an ECG electrode
on the upper arm. An acupunctureoscope (WG-10D, Beijing, China) point locator
was connected to an electrode with an insulated block needle. A buzzing sound
indicated correct needle placement. Each participant served as their own con-
trol and were first timed performing ISB. Next, they were trained using the study
technique the timed performing within 48 hours. A second group (n=7) and their
controls and were first timed performing ISB. Next, they were trained using the study

Background and Goal of Study: The purpose of this study was to evaluate the
efficacy, recovery profile and perioperative cost of spinal anesthesia versus general anesthesia for
gynecologic-cervix surgery

Comparison of efficiency, recovery profile and perioperative
cost of spinal anesthesia versus general anesthesia for
gynecologic-cervix surgery

Materials and Methods: 60 woman ASA I, II mean age 32±,
CINI-III, were randomly allocated to receive spinal-tadder block (SSB), or general anesthesia using
largegauge mask (LMA) or using endotracheal tube (ETT). Premedication, general anesthesia,
microflow monitoring, intraoperative medication was standardized. 1
levobupivacaine +25mg Fentanyl+1.0ml 10% glucose,intratechally through the
Whitacre needle at the L3-L4 interspace was used for SSB. After 15min. of
sitting interval time the patients were turned in supine position. In EOT group
general anesthesia was induced with thiopental/fentanyl and rocuronium
was needed for muscle relaxation.In the LMA group induction was performed us-
ing propofol and fentanyl. Maintenance was achieved by fentanyl, inhalation
anesthetic isoflurane in O2:N2O 50:50 in low flow setting. The three groups were
then analyzed and compared on the following data; (1) anesthesia prepara-
tion time; (2) intraoperative haemodynamics change; (3) Alderet score in recovery
phase (4) postoperative medication (pain management,PONV,airway obstruct-
ion); (5)perioperative cost of anesthesia procedures. Statistical analyses were
performed using One-way ANOVA,P<0.05.

Results and Discussion: There was no significant difference in anesthesia
preparation time (SSB 17.8±8min, LMA 14.4±6min, ETT 13.3±6min),and in the in-
traoperative cardiovascular stability. All SSB have Alderet 9, and less demand
for pain therapy. PONV was present in 3.3% LMA, 4.1% ,noone in SSB.
Perioperative cost in the SSB was 40% less than in the LMA or OET groups.

Conclusion(s): These results support the use of SSB for cervix surgery and
can translate into significant healthcare cost saving.

References:
status after vaginal hysterectomy. Intrathecal versus general anesthesia. Canadian Journal

8AP2-9

Efficacy and safety of a topical diclofenac solution (penssal)
in the treatment of elbow osteoarthritis

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Anesthesiology, West Attica General Hospital; Athens, Greece

Background and Goal of Study: Oral nonsteroidal anti-inflammatory drugs
(NSAIDS) are commonly used to relieve the symptoms of osteoarthritis but can
produce harmful systemic effects especially to elderly patients. A topical NSAID
formulation may provide symptom relief with fewer adverse effects, a new
topical diclofenac sodium solution containing dimethyl sulfoxide as absorption en-
hancer was evaluated for the relief of primary elbow osteoarthritis.

Materials and Methods: A total of 40 patients met entry criteria (abnormal ra-
derographic findings and flare of pain) and were randomised to receive 30 drops of
topical diclofenac solution or a vehicle- control solution, 3 times daily for a
month. We evaluated the outcome using the WOMAC (Western Ontario Mc-
Master Universities osteoarthrtitis index) pain and physical function subscales
as well as patients’ satisfaction after final application. We assessed safety by
evaluation of adverse effects, vital signs and irritation at the application site.

Results and Discussion: Topical diclofenac solution was significantly more
effective than the vehicle-control solution for all outcome measures; pain, P =
0.001; physical function, P = 0.002; patient global assessment, P = 0.003; stiff-
ness, P = 0.005, and pain on physical activity using the arm, P = 0.004. Among
patients receiving topical diclofenac, self-limiting minor skin irritation occurred
in 4 (20%) of 20 patients, including dryness in 2 (10%), rash in 1 (5%), and
paresthesia with pruritus, in 1 (5%). There was no significant difference between
groups in NSAID-related gastrointestinal tract complaints or in dropouts due to
study-related adverse effects.

Conclusion(s): Topical diclofenac is effective in the treatment of elbow os-
teroarthritis, with only minor local irritation and no systemic adverse effects com-
pared to oral NSAIDs.

8AP3-2

Comparison of efficiency, recovery profile and perioperative
cost of spinal anesthesia vs. general anesthesia for
gynecologic-cervix surgery

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Background and Goal of Study: The purpose of this study was to evaluate the
efficacy, recovery profile and perioperative cost of spinal anesthesia compared with general anesthesia in patients undergoing gynecologic surgery of cervix carcinoma.

8AP3-3

Spinal anesthesia for transurethral prostate resection:
Isobaric ropivacaine 0.75% versus isobaric bupivacaine 0.5%
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Department of Anaesthesiology, Intensive Care and Pain Therapy, University of
Rome "La Sapienza", Rome, Italy

Background and Goal of Study: It's not well recognized that intrathecally ad-
ministered ropivacaine provides satisfactory and long term sensory block for
diagnostic urological procedures associated with less motor nerve fibre effect.
Our study aimed to examine the efficacy of analgesia and to measure motor
block provided by spinal isobaric ropivacaine 0.75% compared to isobaric bupiva-
caine 0.5% with equipotent doses (0.2) ratio) in patients undergoing transurethral
resection of prostate.

Materials and Methods: Eighty patients, ASA I-III, were randomized to re-
ceive intrathecal injection of a 5 ml isobaric solution of either bupivacaine 15 mg
(group B), or ropivacaine 22.5 mg (group R), through a 25 gauge pencil
note needle at the L (L)-4 interspace performed in lateral po-
osition. Analgesia was considered effective when sensitive block achieved T10
dermatome at pinprick test. Onset time and duration of sensory block at the
T10 dermatome, intensity and duration of motor block (Bromage Scale), upper
level of sensory block spread (cold test) and analgesic drugs supplementation
were all recorded.

Results and Discussion: Mean resection time was 88 min. Anesthesia was
effective in 97.5% of group B and 95% of group R. The onset of sensory block at
T10 dermatome was rapid and without significant differences; group R onset
time ranged from 3 to 10 min, group B onset time ranged from 2 to 9 min. Complete motor
block (Bromage score of 3) occurred in 33 patients of group R and 38 patients
of group B. The mean duration of complete motor block was shorter with spinal
ropivacaine (110 min) then with spinal bupivacaine 186 min (p<0.001). Sensory
block spread was significantly higher in group B (median level T4) compared with
group R (median level T7). Sensory block mean time was superior in group
B (mean value 225 min) then in group R (mean value 176 min).

Conclusion(s): Equotent doses of ropivacaine and bupivacaine both pro-
vided appropriate and safe anesthesia for endoscopic prostate resection. Both
local anesthetics were well tolerated without side effects. Ropivacaine resulted
suitable for endoscopic prostate resection with a rapid return of motor func-
tion. Bupivacaine had major effect on motor and sensory nerve fibres therefore
results an adequate choice for those surgical procedures of higher duration.

8AP3-4

Effects of thoracic epidural anaesthesia on hepatic blood flow
in patients under general anesthesia

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Background and Goal of Study: Hepatic hyperfusion is regarded as an
important factor in the pathophysiology of perioperative liver injury. Epidural
anesthesia (EDA) with local anaesthetics is a widely used technique. However, no data about the effects of thoracic EDA, with sensory blockade restriction to the thoracic segments, on hepatic blood flow in humans are available. The main objective of the present study was to investigate the effects of thoracic EDA on hepatic blood flow in humans. Apart from fluid substitution, vasopressor therapy is commonly used and recommended to treat EDA induced hypotension. Therefore the second objective was to investigate the effects of norepinephrine in patients with a marked EDA induced arterial hypotension.

Materials and Methods: In 20 patients under general anesthesia hepatic blood flow index in the right and middle hepatic vein and cardiac output were assessed by use of multplane transesophageal echocardiography before and after induction of thoracic EDA. The EDA catheter was inserted at the level of TH7-9. EDA was performed with mepivacaine 1%. The volume necessary to reach a sensory blockade from TH4-TH11 was determined in the awake patient at the evening before operation. In case of an EDA induced decrease in mean arterial pressure below 60 mm Hg norepinephrine was continuously admin-istered (EDA-NA-Group, n=5). The other patients (EDA-Group, n=15) did not receive any catecholamine during the study period. Further 10 patients without EDA served as controls (Control-Group). The study was approved by the ethics committee of Ulm University.

Results and Discussion: Patients of the EDA-Group revealed a median decrease in hepatic blood flow index of 24% in both hepatic veins (p<0.01) after induction of EDA. All 5 patients who received norepinephrine (EDA-NA-Group) showed a dramatic decrease in the blood flow index of the right (median decrease 39%) and of the middle hepatic vein (median decrease 32%). Patients of the Control-Group revealed a constant blood flow index in both hepatic veins. Reduction in hepatic blood flow index in the EDA-Group as well as the EDA-NA-Group was significant in comparison to the Control-Group. In contrast to hepatic blood flow cardiac output was not affected by EDA.

Conclusion(s): We conclude that in humans thoracic EDA is associated with a decrease in hepatic blood flow. Combination of EDA with continuous infusion of norepinephrine seems to induce a further decrease in hepatic blood flow.

8AP3-5
Effects of adjuvants combined with bupivacaine during spinal anesthesia and postoperative analgesia
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Background and Goal of Study: The aim of this prospective, double-blinded study, was to investigate the effects of adjuvants in co-administration with bupivacaine during spinal anesthesia, regarding the onset and regression of motor block, sensory block, postoperative analgesia and possible side effects.

Materials and Methods: Fifty patients aged 30-65, ASA I-II undergoing lower abdominal surgery, were randomly allocated into five groups of 10 patients each, to receive intrathecally: (Gr I) b - isotonic bupivacaine 0.5% 10mg, (Gr II) BF - bupivacaine 10mg + 25 μg fentanyl, (Gr III) BM - bupivacaine 10mg + 1mg midazolam (preservative free), (Gr IV) BC - bupivacaine 10mg +50 μg clonidine, (Gr V) BN - bupivacaine 10mg+25 μg neostigmine. The sensory block was assessed with pinprick, motor block with Bromage scale, analgesia with VAS scale, sedation with Wilson scale. Hemodynamic and respiratory parameters were recorded every 5 min. The data are analyzed and tested by analysis of variance (One Way ANOVA) and Bonferroni test.

Results and Discussion: The groups were demographically similar. The longest mean time of complete motor block, was at group B- 10.5 min (SD ±1.6 min.), while the shortest time was at group BM - 5.1 min. (SD±1.4 min.) (F=6.001, p=0.001). The longest mean time of sensory block level at T9, was at group B-16.4 min (SD ± 1.8 min.) (F=12.42, p=0.0001). The longest mean time of regression of sensory block was at group BM-42.9 min (SD±29.0 min), while the shortest time was at group B - 22.7 min (SD ± 33.6 min) (F=14.78, p<0.0001). The longest mean time of regression of motor block was at group BN - 352.3 min (SD ± 31.2 min) at B-195.5 min (SD ± 35.1 min). (F = 22.47, p=0.0001). No complication or significant adverse effects were recorded, except at neostigmine group where is observed a high incidence of nausea (30%).

Table 1. Technical, functional & patient parameters (data presented as mean).

<table>
<thead>
<tr>
<th>Group</th>
<th>Onset of Motor block-Bromage 3-4</th>
<th>Onset of Sensory block T9</th>
<th>Regression of Motor block</th>
<th>Regression of Sensory block T9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gr. B</td>
<td>10.5</td>
<td>16.4</td>
<td>199.5</td>
<td>227.4</td>
</tr>
<tr>
<td>Gr. BF</td>
<td>6.0</td>
<td>11.3</td>
<td>260.4</td>
<td>361.1</td>
</tr>
<tr>
<td>Gr. BM</td>
<td>5.1</td>
<td>7.7</td>
<td>227.5</td>
<td>422.9</td>
</tr>
<tr>
<td>Gr. BC</td>
<td>8.4</td>
<td>11.5</td>
<td>232.6</td>
<td>415.1</td>
</tr>
<tr>
<td>Gr. BN</td>
<td>7.6</td>
<td>10.5</td>
<td>352.3</td>
<td>404.7</td>
</tr>
</tbody>
</table>

In addition to the tabulated comparative results, seventy five percent of the patients in RFA group had first success versus twenty percent in conventional group (P<0.01). Overall, the final successful approach in two groups were ‘others’ (RFA-13, conventional-6), ‘paramedian’ (RFA-4, conventional-6) and ‘midline’ (RFA-2, conventional-4). In our study, ‘others’ signifies ‘near-lateral’ approach, i.e., window lying just lateral to either side of midline (within 1 cm).

Conclusion(s): Radiograph-assisted first approach proved superior to conventional approach in accessing SAS/ES in non-scoliotic difficult spine in elderly patients in regard to technical and functional parameters (P<0.05) along with improved subjective patient responses (P<0.05).


8AP3-7
Landscaping study of tactile perceptions from expert and nonexpert performers of spinal anesthesia
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Background and Goal of Study: The objectives of this study were to provide data for programming a realistic simulator device for teaching spinal anesthesia [1] and to test the hypothesis that a body of tacit information exists regarding tactile elements of this technique.

Materials and Methods: Experts (24) and non-experts (12) were invited to test sensations which typically occur during performance of spinal anesthesias: 1. touching different surfaces (skin, bone), 2. the “pop” sensations of nee-
die passing through skin and dura mater, 3. the sensations needle advancing through tissues (subcutaneous tissue, ligaments, intraspinal space), This study was performed using a haptic device simulating these sensations. The perception of each participant was recorded, and analyzed for best fit consistency and expert/non-expert differences.

Results and Discussion: Great variation within experts and non-experts exists with regards to all components of tactile sensations experienced during performance of spinal anaesthesia (Table 1).

Table 1. Experts’ and non-experts’ tactile perceptions

<table>
<thead>
<tr>
<th>Question</th>
<th>Estimate (95% CI)</th>
<th>SD Estimate (95% CI)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>touching bone</td>
<td>0.77 (0.75, 0.79)</td>
<td>0.04</td>
<td>0.05</td>
</tr>
<tr>
<td>pop thru’ dura mater</td>
<td>0.49 (0.41, 0.52)</td>
<td>0.11</td>
<td>0.05</td>
</tr>
<tr>
<td>advancing thru’ subcutaneous</td>
<td>0.53 (0.50, 0.68)</td>
<td>0.08</td>
<td>0.02</td>
</tr>
<tr>
<td>advancing thru’ ligamentum</td>
<td>0.23 (0.20, 0.27)</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>intrathecal space</td>
<td>0.46 (0.40, 0.52)</td>
<td>0.03</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Results are based on a random effects analysis that allowed experts (or non-experts) perceptions of the true “feeling” to vary between experts (or non-experts). As such the results above represent estimates of this average underlying perceptions and 95% CI for the estimate. The standard deviation is a measure of how perceptions vary.

Conclusion(s): At virtual haptic values close to “best fit”, expert and non-expert perceptions were different for dura puncture, intraspinal space and subcutaneous tissue.

References:

8AP4-2

Patient controlled versus continuous sedation during regional anesthesia in orthopedic procedures

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Background and Goal of Study: Sedation during regional or local anesthesia is an established approach to improve patients comfort in the course of surgical procedures. However, under- or oversedation as well as cardio/circulatory or respiratory depression may lead to a potential compromise of the patient.

Patient-controlled sedation using propofol might be a promising approach to overcome most of these problems. In the present study, we compared patient controlled (PCS) vs. anesthesiologist controlled sedation (ACS) due to possible side–effects and patient contentedness.

Materials and Methods: After approval of the local ethic committee in this prospective randomized clinical study one hundred patients undergoing elective knee- or hip-replacement in spinal anesthesia were included. Patients were randomized to receive either a PCA (bolus: 0.25 mg kg⁻¹, zero lockout interval; n = 50) or a continuous infusion of propofol 1% (3 g mg kg⁻¹ h⁻¹; n = 50) after an initial bolus of 0.5 mg kg⁻¹. The cardio–respiratory parameters, propofol consumption and adverse effects were monitored. In post anesthesia care unit patients’ satisfaction was evaluated using a standardized questionnaire. Propofol plasma concentration (C₁) and effect site concentration (Cₑₑₑ) were analyzed.

Results and Discussion: Demographic data, sedation and operation times were comparable. Independently from the applied sedation regime patients’ satisfaction was comparable between the investigated groups. Background noise was significantly more recorded in the PCS group than in the ACS group without any influence on patients’ satisfaction. C₁ and Cₑₑₑ differed significantly. Episodes of respiratory depression (<1 min) occurred in one PCS and in three ACS patients.

Conclusion(s): PCS using propofol boluses of 0.25 mg kg⁻¹, without a lockout interval is a very safe and reliable procedure to sedate during orthopedic procedures with a high level of background noise, like knee- and hip replacements, with a high degree of patient satisfaction. In this patient population C₁-PCS seems to be superior to ACS, especially with respect to the propofol plasma and effect site levels as well as with regard to adverse effects.

8AP4-3

Fast track anaesthesia with remifentanil and spinal analgesia for cardiac surgery: Effect on pain control and quality of recovery

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Background and Goal of Study: Fast track cardiac surgery requires effective postoperative pain control. This prospective, randomized, controlled study aimed to assess pain intensity and quality of postoperative recovery in a group of patients treated by fast track anaesthesia with spinal analgesia compared to a group that received a standard anesthetic and analgesic protocol.

Materials and Methods: The study included 83 patients scheduled for cardiac surgery with cardiac-pulmonary bypass. The fast track group (FTG) (n = 42) received general anaesthesia with remifentanil and spinal analgesia with morphine 4 µg/kg and clonidine 0.5 µg/kg. The control group (CG) had general anaesthesia with sufentanil and no spinal analgesia. During the postoperative period, the two groups were given paracetamol and patient controlled intravenous analgesia with morphine. Postoperative pain intensity was evaluated during 48 hours byVAS scores and intravenous morphine consumption. Incidence of pain on quality of life was analyzed until day 8 with the brief inventory pain score (BIPS), and recovery was evaluated with the quality of recovery score (QoR40). Test used Student T test; Mann-Whitney U, Shapio-Wilk test, Chi square test. A p value < 0.05 was considered statistically significant.

Results and Discussion: Characteristics of the patients were comparable in the two study groups. Pain intensity was significantly lower in the FTG from 4 to 4 hours (p < 0.01) and from 6 to 12 hours (p < 0.05). Intravenous PCA morphine consumption was significantly lower in the FTG at 6 hours (p < 0.01), 12 hours (p < 0.001), 24 hours (p < 0.001) and for total consumption (p < 0.01). BPI analysis documented that FTG patients had significantly less “pain at its worst” on day 1 (p < 0.001) and day 2 (p < 0.01), significantly less “pain at its least” on days 1 (p < 0.001) and significantly less “pain on average” on day 1 (p < 0.001). There was significantly less interference of pain with daily life measured by BPI in the FTG on day 1 (p < 0.001). The QoR40 test global score was higher in the fast track group (p < 0.05).

Conclusion(s): Fast track anaesthesia combined with spinal analgesia with morphine low doses and clonidine reduces postoperative pain and allows a better quality of recovery.

8AP4-4

A comparative study of prophylaxis with clonidine and tramadol for perioperative shivering in spinal anaesthesia for T.U.R.P surgery

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Background and Goal of Study: Perioperative shivering in patients undergoing transurethral resection of prostate under spinal anaesthesia is a common complication. Decreased core temperature secondary to peripheral vasodilatation from sympathetic blockade and/or use of cold irrigating fluids may lead to shivering. Prophylactic measures to reduce shivering could lead to decrease in the morbidity in such patients.

Materials and Methods: In our double blinded, placebo-controlled study, 120 randomly chosen patients (ASA grade I–III), scheduled for transurethral resection of prostate under subarachnoid block were divided into three groups of 40 each. Group I received oral Clonidine 150 micrograms, Group II received oral Tramadol 50 microgram, while Group III received a placebo. The shivering was graded from 0-4. All the results were tabulated and analyzed using student’s “t” test, “Z” test, and ANOVA test.

Results and Discussion: In the clonidine and tramadol group, 38 patients (95%) and 37 patients (82.5%) did not shiver respectively. While in the placebo group, 24 patients (60%) exhibited no grades of shivering. The shivering was of significantly severe intensity and longer duration in the control group. While patients who were given clonidine or tramadol did not show any clinically significant collateral effects.

Conclusion(s): Both the drugs were comparable in respect to their effect in decreasing the incidence, intensity and duration of shivering when used prophylactically to prevent shivering in patients who were to undergo transurethral resection of prostate surgery under subarachnoid blockade.
8AP4-5
Influence of sedation on duration of drug action, patients' perceptions and complications for transanal surgery in saddle block technique
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Background and Goal of Study: Additional sedation with midazolam and propofol is very common in patients receiving transanal operations in saddle block technique. However, there is only rare information if sedatives have an influence on duration of drug action, patients' perceptions and complications.

Materials and Methods: 500 patients undergoing transanal surgery received 1.0 mL hyperbaric bupivacaine 0.5% for spinal anaesthesia. On demand, sedation was provided with midazolam and/or propofol in bolus application. Sub-stance and dosage could be freely chosen by the performing anaesthesiologist. We asked all patients to answer questions about: 1. duration of drug action, 2. popularity of the spinal anaesthesia technique, 3. perceptions during the performance of anaesthesia, 4. perceptions during the operation, 5. postoperative complications and problems 6. evaluation of the technique. Statistic was provided with the chi²-square-test or the fisher's exact-test, as appropriate.

Results and Discussion: 56.5% (n=227) of the 402 respondents received sedation. 40 patients (10%) received midazolam as single substance (2.3±1.1 mg), n=19 (4.7%) received only propofol (58.9±46.3 mg) and 168 patients (41.8%) received a combination of both substances. More female than male patients received sedation (n=91, 63.6% vs. n=136, 52.5%, p=0.0312). Respondents with sedation were significantly younger (46.7±13.8 years vs. 50.3±13.8 years, p=0.0171) and had less body weight (77.2±15.8 kg vs. 83.9±16.3 kg, p<0.0001) as well as a lower body mass index (25.6±4.3 kg/m² vs. 27.3±5.1 kg/m², p<0.0001). Patients with sedation had a longer time until first mobilization (4.8±1.9 h vs. 4.4±2.1 h, p=0.0194) and first micturition (5.9±2.8 hours vs. 5.4±2.3 hours, p=0.0188). They also had more "fears" of the spinal anaesthesia technique (n=126, 55.5% vs. n=69, 39.4%, p=0.0014). Sedated patients percepted the performance of spinal anaesthesia more frequent "unnerving" (18.1%, n=41 vs. 8.6%, n=15, p=0.0064) and "painful" (12.8%, n=29, vs. 5.1%, n=9, p=0.0091) and there was a higher incidence of nausea in the group with sedation (n=26, 7.7% vs. n=3, 0.6%, p=0.014). Gender, age, lower body weight and lower body mass index correlated with a higher sedation rate during transanal surgery in saddle block technique. This leads to a delay until first mobilization and first micturition after surgery as well as to a higher incidence of nausea.

8AP4-6
Preemptive analgesia with ketorolac reduces pain after carotid endarterectomy surgery
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Background and Goal of Study: Carotid endarterectomy surgery (CES) is commonly performed under cervical plexus block. CES is frequently associated with postoperative pain requiring narcotic analgesics administration, which may delay postoperative recovery. The aim of the present study was to investigate whether a single, preemptive dose of ketorolac may prevent pain after CES.

Materials and Methods: After obtaining IRB approval and written, informed consent, 120 patients, aged > 18 yr, scheduled for CES under cervical plexus block (CPB) were included in a prospective, double-blind, randomized study. Patients were randomly assigned to receive either IV ketorolac 30 mg (n=60) or saline placebo (n=60) 30 min before surgery. Postoperative pain intensity was measured using the Verbal Rating Scale (VRS) 0-10; 0 = no pain, 10 = the worst pain imaginable) pain scores at 3 h (T1) and 6 h (T2) after surgery. Additional analgesics were given to patients reporting VRS > 3. The number of patients requiring postoperative analgesia and the time to first request for analgesia were recorded. Statistical analysis was performed using Student’s t test or Mann-Whitney U test and Fisher’s exact test, as appropriate. A P value < 0.05 was regarded as significant.

Results and Discussion: The two groups were similar with respect to demographic, clinical and surgical characteristics. VRS pain scores were significantly lower in the ketorolac group than in the placebo group both at the control time T1 T2 after surgery. The number of patients requiring supplemental analgesia was significantly lower, whereas the time to first request for analgesia was significantly longer in the ketorolac group compared with the placebo (Table 1).

There were no adverse events related to the study drug, anesthesia or surgical procedure.

Conclusion(s): A single preemptive 30 mg dose of ketorolac reduces significantly postoperative pain in patients undergoing CES under cervical plexus block.

8AP4-7
The effect of topical local anaesthetic agents upon forearm skin blood flow reactivity
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Background and Goal of Study: Different local anaesthetic drugs have varying effects on vascular tone, which may be independent of their local anaesthetic properties. A potential benefit of regional blockade is improved microvascular blood flow, but it is not clear whether this effect occurs with all topical anaesthetics. The transient hyperaemic response (THR) to brief compression of the brachial artery has been described as a way to assess vascular reactivity of microvessels of forearm skin.1 We hypothesised that local vasodilatation and disturbance of vascular reactivity by Ametop is a drug specific effect, rather than an effect of local anaesthesia.

Materials and Methods: Following Ethics Committee approval and informed consent, 20 healthy male volunteers were recruited. Non-invasive probes were placed on the volar surface of the forearm and baseline blood flow-flux (arbitrary units, AU) and the transient hyperaemic response (THR) to a 20 second occlusion of the axillary artery were measured using laser Doppler flowmetry; 3 measurements were taken at 5 minute intervals. The THR ratio (THR/THR) is not hyperaemic flow divided by net baseline flow. Topical local anaesthetic cream was applied to the point on the forearm where baseline measurements had been made. One arm had EMLA (2.5% lidocaine, 2.5% prilocaine) applied and the other arm had Ametop (4% lachexine). Aquous cream was applied to both arms to act as a control. An occlusive dressing was used. After 60 minutes the creams were removed and skin blood flow-flux and THR measured as before. These measurements were repeated at 90 minutes and 120 minutes after cream application. Data were analysed using repeated measures ANOVA.

Results and Discussion: At 60 minutes, EMLA and control showed a small, significant rise in flow (19.2 (5.6) and 16.7 (7.1) to 21.1 (6.1) and 23.1 (7.1) AU), and a small decrease in THR (4.0 (1.8) and 3.63 (1.34) to 3.17 (1.75) and 2.43 (1.27)); significantly larger differences were observed with Ametop (16.6 (3.9) to 111.2 (65) AU and 4.86 (1.8) to 1.35(0.67)). These effects persisted to 120 minutes for Ametop, but not for EMLA and control.

Conclusion(s): Skin vascular reactivity can be altered by the application of the topical local anaesthetic Ametop. This effect is not purely the result of local anaesthesia of the skin and occlusive dressing, but is rather due to another property of the cream.

References:

8AP4-8
Pulse oximetric measurement of prilocaine-induced methemoglobinemia in regional anesthesia
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Background and Goal of Study: The local anaesthetic agent prilocaine is characterized by a low systemic toxicity, but can induce methemoglobinemia in a highly interindivdual variation. Increased values may be hazardous in patients with anemia or cardiopulmonal disease. The Masimo Rad® (Masimo Inc., Irvine, CA) is a pulse oximeter designed to measure methemoglobin (met-Hb). In this prospective observational study we examined the arterial met-Hb levels and the corresponding pulse oximetric values in regional anesthesia with prilocaine.

Materials and Methods: 20 patients received 300 mg of prilocaine 1% via a interscalene plexus catheter and 20 patients 2 x 300 mg of prilocaine 1% for a combined femoral/sciatric nerve blockade. All blocks were performed using a nerve stimulator. Before and 15, 30, 60, 120, 180, 240, 300 and 500 minutes after prilocaine injection met-Hb levels were measured in arterial blood samples. These values were matched with the corresponding pulse oximeter readings (mean one-minute-value of met-Hb and perfusion index). We compared the results with those obtained with a hemoximeter (Radiometer ABL 625, Copenhagen) as an accepted standard.

Table 1. Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ketorolac group (n = 60)</th>
<th>Placebo group (n = 60)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VRS (T1)</td>
<td>2.1±1.0</td>
<td>3.4±1.1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>VRS (T2)</td>
<td>2.0±0.9</td>
<td>2.5±1.1</td>
<td>0.03</td>
</tr>
<tr>
<td>Postoperative analgesia</td>
<td>9 (15%)</td>
<td>37 (62%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Opioid administration</td>
<td>0 (0.9)</td>
<td>12 (16%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Time to first analgesia (T1)</td>
<td>3.5±0.5</td>
<td>2.2±0.7</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
Results and Discussion: The mean maximum level of met-Hb in the interscalene plexus group was 2.4% (sd ± 1.0%) (range 0.6 - 4.6%) reached after 120 minutes. For combined femoral/sciatic nerve block peak blood levels for met-Hb were reached 4 hours after prilocaine injection with a mean value of 4.4% (sd ± 2.3%) (range 0.9 - 8.2%). For evaluation of accuracy and precision of the Masimo Rad7 we so far analyzed 315 data pairs using statistical techniques recommended by Altman and Bland: The precision of the device was 0.48% and the bias 0.22%. All outlier values were found in cases of a perfusion index lower than 2.

Conclusion(s): The pulse oximeter Masimo Rad7 improves the safety of regional anesthesia using prilocaine as local anesthetic agent by continuous monitoring of methemoglobin levels. In case of a perfusion index above 2 we achieved reliable values of met-Hb. After injection of the maximum recommended doses of prilocaine for interscalene block and for combined femoral/sciatic nerve block we found no met-Hb level above 9%.

8AP4-9
Analgesia after thoracotomy: Is an intercostal nerve block plus intravenous patient-controlled analgesia with morphine as effective as patient-controlled epidural analgesia with sufentanil/ropivacaine? A prospective randomized clinical study
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Background and Goal of Study: Epidural analgesia (EDA) is considered by many to be the best method of pain relief after thoracic surgery (1). An intraoperatively performed intercostal nerve block (ICB) plus intravenous patient controlled analgesia (PCA) with opioids could be an easier, less time consuming and safer alternative to EDA, but data about the efficacy of this technique are scarce. Thus the main objective of the present study was to evaluate the analgetic efficacy of the ICB in comparison to EDA in patients undergoing pulmonary surgery through a posterolateral thoracotomy.

Materials and Methods: With approval of the local ethic committee 55 patients were randomly allocated to the EDA-Group (n=27) or ICB-Group (n=28). Patients in the ICB-Group, received intraoperatively a 5 segment intercostal block with 30 ml ropivacaine 0.75% and postoperatively intravenously PCA morphine. Patients in the EDA Group received intraoperatively ropivacaine 1% through a thoracic epidural catheter (TH6-TH8) and postoperatively patient controlled EDA with ropivacaine 0.2% and sufentanil 2µg/ml. Using the numeric rating scale (NRS: 0=10) pain was assessed at rest and during coughing 1h after arrival in the recovery room (1h PO) and at the first four postoperative days (POD).

Results and Discussion: The median NRS values are shown in the table. Apart from the NRS values obtained in the recovery room there was a tendency to higher NRS values in the ICB-Group at rest as well as during coughing. At the second POD the difference was significant during coughing (*p<0.01).

Postoperative NRS pain scores at rest and during coughing expressed as medians

<table>
<thead>
<tr>
<th></th>
<th>1h PO</th>
<th>POD 1</th>
<th>POD 2</th>
<th>POD 3</th>
<th>POD 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest EDA-Group</td>
<td>2.0</td>
<td>2.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.75</td>
</tr>
<tr>
<td>ICB-Group</td>
<td>2.0</td>
<td>3.0</td>
<td>2.25</td>
<td>2.0</td>
<td>1.75</td>
</tr>
<tr>
<td>Coughing EDA-Group</td>
<td>4.0</td>
<td>3.5</td>
<td>3.0</td>
<td>3.0</td>
<td>3.5</td>
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<tr>
<td>ICB-Group</td>
<td>2.75</td>
<td>5.0</td>
<td>5.0</td>
<td>3.5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Conclusion(s): We conclude that in particular during coughing ICB with subsequent IV PCA does not achieve the same analgetic efficacy as patient controlled EDA in patients undergoing pulmonary surgery through a posterolateral thoracotomy.

8AP4-10
Sympathetic block with 0.2% ropivacaine induces a significant increase of peripheral arterial blood flow compared with that with 0.25% bupivacaine or levobupivacaine
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Background and Goal of Study: Sympathetic block is used for patients with sympathetically maintained pain or peripheral vascular diseases. We compared the duration and magnitude of the increase in vasodilation induced by sympathetic block with 0.2% ropivacaine with that of 0.25% bupivacaine, or 0.25% levobupivacaine in dogs.

Materials and Methods: This study was conducted according to the animal experimental guideline of Dokkyo University School of Medicine, which adhere to the National Institute of Health Animal Experimental Guidelines. Twenty-four mongrel dogs were anesthetized with a 25mg/kg intravenous injection of pentobarbital, and the tracheas were intubated. The left cervicothoracic sympathetic ganglion was exposed by a left lateral thoracotomy at the second and third intercostal space. A 25-gauge winged needle was placed adjacent to the ganglion with suture for performing left cervicothoracic sympathetic ganglion block (CSGB) used as a sympathetic block, and the chest was closed. Mean arterial pressure (MAP), heart rate (HR), and right and left brachial artery blood flow (BABF) were measured before and after the block with 0.2% ropivacaine 1 ml, 0.25% bupivacaine 1 ml, or 0.25% levobupivacaine 1 ml.

Results and Discussion: MAP and HR did not changed significantly throughout the study in either group. Although left BABF significantly increased after the block in either group, increase in left BABF was significantly higher than that induced by the block with 0.25% bupivacaine or levobupivacaine. On the other hand, right BABF was significantly decreased after the block. There were no significant differences in right BABF after the block among local anesthetics.

Conclusion(s): Sympathetic block with 0.2% ropivacaine induced a significant increase of peripheral arterial blood flow, compared with that with 0.25% bupivacaine or 0.25% levobupivacaine. Our results suggest that ropivacaine may have a high potency, compared with bupivacaine and levobupivacaine in sympathetic block in dogs.

8AP5-1
Comparative study of tramadol and lidocaine as local anesthetics before insulated needle insertion in axillary blocks
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Background and Goal of Study: Tramadol has been found to have local anesthetic properties. In this study, we compared the onset time and analgesia quality of lidocaine and tramadol before insertion of an insulated needle for axillary brachial plexus blocks.

Materials and Methods: Informed consent was obtained from 90 ASA I–III patients undergoing forearm or hand surgery. The study was prospective, randomized, and double-blind designed. Patients were assigned into 3 groups of 30 subjects, receiving either lidocaine 20 mg (group L), or tramadol 50 mg (T50) or tramadol 100 mg (T100). Local anesthesia was performed by sub-cutaneous injection (s/c), with 2 ml of a different drug formulation, using a 27 Gauge needle. According to a waiting period of either 15, 30 or 60 seconds between s/c injection of each drug and insertion of a 21 G insulated needles, each group was divided into 3 subgroups of 10 patients. The pain sensation was measured and scored with the visual analog scale (VAS) 0-10 at the moment of s/c injection, and at the time of the insulated needle insertion. Edeema around the puncture and side effects were documented too. Student’s t-test was used for statistical analysis. P < 0.05 was considered significant.

Results and Discussion: No significant difference was observed between groups L and T50, while there was a difference (P<0.05) between each of these groups and group T100. At the s/c injection time, among the L and T50 groups, 7 and 4 patients respectively complained of moderate pain (VAS>4) versus 1 in the T100 group. Pain scores decreased with time: the mean values were 7±1.5, 5±1 and 4±0.5 in L and T50 groups versus 3±1, 0, 0 in T100 after 15, 30 and 60 sec respectively. The data obtained among the L or T50 groups were similar to those reported by Pang (1, 2). Six edema were noted around the site of puncture in the lidocaine, and 2 in the tramadil groups. No further side effects were noted.

Conclusion(s): Subcutaneous injection of tramadol 100 mg had a more effective anesthetic effect than lidocaine 20 mg and tramadol 50 mg, with a rapid onset of less than 15 sec. The action of tramadol 50 mg and lidocaine 20mg was similar in terms of onset time and quality of anesthesia.

References:

8AP5-3
The comparison of femoral nerve block and continuous intravenous administration of fentanyl in patients undergoing anterior cruciate ligament reconstruction
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Background and Goal of Study: Establishment of safe and effective method to relieve postoperative pain is important for the early recovery and patients' satisfaction after anterior cruciate ligament (ACL) reconstruction. This study compared the efficacy of single-injection femoral nerve block and continuous intravenous administration of fentanyl in pain management after ACL reconstruction.

Materials and Methods: Thirty-two patients were randomly allocated to one of the two study groups to receive either femoral nerve block (FNB) or an intravenous administration of fentanyl (FEN). Anesthesia was induced with propofol (1.5 mg/kg) and fentanyl (100 μg) and we intubated either laryngeal mask or endotracheal tube. Anesthesia was maintained with oxygen, air and sevoflurane (1.5-2.0%) under bispectral index (40-60). FNB group was performed using ultrasound guidance and nerve stimulator with 0.5% ropivacaine 20ml during the induction of anesthesia. Fentanyl administration FEN group was received continuous injection of fentanyl 1 μg/kg/hr throughout operation and 0.5μg/kg/hr after operation. Visual analog scale (VAS) as well as occurrence of any side effect was recorded at immediate postoperative period and at 2, 6, and 1 postoperative day after surgery.

Results and Discussion: Patients demographics were similar. There were no differences between each group in terms of mean surgery time, tourniquet time, anesthesia time, patient’s satisfaction and side effects. VAS scores at rest and movement were significantly smaller in the FNB group than the FEN group at 2 hours after surgery (P<0.05).

Conclusion(s): Continuous IV fentanyl is frequently used for the management of postoperative pain because of a low incidence of side-effects. Based on the results of this comparative study, FNB is thought to be more effective in pain relief during early postoperative period for patients undergoing ACL reconstruction.

Acknowledgements: We would like to thank Dr Shinya Yoshiya and the staff in the Department of Orthopaedic surgery, Hyogo College of Medicine.

8AP5-4
Intraarticular piroxicam for postoperative analgesia after knee arthroscopic surgery
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Background and Goal of Study: Several intraarticular drugs have been used to decrease postoperative pain after arthroscopic knee surgery. Intraarticular injection of morphine produces a definitive reduction in postoperative pain intensity (1). The Combined use of opioid and local anaesthetic had an additive early effect. Intraarticular use of glucocorticoids or nonsteroidal anti-inflammatory drugs (NSAIDs) was associated with conflicting data (2, 3). The aim of the study was to demonstrate the analgesic effects of Intraarticular injection of piroxicam after arthroscopic knee surgery.

Materials and Methods: With approval by the institute ethical committee, informed patient consent was obtained from all the patients. Fifty patients, ASAI-II, scheduled for knee arthroscopic meniscectomy were recruited for a double-blind controlled study. Patients with a chondropathy were not included in the study. All operations were performed under 0.5% isobaric bupivacaine unilateral spinal anesthesia. The surgical procedure was standardized in all patients. At the end of surgery, the patients were randomly allocated to one of the two groups: in group C, patients received 30 ml saline solution and in group P, they received 30 ml saline solution and 20 mg piroxicam. The pneumatic tourniquet was kept inflated until 10 min after intraarticular injection of the trial drug. The postoperative analgesia was assessed using visual analog scale at 3h, 6h, 12h and 24h. Pain scores and analgesic rescues were compared using ANOVA, the Mann-Whitney U-test and Fischer’s exact test. A p-value less than 0.05 was kept inflamed until 10 min after intraarticular injection of the trial drug. The usage of rescue analgesic during and after surgery.

Results and Discussion: The two groups were similar for block execution time as well as demographics. Four patients in group LP did not develop sufficient anesthesia in the anteromedial aspect of the lower leg. However, the quality of surgical anesthesia was significantly better in group LP than in group FN. Significantly more patients required intraoperative fentanyl in group FN (15/19) than in group LP (12/19). The two groups were similar for the usage of rescue analgesic postoperatively.

Conclusion(s): The combination of posterior lumbar plexus and sciatic nerve blocks provides superior analgesia to the combination of femoral, lateral femoral cutaneous, and sciatic nerve blocks during and after arthroscopic anterior cruciate ligament reconstruction using a hamstring autograft.

Materials and Methods: With IRB approval and informed consent, we studied two groups of patients undergoing arthroscopic anterior cruciate ligament reconstruction using a hamstring autograft: group FN (n = 15) received combined femoral, lateral femoral cutaneous, and sciatic nerve blocks; group LP (n = 19) combined lumbar plexus and sciatic nerve blocks. All the blocks were conducted using ultrasound. Patients were sedated with propofol or midazolam during surgery. Measurements included block execution time, onset time and duration of the sensory block, quality of surgical anesthesia using a scale of 1 to 5, and the usage of rescue analgesic during and after surgery.

Results and Discussion: The combination of posterior lumbar plexus and sciatic nerve blocks provides superior analgesia to the combination of femoral, lateral femoral cutaneous, and sciatic nerve blocks during and after arthroscopic anterior cruciate ligament reconstruction using a hamstring autograft. The present results suggest the involvement of the obturator nerve in this particular operation.

8AP5-6
Sciatic nerve block in 18 patients suffering from Charcot-Marie-Tooth-syndrome
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Background and Goal of Study: Charcot-Marie-Tooth (CMT) disease is a hereditary motor sensory neuropathy with distal muscular weakness and atrophy. There are concerns about performing regional anaesthesia in these patients in fear of neurologic sequelae. The aim of this study was to assess the safety and efficacy of sciatic nerve blockade for postoperative pain relief in 18 CMT patients.

Materials and Methods: Following informed consent 18 patients suffering from CMT disease scheduled for corrective surgery of the lower extremity were included. All patients presented in good clinical conditions (ASA I-II) and were fully ambulatory. The catheter for sciatic block was inserted before surgery with the aid of a nerve stimulator by means of the posterior polar approach. The aim was to elicit the typical motor response (plantar or dorsal flexion) stimulating with an impulse duration of 0.1 ms at a current less than 0.5 mA. A 22-gauge catheter was inserted in all cases where it was possible to elicit the typical motor response irrespective of intensity of current used. For surgery anesthesia was accomplished with propofol and alfentanil. For postoperative pain relief bolus of 30 ml ropivacaine 0.2% were given every 4 hours on demand for three days. Pain relief was assessed by a numeric rating scale (0-10), and additional request for analgesics documented. 6 months after surgery we did a follow-up questionnaire to assess patient’s neurologic status by self-evaluation.
Results and Discussion: In ten patients placement of the catheter was possi-ble with a current less than 0.5 mA. In five patients a higher intensity of current was necessary to elicit motor response. In three patients it was not possible to elicit any motor response, and therefore, in these cases no catheter could be inserted. Ropivacaine consumption and additional request for nonopioid analgesics was highest in the group of patients with the lowest current for catheter insertion. The three patients where it was not possible to insert a sciatic catheter (due to a lack of motor response) had the lowest analgesics request overall. 6 months after surgery no patient reported on worsening of its neuropathic status. The surprising result concerning analgesic consumption and sciatic block is difficult to interpret. We speculate that patients requiring higher intensity of current had a major progression of the disease with major deficits in pain sensation.

Conclusion(s): The results of this small investigation do not allow concluding remarks on benefit or risk of sciatic nerve block in CMT patients.

8AP5-7
Effect of local infiltration analgesia supplemented with a single ropivacaine bolus after total knee arthroplasty
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Background and Goal of Study: Local infiltration Analgesia (LIA) with postoperative infiltration analgesia for postoperative pain relief after total knee arthroplasty (TKA) has been shown to be a promising approach, already implemented in our department. The aim of the present study was to evaluate the effect of a standardised postoperative bolus of ropivacaine in preventing breakthrough pain.

Materials and Methods: Thirty-four patients scheduled for TKA had a spinal anaesthesia and LIA. Seventeen patients had a continuous infusion of ropivacaine 2 mg/ml 5 ml/hour (group A) and seventeen patients had an identical ropivacaine infusion plus a bolus of 20 ml ropivacaine 7.5 mg/ml 6 hours postoperatively (group B). Pain scores were recorded 6 and 24 hours postoperatively, using a Visual Analogue Scale (VAS, 0-10 cm) and the occurrences of breakthrough pain were assessed.

Results and Discussion: Seventy percent of patients in the non-bolus group (A) had breakthrough pain compared to only 35% of the patients in the bolus group (B) (p < 0.01). At 8 am the next morning, VAS at rest was 5 (0, 10) in the A group and 1 (0, 6) in the B group (median (range)) (=p < 0.001). VAS score at mobilisation was 6 (6, 10) in the A group and 3 (0, 7) in the B group (p < 0.01).

Conclusion(s): The study shows that pain, VAS score, and opioid consumption were lower in patients having bolus dose of ropivacaine 6 hours postoperatively.

8AP5-8
A comparison of two different concentrations of levobupivacaine in continuous femoral block for postoperative analgesia after total knee resection
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Background and Goal of Study: To study the minimum effective concentration of levobupivacaine in continuous femoral block after TKA.

Materials and Methods: This is a prospective, randomized, double blind study. We studied 40 female patients, ASA II-III who were scheduled for elective TKA. All patients had spinal anaesthesia for the operation. In the PACU after surgery and motor blockade had worn off a femoral block was performed with a nerve stimulator using an aseptic technique. The patients were randomly allocated in two groups. Group A received 20 ml bolus dose levobupivacaine 0.5% and a continuous infusion of levobupivacaine 0.125% with a rate of 5 ml/hour for 26h. Group B received 20 ml bolus dose levobupivacaine 0.25% and a continuous infusion of levobupivacaine 0.0625% with a rate of 5 ml/hour for 26h. Both groups received PCA morphine. The consumption of morphine and the evaluation of pain according to the VAS scale were recorded 2 hours after initiation of the analgesia and then every 4 hours for the first 26 hours.

Results and Discussion: There were no statistical differences of the morphine consumption between the two groups. The average pain score was the same in both groups. There were no complications attributable to the femoral block.

Conclusion(s): The levobupivacaine of 0.0625% used for femoral block had equally analgesic effect as the levobupivacaine of 0.125%, and there were no side-effects. We consider that the more diluted local anaesthetic can be used with the same efficacy in femoral block for postoperative analgesia in Total Knee Replacement.

References:

8AP5-9
Dextранe prolongs the duration of sciatic block with ropivacaine in rats
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Background and Goal of Study: It has been shown that dextranene added to local anaesthetics may prolong peripheral nerve block duration [1]. This observation has been questioned by some studies [2]. The association of dextranene and ropivacaine has not been tested. We assessed the effect of adding dextранe to ropivacaine on sciatic nerve block in rats.

Materials and Methods: Study animals were treated according to European Guidelines 86/60. 24 Wistar female rats received inhalational anaesthesia with N2O/Isoflurane and a right sciatic block with 0.2 ml of Dextran 40 000 D (group D, n=5), 0.2% Ropivacaine in distilled water (group R, n=9) or 0.2% Ropivacaine in Dextran 40 000 D (Group RD, n=10). Operators were blinded to study solutions. A neurostimulator, set at 0.2 mA and 2 Hz, and insulated 25 G 25 mm needles were used. The solution was injected after eliciting hind paw twitches, and anesthesia was discontinued. The rats underwent plantar tests in both legs, before anesthesia (basal) and at 20, 60, 120 and 180 minutes after the block, using an infrared thermal stimulus with maximum exposure time of 30 seconds, and automated discontinuation of time count at hind paw retrieval. Duration of block was defined as the time at which the blocked leg reacted at the stimulus with the same latency of the unblocked leg. Data (mean±SD) were analysed with Kruskal Meier curves and differences among groups were assessed with a log-rank test. Two animals per group were sacrificed at day 1 and 7 after the study and nerve histology was examined.

Results and Discussion: At 180 minutes 30% of rats in RD group and 0% in D and R groups were still blocked (p<0.0001). Mean block duration was longer in RD group (168±56 min) than in groups D (12±26 min) or R (100±67 min; p<0.002 among groups, p=0.04 RD vs R). No histological evidence of nerve damage was observed in any group. Dextranene added to ropivacaine prolonged sciatic block duration in an animal model.

Conclusion(s): 0.2% ropivacaine in dextranene increases the duration of analgesia to thermal stimuli in comparison with 0.2% ropivacaine alone, without evidence of nerve damage. Prolonging analgesic effect of ropivacaine may be desirable in clinical practice.

References:

8AP6-1
Spinal anaesthesia for pilonidal cyst-sinus operations in prone position: Bupivacaine versus levobupivacaine
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Background and Goal of Study: Hyperbaric solutions used in spinal anaesthesia in prone position may cause the spread of local analgesic solution to cephalic direction (1). We aimed to test the hypothesis that 1 ml plain solution of 0.5% bupivacaine or 0.5% levobupivacaine offers adequate anaesthesia and operating conditions for pilonidal cyst-sinus operations in prone position.

Materials and Methods: Under local ethics committee approval, 50 male aged >18 years, ASA I patients who were scheduled for elective pilonidal cyst-sinus operations were included into the prospective, randomized, double-blind study. Patients with infection at the injection site, disorders of coagulation, neuropsychiatric disease, hypersensitivity to amide local anaesthetics or reluctance for procedure were excluded from the study. Spinal anaesthesia was performed with the patient in sitting position using a 25 G Quincke needle at the L4-5 interspace with midline approach. In Group B (n=25), 1 ml of 0.5% plain bupivacaine and in Group L (n=25), 1 ml of 0.5% levobupivacaine was administered via intrate- chal injection without aspiration or barbotage. After the administration of local
anesthetic had been completed, patients were placed in prone position quickly. The characteristics of sensory and motor block, haemodynamic data, adverse effects, patient and surgeon satisfaction were recorded. The sample size was calculated to provide 80% power to detect a 25% reduction in the incidence of complete motor block in Group L compared with Group B. Descriptive statistics were quoted as mean±SD, median (range), number (incidence) as appropriate. Statistical analyses were performed using Student’s t, Mann-Whitney U, Fischer’s exact and Chi-Square tests.

Results and Discussion: There were no significant differences between the two groups for patient demographic data, duration of operation, patient-surgeon satisfaction, haemodynamic and side effects. The onset time, highest level, two segment regression, time to 52 regression of sensory block weren’t different in two groups (p=0.077, 0.057, 0.091 and 0.084 respectively). The incidence of complete motor block was 16% and 8% in Group B at the beginning and the end of the operation. There was not complete motor block in Group L (p=0.110 and 0.490 respectively).

Conclusion(s): We concluded that both regimes are effective and safe in spinal anaesthesia for plonidal cyst-sinus operations in prone position.

References:

8AP6-2
Urinary retention after spinal anaesthesia: Unilateral vs. bilateral spinal anaesthesia with 0.5% bupivacain. A prospective randomized study
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Background and Goal of Study: Urinary retention is one of the most common complications next to haemodynamic effects following spinal anaesthesia. The aim of this prospective randomized study was to compare the time to first voiding and the incidence of urinary retention after two different techniques of spinal anaesthesia.

Materials and Methods: 251 patients (ASA-I-II) were randomly allocated to 2 groups to receive either hypobaric for unilateral (Group 1) or isotonic bupivacaine for bilateral (Group 2).Spinal anaesthesia. Bladder volume was measured preoperatively via ultrasound. Sensory and motor block was assessed by loss of cold sensation and modified Bromage scale. Time from spinal injection to first voiding and necessity to catheterisation was recorded.

Results and Discussion: There were no differences between the two groups regarding demographic data. Postoperative measurements of bladder volume were similar in both groups: Group 1: 282ml ±159; Group 2: 282ml±154.

Unilateral block was recorded in 87% patients. Sensory level on the operated side was Th 8 in both groups. Time of first voiding after injection required 273±61 minutes in group 1 and 329±73 minutes in group 2. All patients in group 1 were able to void spontaneously and 16 Patients (12%) need catheterisation in group 2. This study demonstrated no significant influence of risk factors [2], with incidence around 25%, & more if intrathecal morphine is used. In such a case, we want to know if Unilateral hypobaric Spinal Anaesthesia (U.h.S.A.) may lead to fewer Post-Operative Bladder Catheterization (P.O.B.C.).

Materials and Methods: From Oct.06 to Oct.07, 120 patients with short (<90) lower limb surgery, were randomized in 2 groups, after informed consent: Group 1: 60 patients had U.h.S.A.with hypobaric L-bupivacaine 2mg/ml. Group 2: 60 patients had U.h.S.A.with hypobaric L-bupivacaine 2mg/ml & intrathecal morphine. We used a same protocol in both groups: 25G Whitacre needle, no preloading infusion, epidural delivery of U.h.S.A. &/or H.R., was >-20%. No postoperative morphine P.C.A. Items noticed were: Age, Sex, ASA score, L-bupivacaine dose, epidurine doses & peri-operative infusion volume required, spontaneous urination or bladder catheterization.

Results and Discussion: Both groups had same characteristics for sex, age, ASA score, L-bupivacaine dose, & surgery. No differences were found in epidurine consumption & in infusion volume required. Unilateral Spinal Anaesthesia provides better early post-operative comfort & less haemodynamic changes than conventional spinal anaesthesia [1,3]. This is confirmed here, by low doses of epidurine and low volumes of peri-operative infusion required.

8AP6-3
Performing a spinal anesthesia in the supine position in patients with unstable femoral fractures
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Background and Goal of Study: Surgical operation on account of femoral fractures can be successfully done with spinal anaesthesia (SA) but unstable fractures makes difficult and dangerous moving the patients in sitting or lateral position. Use the Orthopedic Navigation Table permits performing a stable fractures makes difficult and dangerous moving the patients in sitting position in patients with unstable Femoral Fractures.

Materials and Methods: 60 ASA physical status I-III patients, scheduled for lower limb surgery, were randomized in 2 equable groups. SA in patients of group A (N=48) was performed in SpP. SA in patients of group B (N=14) was performed in SpP on the Orthopedic Navigation Table. All patients received 10-20 mg of 0.5% plain bupivacaine through a 23 gauge spinal needle at L3-L4 level. The VAS at positioning for lumbar puncture (LP), time to perform SA and patient acceptance were observed. To investigate the clinical effects of SA the analysis of onset of sensory block, level of anesthesia, Bromage scale time to achieve level I, duration of analgesia and adverse effects (AE) was done.

Results and Discussion: Patients data are shown in the table 1.

Table 1. Patients data by group (Median [25-75 percentaged])

<table>
<thead>
<tr>
<th>Group A (N=48)</th>
<th>Group B (N=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS at positioning for spinal</td>
<td>3 [2-3]</td>
</tr>
<tr>
<td>Time to perform spinal anaesthesia</td>
<td>3 [2-4]</td>
</tr>
<tr>
<td>Patient acceptance [yes/no]</td>
<td>45/3</td>
</tr>
<tr>
<td>Bupivacaine dose (mg)</td>
<td>17.5 [15.6-20]</td>
</tr>
<tr>
<td>Onset of sensory block (min)</td>
<td>10 [9-10]</td>
</tr>
<tr>
<td>Anesthesia level</td>
<td>T4 – ST</td>
</tr>
<tr>
<td>Bromage scale time to achieve</td>
<td>12 [12-13]</td>
</tr>
<tr>
<td>Duration of analgesia (min)</td>
<td>250 [230-250]</td>
</tr>
<tr>
<td>Number of patients with clinically significant adverse effects</td>
<td>3</td>
</tr>
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</table>

P.O.B.C. incidence is among lowest levels reported (no P.O.B.C. in the "mor- phineless group"). But, as in conventional spinal anaesthesia, P.O.B.C. incidence was significantly higher (p < 0.01) in the "morphineless group", with incidence reaching 13% of patients.

Conclusion(s): U.h.S.A. doesn’t protect from P.O.B.C.when intrathecal morphine is used.

References:

Local and regional analgesia 119

8AP6-5
Comparative study of two doses of bupivacaine for continuous spinal anesthesia in elderly
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Background and Goal of Study: Aging and disease may make elderly patients particularly susceptible to hypotension during spinal anaesthesia (SA). Continuous Spinal Anaesthesia (CSA), by enabling the reduction and fractionation of the induction dose through a catheter, reduces the hemodynamic effects of SA (1-3).

3) Initial dose of 2.5 mg of isobaric bupivacaine 0.5% was associated with a low incidence of hypotension when compared with the dose of 7.5 mg for unilateral spinal anaesthesia (3). The aim of our study was to compare the hemodynamic effect of two doses of bupivacaine in CSA in elderly patients undergoing surgical repair of hip fracture.

Materials and Methods: After approval by the local Ethics Committee, all patients provided informed consent. Patients without any contraindication to CSA were randomized to receive either an initial dose of 5 mg isotopic bupivacaine 0.5% (group GH) or a dose of 2.5 mg of bupivacaine (group GL). Before spinal anaesthesia, patients received an infusion of 8 mL/kg/30 min of lactated Ringer’s solution. All patients received oxygen (3 L/min) during the procedure. Standard monitoring included heart rate, blood pressure and pulse oximetry. Subarachnoid puncture was performed with a 19-gauge Tuohy needle at the L4-5 interspace in sitting position, and 3 cm of a 22-gauge catheter was introduced cephalad. Bupivacaine was titrated until satisfactory sensory level was obtained (T12). Hypotension was defined as a decrease in SAP more than 25% of base-line value. It was treated with IV boluses of ephedrine 3 mg repeated every 3 min. Data were expressed in mean SD, median or percentage. Non parametric tests and Fischer exact test were used for comparison. p < 0.05 was considered significant.

Results and Discussion: Data of the first forty patients were analysed. Demographic data and surgical characteristics were similar in both groups. Incidence of hypotension and ephedrine use were similar in both groups (7/20 GL vs 8/20 Data of the first forty patients were analysed. Demographic data and surgical characteristics were similar in both groups. Incidence of hypotension and ephedrine use were similar in both groups (7/20 GL vs 8/20 Data of the first forty patients were analysed. Demographic data and surgical characteristics were similar in both groups. Incidence of hypotension and ephedrine use were similar in both groups (7/20 GL vs 8/20

Conclusion(s): Incidence of hypotension after CSA in patients undergoing hip fracture repair remained high whatever the initial dose of bupivacaine used. The study is continuing to confirm this result.

References:
 prick analgesia at T10, time for total regression of the spinal block and hemodynamic changes (mean arterial pressure-MAP, heart rate-HR) were recorded (t-test, Fisher’s exact test).

**Results and Discussion:** Patients characteristics and the surgical time were similar in both groups. No spinal block failure was reported. The onset of pin-prick analgesia at T10 was faster in group LF, 4 min. (3.12 min.) vs 7 min. (4.18 min.), p=0.03. Complete motor block (Bromage score 3) was achieved at 33% patients in LF group and at 88% patients in L group, p<0.001. The mean duration of motor block was longer in L group (131±39 min. vs 93±33 min., p=0.01). Complete regression of spinal block was longer in group LF, 210±14 min. vs 188±17 min., p=0.003. Incidence of MAP-decrease for more than 25% of baseline values was 15% in LF group, compared to 85% in L group, p<0.01; incidence of bradycardia was similar in both groups (p>0.05). No nausea, vomiting, neurologic complications or pruritus were recorded. No rescue analgesia was needed intraoperatively. The time for postoperative analgesic administration of 30 mg i.m. ketorolac was longer at group L (145±23 min. vs 110±17 min., p=0.004).

**Conclusion(s):** Levobupivacaine provides an adequate anesthesia for unilateral inguinal hernia repair; adding an opioid prolongates the sensory blockade.

**References:**

**8AP6-9**
**Ropivacaine and bupivacaine in spinal anesthesia for lower limb surgery**

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**Background and Goal of Study:** Many reports have described the use of spinal ropivacaine in orthopedic surgery. The aim of this study was to compare the effectiveness and safety of ropivacaine and bupivacaine to produce motor blockade (MB) in patients undergoing lower limb surgery. (20 vs 23).

**Materials and Methods:** Forty three patients were randomized to receive 15 mg of isobaric ropivacaine (n=23) or 10 mg of isobaric bupivacaine (n=20) for spinal anesthesia: Measurement: Onset time of complete MB, duration of MB, degree of MB determined by modified Bromage scale at the end of the surgery and percentage of patients that achieved a complete MB. Adverse effects and haemodynamic parameters were evaluated. We performed parametric and non-parametric statistical tests.

**Results and Discussion:** We obtained the following results (X±SD): *p<0.05, Data from the comparison between bupivacaine and ropivacaine.

<table>
<thead>
<tr>
<th></th>
<th>Ropivacaine (n=23)</th>
<th>Bupivacaine (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>32±18</td>
<td>35±20</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>78±12</td>
<td>78±15</td>
</tr>
<tr>
<td>Duration of surgery (min.)</td>
<td>74±30</td>
<td>69±29</td>
</tr>
<tr>
<td>Onset time of complete MB (min.)</td>
<td>18±10</td>
<td>21±13</td>
</tr>
<tr>
<td>Degree of MB (Bromage scale) (median)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Complete motor block (%)</td>
<td>100</td>
<td>85</td>
</tr>
</tbody>
</table>

There were not adverse effects or significant variation of haemodynamic parameters between groups.

**Conclusion(s):** Ropivacaine produced a significantly more rapid postoperative recovery of motor function than bupivacaine. We propose the use of ropivacaine for ambulatory surgery.

**Acknowledgements:** Anaesthesiologists, nurses and technical staff.

**References:**

**8AP6-10**
**Continuous spinal analgesia versus continuous femoral nerve block for total knee replacement. A randomised controlled trial**

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**Background and Goal of Study:** Continuous spinal analgesia (CSA) and continuous femoral nerve blockade (FNB) are well established procedures for postoperative pain relief after total knee replacement. However, up to now there is no data comparing these two methods concerning their efficacy in pain relief, adverse effects, complications and need for additional pain medication.

**Materials and Methods:** After approval by our university ethical committee patients undergoing total knee replacement were randomized into two treatment groups. Patients of the first group received intra- and postoperative analgesia via a spinal catheter. Patients of the second group received spinal analgesia intra-operatively and a femoral nerve catheter inserted in the recovery room for post-operative pain therapy. Primary endpoints were pain intensity according to the visual analogue scale for the first three postoperative days, total Piritramid consumption at 24h postoperatively and satisfaction. Secondary endpoints were knee-mobilisation, adverse effects and complications.

**Results and Discussion:** 62 patients scheduled for total knee replacement were randomised into two groups (CSA: n=30; FNB: n=32). The demographic data were comparable among the groups. Postoperative analgesia was excellent for both regimes without significant difference (p<0.05). We found a pain maximum between the 12th and 24th postoperative hour (CSA: mean VAS 17.3, 95%CI 11.0-23.7; FNB: mean VAS 24.1, 95%CI 18.4-30.7). Piritramid consumption was significantly higher in patients with FNB compared to CSA (FNB: 15.3mg, 95%CI 3.9-21.3; CSA 4.5, 95%CI 1.9-7.0) (p<0.01). No differences were noticed concerning postoperative mobility of the joint. We observed no adverse effects and complications related to the regional anesthetic regimen. Patients of both groups were equally satisfied (p>0.05).

**Conclusion(s):** Continuous spinal anesthesia and continuous femoral nerve block both demonstrated satisfactory effectiveness in postoperative pain relief in patients undergoing total knee replacement, despite an increased piritramid consumption in FNB-group. Decisions for or against CSA or FNB for total knee replacement should therefore be based on their potential risk profile.

**8AP6-11**
**Spinal anaesthesia with 4 mg versus 3 mg of hyperbaric bupivacaine + 10 mcg of fentanyl for adult anorectal surgery: Faster recovery with prolonged analgesia**

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**Background and Goal of Study:** The goal of the randomized controlled study was to test the hypothesis that addition of fentanyl to low-dose spinal hyperbaric bupivacaine enables to reduce the effective dose of bupivacaine with faster recovery and similar quality of anaesthesia for anorectal surgery.

**Materials and Methods:** The study included 132 adult consecutive ASA 1 – 3 patients. Spinal anaesthesia (SA) was induced in the sitting position at L3-4 or L4-5 with hyperbaric bupivacaine (Marcaine Spinal Heavy 0.5%) injected over 2 minutes: group S4 (n=66) 0.8 ml, group S3F (n=66) 0.6 ml +fentanyl 10 mg to 0.8 ml. After sitting for 10 minutes surgery was started. Following variables were assessed: rate of success, level and duration of sensory and motor block, time to voiding and ambulation, changes in mean BP and HR, complications, consumption of analgesics, quality of anaesthesia according to the patient and medical staff (0-2 score). Student’s t, Mann-Whitney, ANOVA, Kruskall-Wallis and χ2 tests were used where appropriate.

**Results and Discussion:** Groups were comparable in demographics. There was 1 case of failed block in group S3F. Characteristics of SA are presented in the table, mean±SD, no of cases (%), median (range), p<0.05 significant:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group S4</th>
<th>Group S3F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sens. block, domatoma</td>
<td>7.8±1.5</td>
<td>7.7±1.4</td>
</tr>
<tr>
<td>Motor block, scores</td>
<td>58 (87.9)</td>
<td>63 (96.9)</td>
</tr>
<tr>
<td>Duration (min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and 2</td>
<td>8 (12.1)</td>
<td>2 (35.1)</td>
</tr>
<tr>
<td>sensory block</td>
<td>213±36.5</td>
<td>212±36.5</td>
</tr>
<tr>
<td>motor block</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>analgesia</td>
<td>217±84.5</td>
<td>242±67.6</td>
</tr>
<tr>
<td>Time to urinate, min</td>
<td>269(120-900)*</td>
<td>315(160-1140)</td>
</tr>
</tbody>
</table>

*p<0.05 and p<0.2, *p<0.05 and p<0.75.

Quality of anaesthesia was comparable among groups. Pruritus was recorded in 4 cases of group S3F vs 0 in group S4 (p<0.05).

**Conclusion(s):** A combination of 3 mg of spinal hyperbaric bupivacaine with fentanyl produces an adequate level of anaesthesia similar as a dose of 4 mg but with faster recovery and prolonged analgesia for adult anorectal surgery.

Disclosure: I am employed as a consultant to Astrazeneca Lithuania representative.

**8AP7-1**
**Nerve stimulator guided paravertebral nerve block for unilateral inguinal hernia repair**

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Background and Goal of Study: The purpose of this study is to examine whether paravertebral nerve block (PNB) can provide enough analgesia – intraoperatively and postoperatively – without the need of general anaesthesia or any other analgesic drugs.

Materials and Methods: Fifteen patients of age 60-7 years, ASA II-III, were subjected in unilateral hernia repair independently of the hernia size. No invasive blood pressure (NIBP), heart rate (HR), ECG and pulse oximetry were monitored. Intraoperatively and postoperatively the visual analog scale (VAS) was our index of pain. Midazolam 1.5 mg and fentanyl 50 μg were given for light sedation. PNV was performed at the level of T12, L1 and L2. Initially the skin at each level was infiltrated with 2 ml of lidocaine 1%. The paravertebral space was identified using a 22-gauge short-level insulated needle connected with a nerve stimulator device 2.5 cm laterally of each spinous process. The initial current was set to 1.5 mA in a frequency of 2 Hz. On the right of the appropriate muscle con-tractions of the abdominal wall, the current was lowered down and the stimulus was slowly increased till the patient complained of the pain. The PNB at T12, L1 and L2 level can provide excellent analgesia either intraoperatively or postoperatively in hernia repair surgery independently of the hernia size.

8AP7-2
The effects on QT interval of intrathecal morphine added to bupivacaine for spinal anaesthesia
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Background and Goal of Study: Bupivacaine is an agent that is used mostly for spinal anaesthesia for its good analgesic properties, but many doses are used for the prevention of the cardiac arrhythmias. There is no literature can be found yet about the effects of intrathecal morphine on QT interval.

Methods and Materials: Sixty patients were randomly allocated into two groups. Group I (n=30) received 12.5 mg 0.5% hyperbaric bupivacaine and 0.3 mg 0.9% NaCl and Group II (n=30) received 12.5 mg 0.5% hyperbaric bupivacaine and 0.3 mg morphine hydrochloride for spinal anaesthesia. MAP, HR, sphygmomanometer block, motor block and ECOG recordings (with 12 derivations) were recorded at the pre and intraoperative time at basal, postspinal 30th, 5th, 10th, 15th, 20th, 25th, 30th mins and postoperatively 30th min, 2nd h, 6th h. The longest QT interval of all derivations of each ECG recording was measured by 2 anesthesiologists. R-R interval of the same ECG derivation was measured and then the corrected QT (QTC) interval calculated with Bazett’s formula (QTC= QTC time/radical R-R time). The measured and calculated data were recorded. VAS and side effects were recorded postoperatively 30 min, 2nd h, 6th h.

Results and Discussion: The demographic data of the groups were similar. The MAP and HR values of group I were lower than group II, but there was no need to give efdrin or atropin. The peak sensory block at dermatomal level was T6 at group I and T4 at group II. The reaching time of block to T10 dermatomal level was 5±0.6 min at group I and 4±0.3 min at group II. The two segment regressing time of block was 55.5± min at group I and 64.90± min at group II. Bromage scores of group II were faster and longer than group I. There were no difference between groups about QT interval. But QT interval of each group was significantly higher than basal values. QTC values of each group were higher than basal values, but QTC values of group II were significantly lower than group I at intraoperative 20th, 25th 30th mins. VAS scores were lower at group II than group I postoperatively.

Conclusion(s): We suggest that adding a cardio-protective opioid agent morphine to a local anaesthetic agent bupivacaine for spinal anaesthesia, may decrease arrhythmia incidence via providing shorter lengthening of QT interval, without hemodynamic changes.

8AP7-3
Total intravenous anesthesia vs spinal anesthesia in varicose vein surgery: Costs, patient satisfaction and postoperative pain
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Background and Goal of Study: Varicose vein surgery can be performed under local, general or regional anaesthesia. Our goal was to determine the advantage of spinal anaesthesia (SA) with L-bupivacaine and fentanyl over total intravenous anesthesia (TIVA) with propofol and fentanyl in patients undergoing varicose vein surgery. We analyzed anaesthesia recovery time, time to food and drink intake, ambulation and voiding, postoperative pain scores, patient satisfaction and costs.

Methods and Materials: After written consent, 40 ASA I and II patients with no relevant differences in age, sex or duration of surgery were enrolled in our randomized prospective study. All patients received midazolam 0.08mg/kg i.m. premedication, ECG, Spo2, NIBP were monitored. In TIVA group, anesthesia was induced with propofol 2mg/kg and fentanyl 3μg/kg i.v. LMA was inserted following induction and anesthesia maintained with propofol infusion 6mg/kg/h, with 50% O2 in air, SA group received 7.5mg 0.5% L-bupivacaine and 0.05mg fentanyl using 27G Whitacre spinal needle. Standard technique of saphenofemoral ligation with below-knee stripping of the long saphenous vein and multiple stab avulsions of varicosities was applied. Visual analogue scale (VAS) was used to measure pain intensity and overall patient satisfaction with the procedure. Student t test was used to compare all measured parameters.

Results and Discussion: Time to full consciousness in TIVA group was 75±6.9min, Time to eating (155.4±47,7 vs 281.4±126,4min, p<0.006), drinking (124.8±8,846 vs 263.2±122,9min, p<0.003) was shorter after SA. Time to ambulation (121.45± vs 216.5±182,0min, p<0.043) and voiding (618.6±125.2 vs Group A 17±5.5min, p<0.002) was shorter in TIVA group. TIVA group had higher postoperative pain scores and needed more analgesics than SA group in the first 6h.

VAS scores

<table>
<thead>
<tr>
<th></th>
<th>TIVA (mean±SD)</th>
<th>SA (mean±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 h</td>
<td>2.73±2.55</td>
<td>0.1±0.26</td>
</tr>
<tr>
<td>1h</td>
<td>2.33±1.65</td>
<td>1.23±1.46</td>
</tr>
<tr>
<td>6h</td>
<td>1.85±1.29</td>
<td>1.87±1.22</td>
</tr>
</tbody>
</table>

Conclusion(s): SA provided higher patient satisfaction, longer pain free interval and lower costs. Earlier home readiness in the TIVA group could be viewed as an advantage when the procedure is done on the day case basis.

8AP7-4
Local infiltration with levobupivacaine and ketamine versus levobupivacaine and parecoxib to patients undergoing hernia repair
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Anaesthesiology, Thriassio Hospital, Eleftheria, Attiki, Greece

Background and Goal of Study: Peripheral injection of NMDA receptors antagonists and non steroidal antiinflamatory drugs is known to suppress hyperalgesia. The aim of this study was to assess whether local infiltration of ketamine or parecoxib of the surgical trauma of hernia repair would better improve postoperative analgesia.

Materials and Methods: Sixty patients, ASA I-II, undergoing hernia repair under spinal anaesthesia were randomly allocated to 3 Groups of 20 patients each. The study was blinded as to the medication used. The local infiltration of the combination pharmacotherapy was done before cutting dermis. Patients in Group A were infiltrated with 20 ml levobupivacaine 0.5% + ketamine 0.5mg/kg i.v. + 10 ml parecoxib 40mg in water for injection 10 ml and Group B with 20 ml levobupivacaine 0.5% + parecoxib 40mg in water for injection 10 ml. Group C received 20 ml levobupivacaine 0.5% + 10 ml water for injection as placebo from the same route as Group A and B. Pethidine was used to control postoperative pain. The VAS score was measured 1,4,6,12 and 24h postoperatively, as also time of first analgesia requested was not differentiated in Groups A (10.8±7.99 < 0.05) decreased in Group B, rather than Group A (P<0.05) decreased in Group C (5.2±4.4 h), total dose of pethidine (95±36 mg) comparing to Group B (82±28 mg) and Group B significant decreased dose than Group C (196±40 mg).

Conclusion(s): The co-administration of ketamine 0.5mg/kg or parecoxib
40mg to levobupivacaine 0.5%, infiltrated into the surgical wound, improved the postoperative analgesia outcome in patients undergoing hernia repair. In addition, parecoxib seems to improve postoperative analgesia outcome to a higher level than ketamine.

8AP7-5
Regional analgesia in obstetric patients: More obstetric epidurals during night?
U. Spreng, V. Dahl
Department of Anaesthesiology and Intensive Care, Department of Anaesthesiology and Intensive Care/Asker and Baerum Hospital, Rud, Norway

Background and Goal of Study: The provision of analgesia in obstetric pa-
tients is an important task for anaesthesiologists. Many anaesthesiologists be-
lieve that obstetric analgesia is requested most often during night-time.
We have studied the frequency of obstetric regional analgesia during the 24 hour period.

Materials and Methods: The exact time for all obstetric regional procedures at
our hospital was registered retrospectively from 2000 to 2004. Obstetric anaes-
thesia and analgesia for elective caesarean delivery was left out. The 24 hour period was divided into daytime (07.00-18.59), evening (19.00-00.59) and night-
time (01.00-06.59).

Results and Discussion: From 2000 to 2004, 9567 babies were born at our hospital (540 of these by elective caesarean delivery). In the same period, 3801 women with planned vaginal deliveries received regional analgesia (40,1%). Of these patients, 3767 received epidural analgesia and 34 women got spinal analgesia or combined spinal/epidural analgesia. In 267 cases, the exact time of the regional analgesia procedure was not registered. Of the 3534 time-registered procedures 1831 (51.8%) were carried out during daytime, 789 (22.3%) during evening and 914 (25.9%) during night-time. In the period between 11.00 and 14.00, just before midnight and in the time between 04.00 and 06.00, the request for regional analgesia was higher than average.

Conclusion(s): At our obstetric department, the frequency of obstetric regional analgesia is nearly the same throughout the 24 hour period. In the early morning hours obstetric analgesia is slightly more often required than average. One possible explanation for these findings is that the patient and her partner and/or the midwife are more exhausted during a long and hard nightshift. However, it is important to emphasize that most of the obstetric regional procedures are done at noon-time and not during night, contrary to what many anaesthesiologists believe. A probable reason for this belief can be that the anaesthesiologists best remember the epidurals and spinals which are carried out at night-time.

8AP7-6
Effect of anesthesia upon major reconstructive surgery on beta-herpesviruses activation
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Background and Goal of Study: The aim of this study was to investigate the
frequency of beta-Herpesviruses activation in patients under long-lasting general or regional anaesthesia.

Materials and Methods: 17 patients (16 - 65 years) treated in Latvian Centre of reconstructive and microsurgery were undergoing major reconstructive mi-
cro-surgical procedures. For 11 patients GA group and for 6 patients RA group was used. All patients had complicated previous history (7-15 surgical proce-
dures under general anaesthesias during 1-year period) from initial trauma until
was used. All patients had complicated previous history (7-15 surgical proce-
cedures).

Results and Discussion: Before surgery: all 17 patients had latent/persistent
in orthopaedic surgery, despite its advantages. Many patients do not have any
preference regarding choice of anaesthetic and may be influenced by the rec-
ommendations and beliefs of the surgeons, whose opinion may vary widely (1).
We are not aware of any previous surveys in UK and Ireland looking at or-
thopaedic surgeons’ attitude and knowledge regarding regional anaesthesia.
We therefore carried out a postal survey of the British orthopaedic surgeons’
attitudes and knowledge regarding regional anaesthesia. A postal based questionnaire (2) was sent to 541(30%) currently practicing orthopaedic surgeons - members of the British orthopaedic association (BQA) within the UK and Ireland. The surgeons were
asked whether they discussed mode of anaesthesia, postoperative analgesia and regional anaesthesia with their patients.

Results and Discussion: Two hundred and twenty five questionnaires
were returned, a response rate of 41%, of which 188 (96%) respondents were males and 8 (4%) were female surgeons. Ninety three percent of the respondents
were trained in the United Kingdom and 22 (10%) no longer practiced orthopaedics.
Table 1 shows that British orthopaedic surgeons’ commonly discuss mode of
anaesthesia, postoperative analgesia and regional anaesthesia with their pa-
tients.
Abstract A8P7-10 – Figure 1

Conclusion(s): The surgeons establish a rapport with the patient well in advance of surgery and this maybe an important factor influencing patient anaesthetic choice (1). Anaesthetists may meet the patient only on the day of surgery and patient expectations at this time can lead to confusion and anxiety. Although much has been written regarding patient preferences, very little information is available on surgeons’ attitudes toward regional anaesthesia. This survey suggests that orthopaedic surgeons may influence the patient’s choice of anaesthesia. Futher study is on the way to determine whether surgeons direct patients to have a general or regional anaesthesia.

References:

8A8P7-9

Critical incident reports concerning regional anaesthesia: Analysis of the UK National Reporting and Learning System (NRLS) data from 2006
K. Cide, J. Arnot-Smith, A. Smith
Anaesthesia, Royal Lancaster Infirmary, Lancaster, United Kingdom

Background and Goal of Study: Incident reporting is a key factor in improving patient safety in anaesthesia. The UK National Patient Safety Agency (NPSA) set up the National Reporting and Learning System (NRLS) to identify and learn from adverse incidents nationally. We aimed to extract and analyse the incidents relating to regional anaesthesia.

Materials and Methods: The NPSA provided us with a Microsoft Excel® spreadsheet containing anonymised anaesthetic and surgical incidents from the calendar year 2006 (n=30,724). Using the database’s ‘Find’ function, we applied in sequence 23 key words relating to regional anaesthesia and individual blocks until no further records were found. These reports were reviewed for relevance then categorized by site of block, nature and severity of incident.

Results and Discussion: We identified 243 incidents. The major categories are shown in the Table. 52 (21%) were categorised as having caused moderate or severe harm to the patient.

Critical incident reports involving regional anaesthesia

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Epidural</th>
<th>Spinal</th>
<th>Femoral</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription/dosing problems</td>
<td>34</td>
<td>3</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>Block inserted on wrong side</td>
<td>–</td>
<td>–</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Poor attendance/lack of staff</td>
<td>26</td>
<td>–</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Equipment/drugs not available</td>
<td>25</td>
<td>2</td>
<td>–</td>
<td>5</td>
</tr>
<tr>
<td>No/poor effect of block</td>
<td>1</td>
<td>8</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Failure of insertion</td>
<td>–</td>
<td>11</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Patient fall injury</td>
<td>5</td>
<td>6</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>Nerve injury</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>Exaggerated physiological response</td>
<td>7</td>
<td>6</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Antipressor/antiemetic drug problems</td>
<td>3</td>
<td>8</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Conclusion(s): This initial high-level analysis has provided a framework to allow us to begin identifying and sharing the learning points for improving patient safety in regional anaesthesia. It is of interest that most of the reported incidents relate to broader issues such as global management of patients receiving regional blocks rather than technical problems during insertion.

Acknowledgements: We would like to thank the NPSA for their assistance.

8A8P7-10

A survey of British orthopaedic surgeons’ perception of regional anaesthetic techniques
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Background and Goal of Study: Regional anaesthesia has become increasingly popular because it provides excellent surgical anaesthesia and post operative pain relief (1). Despite the perceived popularity, regional anaesthesia is not used universally in trauma and orthopaedic surgery. We postulate that this may be due to lack of awareness amongst the surgeons about the advantages of regional anaesthesia or lack of familiarity with the technique. We therefore conducted a survey of the British orthopaedic association members to determine their views regarding regional anaesthesia as a sole anaesthetic technique.

Materials and Methods: A postal based questionnaire [2] was sent to 541(26%) currently practicing British Orthopaedic Association (BOA) members within the UK and Ireland. The Surgeons’ views were sought on advantages/disadvantages of regional anaesthesia as a sole anaesthetic technique on a five point categorical scale (Agree, Strongly Agree, Disagree, Strongly Disagree, No Comments).

Results and Discussion: A total of 541 questionnaires were mailed, 225 were returned (41% response rate). The majority of the respondents were males (96%) and forty six percent had more than twenty years clinical experience. Figure 1 below shows the perception of surgeons regarding regional anaesthesia.

Conclusion(s): This survey suggests that orthopaedic surgeons have a positive perception of regional anaesthesia and recognize the benefits of regional anaesthetic technique. The respondents tended to agree that regional anaesthesia is safer and is associated with less post operative nausea and vomiting (PONV) and increased patient satisfaction. However barriers to increased popularity include perceived delays of the theatre list and unreliability of the technique.

References:

8A8P7-11

SIH treatment with lumbar epidural blood patch (LEBP) under fluoroscopy guidance
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Anaesthesia and Rianimation, Niguarda Hospital, Milano, Italy

Background and Goal of Study: To evaluate the efficacy and safety of LEBP performed under fluoroscopy guidance.

Materials and Methods: Since 1992 we treated with LEBP 35 patients with spontaneous intracranial hypotension (SIH). In the last 7 patients (20%), LEBP was performed under fluoroscopy guidance with lopamidol to localize the epidural space. All patients maintained a 30° Trendelenburg position since an hour before the procedure and for 24 hours after. LEBP was given to the patients with head down about 30° in prone position, after infusion of 500 ml of crystalloids. The correct site of injection was determined by means of metallic detect and confirmed by fluoroscopy. After local anaesthesia with Lidocain 2% 5 ml,
Anaesthesia was maintained with halothane (1.5 vol%) or isoflurane (1.7 vol%) during three consecutive days. A controlled, blinded, experimental study was performed.

### Materials and Methods:
A controlled, blinded, experimental study was performed in twenty mice that received intraperitoneal injections of etomidate, the cannabinoid-receptor agonist arachidonyl-2-chloroethyamine (ACEA), the cannabinoid-receptor agonist JWH 133 alone, and both ACEA and JWH 133 combined with etomidate, respectively. Each drug combination was applied to six to eight mice of these twenty study animals. The cannabinoid-receptor antagonist AM 251 and cannabinoid2-receptor antagonist AM 630 were administered 10 min before the delivery of ACEA and JWH 133, respectively. Sedation was monitored by Rotad-rod. Isolographic analysis was used for evaluation of pharmacologic interaction.

### Results and Discussion:
Single drug administration of etomidate and ACEA produced a dose- and time-dependent decrease of Rotad-rod time ($p < 0.05$). No sedative effect was seen after JWH 133. Etomidate-induced sedation was significantly increased and prolonged with ACEA ($p < 0.05$), but not with JWH 133. Isolographic analysis revealed an additive interaction between ACEA and etomidate that was antagonized by the cannabinoid2-receptor antagonist AM 251. The cannabinoid1-receptor antagonist had no effect on etomidate alone.

### Conclusion(s):
Etomidate-induced sedation was increased and prolonged by activation of the cannabinoid2-receptor, but not of the cannabinoid1-receptor in mice. However, this interaction was only additive.

### References:
AMPAR-Receptor-signaling as a potential clinical applicable antagonist. The purpose of our study was to investigate the potential effect of Lidocaine on AMPAR-signaling in human pain syndromes in the daily routine. The effect of lidocaine on recombinant human AMPA-receptor signalling was demonstrated by GluR1-Subtype (GluR1 and GluR3) recombinantly expressed in Xenopus laevis oocytes in the absence of other mentionable receptors. After the RNA-injection seven days were necessary allowing the cells for receptor expression. In the first step inwards currents induced by kainate (10^{-3} M) in Barium-Tyrodes-Solution were measured by the established 2-electrodes voltage clamp method. Then the cells were incubated on the one side in Lidocaine (10^{-4} M) or on the other side in Barium-Tyrodes-Solution. After 10 minutes inwards currents induced by kainate (10^{-3} M) were measured again and compared to control measurement of the same cell.

Results and Discussion:

Our results show non significant differences between the control cells and the cells incubated in Lidocaine (10^{-4} M) for ten minutes. (Data for GluR1-Subtype lidocaine 10^{-4} M not shown).

Conclusion(s): Our results show that Lidocaine is not effecting the signaling of human AMPA-Receptor subtypes GluR1 and GluR3 rekombinantly expressed in the Xenopus laevis model. Interestingly we have already shown an inhibitory effect for Lidocaine on NMDAR-signaling, as one member of the glutamine receptor group [4].

References:

9AP1-7
Sevoflurane-induced reduction of nitric oxide in the rat brain striatum is antagonized by nicotine and neostigmine, but not by NMMA
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Background and Goal of Study: Previous investigation demonstrated that volatile anesthetics increased the extracellular concentration of dopamine metabolites and the dopamine turnover might be accelerated during anesthesia (1). We speculated that the effect of diffusional transmission of nitric oxide (NO) induced the metabolic change. In the current investigation, we studied the effect of sevoflurane anesthesia on the NO release and the relationships between NO and acetylcholine- or NMMA-regulated activities in the rat striatum using in vivo microdialysis experiments.

Materials and Methods: Male Sprague-Dawley rats, weighing 280-320 g, were used. Microdialysis probe was inserted into the right striatum and perfused with modified Ringer solution after recovering from the surgery. Samples were collected every 15 min and directly injected into an online analytical HPLC system. NO2- and NO3- (NOx) were mixed with a Griess reagent to form a purple azo dye and the absorbance was measured by a flow-through spectrophotometer. The rats were freely moving and anesthesia was induced by inhalation of 1 or 3% sevoflurane for 45 min. Nicotine (0.3 or 1 mg/kg) was administered intraperitoneally and neostigmine (1 or 10 microM) and NMMA (100 microM) were administered with perfusate.

Results and Discussion: Sevoflurane decreased NOx in a dose dependent manner (see figure 1). Administration of nicotine and neostigmine showed no marked effect on the basal NOx release, however, diminished sevoflurane-induced NOx decrease in a dose response manner. NMMA perfusion showed a tendency to increase NOx release, however, the perfusate demonstrated no significant effect on the concentration of NOx during sevoflurane anesthesia.

Conclusion(s): The results of current investigation demonstrated that sevoflurane anesthesia might decrease NO release and the effect was antagonized by nicotine and neostigmine administration. The changes might be modified by
Materials and Methods:
metastatic capability and growth of pre-existing tumour cells. A thiotic agent may be important in the view of mutagenic potential, impaired cancer cells were grown in monolayer in humidified atmosphere of 5% CO2 and Anaesthesiology and ICU, Clinical Hospital Osijek, Osijek, Croatia
S. Kvolik, B. Dobrosec, S. Marczi, L. Prlic, L. Glavas-Obrovac
sphingomyelinase activity
Caco-2 and Hep-2 cells and influence neutral and acid sphingomyelinase
Sevoflurane and halothane increase number of apoptotic tumour cells. The activities of aSMase and nSMase in tumour cells are different than reported in normal cells. Changes in catalytic activities of constitutive enzymes nSMase and aSMase may influence apoptotic signalling in tumour cells exposed to sevoflurane and halothane.

References:

9AP1-8
Sevoflurane and halothane increase number of apoptotic Caco-2 and Hep-2 cells and influence neutral and acid sphingomyelinase activity
S. Kvolik, D. Dobrosec, S. Marczi, L. Prlic, L. Glavas-Obrovac
Anesthesiology and ICU, Clinical Hospital Osijek, Osijek, Croatia

Background and Goal of Study: In the clinical setting the choice of the anesthetic agent may be important in the view of mutagenic potential, impaired metastatic capability and growth of pre-existing tumour cells. 

Materials and Methods: The human colon (Caco-2) and laryngeal (Hep-2) cancer cells were grown in monolayer in humidified atmosphere of 5% CO2 and exposed to sevoflurane 3 vol% and halothane 1.5 vol% in a gas mixture consisting of O2/N2/O2CO2 (35/60.5 vol%). One group of cells was evaluated after exposure, and the other 24 h later. Apoptosis was determined in 1×10⁶ cells by flow cytometry using Vybrant Apoptosis Assay kit. For the measurement of acid sphingomyelinase (aSMase) and neutral sphingomyelinase (nSMase) activity 1×10⁶ cells were exposed to aSMase or nSMase and neutral asSMase and neutral sphingomyelinase (nSMase) activity 1×10⁶ cells were exposed to anesthetics for 2 h, harvested, washed and homogenized in the lysis buffer. The homogenate was centrifuged at 100,000 g for 1 h at 4 °C. The supernatant was used as an enzyme source. Into 15 μl aliquots methyl-[¹⁴C] sphingomyelin (53 mCi/mmol) was added, and incubated for 2 h in the buffers for asSMase and nSMase. The reaction was stopped by chloroform/methanol mixture. Radioactive phosphocholine was determined in the liquid scintillation counter. All results were compared with controls. Data were analyzed by Mann-Whitney and Kruskal-Wallis tests.

Results and Discussion: In control cells apoptosis was 3-3.5%. An increase in the number of apoptotic cells was observed in all experiments, and was significant in Caco-2 cells. After 2 h of exposure 3.0% of cells exposed to sevoflurane were apoptotic (ns.), and increased to 16.9% (p=0.04) after 24 h. In cells Caco-2 exposed to halothane 2 h 7% cells were apoptotic (p=0.03), and 16.5% (ns.) after 24 h incubation. In the control cells the activity of aSMase was higher vs. nSMase 2.3-fold in Hep-2 cells and 2.9-fold in Caco-2 cells. Sevoflurane decreased nSMase activity in Caco-2 cells after 24 h (85% of control, ns), and aSMase activity in Caco-2 (69%) and Hep-2 cells after 24 h (54.2%; ns, p=0.06). Halothane decreased nSMase in Caco-2 cells (48%, p=0.22), in Hep-2 cells (44.4%; p=0.12), and aSMase in Hep-ceils both 1 h after exposure (43.6%) and after 24 h (45.1%; p=0.06). 

Conclusion(s): Sevoflurane and halothane increase number of apoptotic tumour cells. The activities of aSMase and nSMase in tumour cells are different than reported in normal cells. Changes in catalytic activities of constitutive enzymes nSMase and aSMase may influence apoptotic signalling in tumour cells exposed to sevoflurane and halothane.

References:

9AP2-1
Sleep deprivation reduces the minimum alveolar concentration of halothane in rats
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Background and Goal of Study: Several physiological and pharmacological variables alter minimum alveolar concentration (MAC), including old age, anemia or hypoxemia. Those factors can be seen in critical patients receiving anesthesia by volatile anaesthetics. Sleep deprivation is an usual problem in critical patients that would deteriorate cardiovascular, endocrine and immune system.

In the literature research, there is little reports showing the influence between sleep deprivation and variation of minimum alveolar concentration. We
hypothesize that total sleep deprivation (TSD) in rats would reduce the MAC of halothane.

Materials and Methods: Forty rats, weighting 367±21g (mean ± SD), were randomly allocated into two groups. A total sleep deprivation was performed by the disc-on-water method. Two conditions were set, 7 days rest was condition I, and 7 days TSD was condition II. Firstly, Group A rats experienced condition I, and Group B rats experienced condition II. Both groups took 5 days rest for recovery. Finally, condition I was set for group A, whereas condition I was set for group B. Anesthesia with halothane was given to each group for measuring MAC on the day before and after each condition. Baseline MAC value and body weight were obtained before the experiment.

Results and Discussion: After TSD, the MAC of halothane decreased by 25±6% significantly, and body weight decreased by 13±3% (P<0.01) in both groups, comparing with the baseline. These changes were not significantly different between two groups. Body weight and halothane MAC value of rats returned to original values in group B after adequate sleep, but five rats in group B continued to exhibit body weight loss.

Conclusion(s): In comparison with the normal sleep condition, TSD decreased halothane requirement, which corresponded to a lower MAC value. Several investigations have found that prolonged sleep deprivation induces a markedly increasing in immune-related response: for example, blood leukocytes, serum cytokines, and serum immunoglobulins; moreover, those inflammatory factors play an important role in sepsis. Besides, Allaouchiche et al reported that a significant decrease of MAC can be seen in septic pigs. In conclusion, TSD inducing inflammation response associated with septic cascades has taken a critical part in decreasing MAC of halothane in our investigation.

9AP2-2 Efficacy of Abbott, Braun, Schering and Zeneca propofol evaluated with BIS (Hospital Universitario de Canarias Tenerife-Spain)

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Background and Goal of Study: The aim of this study is to compare propofol of different laboratories (Abbott, Braun, Schering and Zeneca) during the induction of the anaesthesia. For that purpose two variables are defined: 1- the peak effect of propofol at the minimal BIS reached during the induction and 2 - the time of peak effect of propofol like the seconds passed from the beginning of the infusion of propofol to reaching the minimal BIS. There is few bibliography concerning different formulations comparison, there we find the relevance of our study.

Materials and Methods: In this randomized, double blind trial, 4 groups (Abbott, Braun, Schering and Zeneca) of 5 women, ASA I-II, between 18 and 60 years, scheduled for gynecological surgery, after obtaining written informed consent, are studied. They had no history of hypertension, liver or neurological disease, or chronic intake of psychiatric medication or abuse in consumption alcohol. The anesthesia is induced with atropine 0,01 mg/kg, fentanyl 2 mg/kg, propofol 4 microg/ml target in biofase and cis-atracurio 0,2 mg/kg. The induction finalizes when the propofol target concentration is reached. Propofol with TCI Graseby 3500 is administered (Medical Graseby, Herts., UK) according to model of Marsh et al. of Rugloop v.1.3 anesthesia monitor and controller installed in lap-top. The BIS data were registered with a monitor of electroencephalography Aspect A-1000, version 3.12 (Medical Aspect System, Natick, MA, the USA) and gathered in Rugloop v. 1.3 at intervals of 10 sg.

Results and Discussion: The averages of peak effect and the time of peak effect for each laboratory were calculated, comparing itself to each other by ANOVA and test post hoc of Bonferroni. It was considered significant p< 0.05. Significant differences in the peak effect of Abbott respect to Braun (p< 0.05) and Schering (p< 0.01) and in the time of peak effect of Schering respect to Braun (p< 0.05), Zeneca (p< 0.01) and Abbott (p< 0.01) were founded.

Conclusion(s): The peak effect of propofol of Abbott is greater than the one of Braun and Shering. The time of peak effect of Schering’s propofol is longer than the one of Abbott, Zeneca and Braun.

9AP2-3 Use of Xenon in combination with Isoflurane for general anaesthesia in adults: Prospective randomized clinical trial

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Background and Goal of Study: Xenon anaesthesia is associated with high cardiovascular stability and rapid recovery. Insufficient analytic, myoplegic properties and price are considered disadvantages. The aim of this trial was to investigate the effects of anaesthesia with Xenon-isoflurane combination.

Materials and Methods: 168 patients aged 50-70 years (ASA II - III) undergoing elective total hip replacement were randomly allocated to xenon (Xe, 1 MAC), isoflurane (ISO,1 MAC) or xenon-isoflurane (Xe-ISO, 0.5 MAC Xe; 0.4 MAC ISO) groups. For maintenance and control of anaesthesia a computerized anaesthesia system (Axeoma™, Alla-Implex Oy, Finland) was used. Supplemental fentanyl was given according to clinical need. We examined BIS index, haemodynamic profile (impedance cardiography), xenon consumption, time of recovery and adverse effects.

Results and Discussion: Xe group: BIS-index was lower, than in other groups (27(4); p<0.001; M [sd]; mean arterial pressure (MAP) (98 [8] mmHg) and stroke volume index (SVI) (37 [3] ml/m²) were higher, than after induction (MAP – 75 [7] mm Hg; SVI – 31 [3] ml/m²; p<0.001), cardiac output index (CI) was reduced due to decrease of heart rate (81 [6]; 62 [6]; p<0.001), no deficit of O₂ delivery (lactate concentration (LG) in the end of surgery - 1.1 (0.3) mmol/l; Xe consumption was 11 (10;12) ml/kg (CI)). No differences were found between groups in the 1-st day after surgery. Extubation time was equal (14 (11;16) min; 15 (11;16) min; 14 (12;16) min); frequency of nausea was 18%; 21% (p=0.885); 16% (p=0.966; 0.661). Only one patient in ISO group had vomiting (p=0.986; 0.993); “sleepiness” was marked in 29%, 47% (p= 0.07), 35% (p=0.597; 0.287). No SAE were found in any groups.

Conclusion(s): Use of Xenon in combination with Isoflurane for general anaesthesia can be safe and effective like Xenon or Isoflurane separately. Xenon consumption is reduced without compromising cardiovascular benefits and the high quality of early postoperative period.

9AP2-4 Increased volatile anaesthetic requirement in short-sleeping drosophila

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Background and Goal of Study: Anaesthesia and sleep share remarkable physiological and behavioral similarities. Therefore, molecular targets associated with sleep regulation are of strong interest for anaesthesiology research. Mutagenesis screening in Drosophila identified a line termed minisleep that exhibits an extreme short-sleeping phenotype. The aim of our study was to investigate whether this mutation affects the sensitivity of Drosophila to the volatile anaesthetic sevoflurane.

Materials and Methods: Drosophila stocks used were Shmns, Sh102, Sh120 (different) mutant alleles of the Shaker locus encoding the alpha subunit of a tetrameric voltage-dependent potassium channel and wild-type. Sleep and wakefulness were determined from individual fruit flies placed in a Drosophila activity monitor system. Students’ t-test was used to assess statistically significant differences for periods of sleep and wakefulness between Drosophila strains. To determine the sensitivity of wild-type and mutants to sevoflurane, we measured at various concentrations ranging from 0.2% to 4% sevoflurane. Based on the response of the flies at different concentrations of sevoflurane, concentration-response curves were generated according to the method of Waard for quantal logic responses.

Results and Discussion: The anaesthetic requirement was statistically significant increased in fruit flies expressing the short-sleeping phenotype compared to wild-type Drosophila. Moreover, EC50 values of sevoflurane were associated with the severity of the short-sleeping phenotype. The differences in the
Sevoflurane EC50 of short-sleeping and wild-type Drosophila calculated from dose-response curves

<table>
<thead>
<tr>
<th>Strain</th>
<th>Sevoflurane EC50 (95% confidence interval)</th>
<th>p values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wild type (n=522)</td>
<td>1.038 (1.180 to 1.416)</td>
<td>0.00005 compared to wild-type</td>
</tr>
<tr>
<td>Sh102 (n=282)</td>
<td>1.619 (1.529 to 1.711)</td>
<td>0.00005 compared to wild-type</td>
</tr>
<tr>
<td>Shmns (n=550)</td>
<td>2.013 (1.868 to 2.158)</td>
<td>0.00005 compared to wild-type</td>
</tr>
<tr>
<td>Sh120 (n=292)</td>
<td>2.349 (2.177 to 2.482)</td>
<td>0.00005 compared to wild-type</td>
</tr>
</tbody>
</table>

anaesthetic requirement of Shmns, Sh102, and Sh120 were also found to be statistically significant. The results are summarized in Table. Our results support the hypothesis that neuronal networks involved in regulation of endogenous sleep also modulate traits that define anaesthesia.

Conclusion(s): We showed that a mutation in a voltage-gated potassium channel powerfully affects the anaesthetic requirement of Drosophila.

References:

9AP2-5
CSI response to high propofol concentrations is related to dog’s weight
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Background and Goal of Study: Dogs have different metabolism depending on their weight, which is related with the drug distribution. In this study, the relation between dog’s weight and drug effect was analysed, considering different concentrations of propofol and the Cerebral State Index of the EEG (CSI).

Materials and Methods: We used data from 13 dogs, anesthetized using plasma propofol TCI (Betsis [1]). Data were collected using Rugged Loop II® software every 5 s. Induction was performed with a propofol infusion of 200 m/hr until loss of corneal reflex, after this anaesthesia was maintained with successive target plasma concentrations (3, 4, 5, 6, 7, 9 and 11 µg/ml). 5 minutes in each target, the infusion stopped when dog was deep, without corneal reflex. It is possible the study finish before 11 µg/ml. Data are presented as mean ± sd. A second order polynomial model was adjusted between dog’s weight and CSI values in the highest propofol target reached (average of last minute). The model was fitted using the data of the first 9 dogs, and tested in the data of the last 4 dogs.

Results and Discussion: Data were from 13 dogs, weight 25.1±5.4 kg, all male. At baseline mean arterial pressure was 97±12 mmHg, and heart rate was 93±21.4 bpm. Duration of study was 39.6±15.1 min. The training error (mean absolute error) was 5.4 and the testing error was 5.0.

Conclusion(s): This study shows that the minimum CSI achieved in high propofol concentrations in dogs was related with dogs’ weight. Dogs around 26 kg had higher values of CSI, than other dogs.

Acknowledgements: FCT, Portugal.

References:

9AP2-6
First human administration of JM1232, a novel isoindoline derivative benzodiazepine agonist
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Background and Goal of Study: We evaluated isoindoline compounds in search of a water soluble hypnotic compound with potential for sedation and anaesthesia. Following appropriate pre-clinical testing we studied a lead compound, JM1232, (--)3-[2-(4-methyl-1-piperazin)-2-phenyl]-3,5,6,7-tetrahydrocyclopenta[isoindolin]-12(1H)-one, in man.

Materials and Methods: Adult male volunteers received a single IV infusion of JM1232 0.05, 0.1, 0.2, 0.4 or 0.8mg/kg over 10min in a blinded ascending dose study with four subjects per dose level of whom one received a saline placebo. Arterial blood samples were collected at 0, 5, 1, 2, 3, 5, 8, 10, 15, 20, 25, 40 and 70min post-dose. Pharmacokinetic analysis was performed using NONMEM and RECOVER.

Results and Discussion: Sedation was seen at all dose levels, larger doses of JM1232 produced a deeper and longer reduction in Bispectral Index, BIS, Figure 1.

Figure 1. BIS in adult males receiving a 10min infusion of JM1232. Times are min after the start of infusion. Each line represents the averaged BIS score of three subjects receiving the same dose. Preliminary NONMEM modelling yielded a 3-compartment model. Typical population parameter estimates were: V1 =8.32 L, k01=0.094 min−1, k12=0.1959 min−1, k13 =0.07957 min−1, k21 =0.065 min−1, k30=0.01508 min−1. Simulated contact sensitive half-times after 10, 30, 60 and 120 minutes of infusion were 3.5, 11, 24 and 36 min, respectively. No serious adverse events occurred.

Conclusion(s): JM1232 is hypnotic in man with rapid onset and a short duration of action.

Acknowledgements: We are grateful to clinical colleagues, nursing and technical staff who assisted in administering sedation, maintaining safety, collecting data and conducting the study. This study was funded by Maruishi Pharmaceutical Company, Japan, which invented and developed JM1232.

Disclosure: All of the authors are either employees of the manufacturer or contracted as consultants to undertake this study.

References:

9AP2-7
Pentobarbital-induced reduction of nitric oxide in the rat brain striatum was antagonized by nicotine and NMWA
Y. Adachi, T. Itagaki, Y. Obata, Y. Shirai, S. Sato
Intensive Care Unit of University Hospital, Hamamatsu University School of Medicine, Hamamatsu, Shizuoka, Japan

Background and Goal of Study: Pentobarbital (PB) induces various changes in the concentration of neurotransmitter in the brain. Previous our investigation demonstrated that PB decreased the extracellular concentration of dopamine (DA) and PB antagonized k-DOPA-induced DA release (1). PB might decrease nitric oxide (NO) concentration by the reduction of acetylcholine (Ach) release (2). In the current investigation, we studied the effect of PB on the NO release and the relationship between NO and Ach and NMWA in the rat striatum using in vivo microdialysis experiments.

Materials and Methods: Male Sprague-Dawley rats, weighing 280-320 g, were used. Microdialysis probe was inserted into the right striatum and perfused with modified Ringer solution after recovering from the surgery. Samples were collected every 15 min and directly injected into an online analytical HPLC system. NO2- and NO3- (NOx) were mixed with a Griess reagent to form a purple azo dye and the absorbance was measured by a flow-through spectrophotometer. The rats were freely moving and PB and nicotine (0.3 and 1 mg/kg) were administered intraperitoneally. NMWA (100 microM) were applied with perfusate.

Reference:
Results and Discussion: PB decreased NOx in a dose dependent manner. Administration of nicotine showed no apparent effect on the basal NOx release and significant antagonistic effect of PB-induced NOx reduction.

Conclusion(s): The results of current investigation demonstrated that PB might decrease NO release by the reduction of cholinergic activity. NOx perfusion did not induce apparent change in NO concentration, whereas, NMDA increased NO release that decreased by PB administration. The enhancement of NO production by NMDA receptor activation might be diminished by acute desensitization (3) and PB has possibility to inhibit the desensitization.

References:

9AP2-9
Women require more propofol for LOC (Loss of consciousness) than men
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Background and Goal of Study: It is known that female patients have a faster decline in plasma propofol at the end of infusion than men, this partially explains the earlier recovery. In a retrospective study we investigated if gender influenced the time to loss of consciousness (LOC) following induction of anesthesia with propofol.

Materials and Methods: Data was gathered from 160 patients submitted to general anesthesia. Remifentanil was given by TCI to achieve a predicted effect site concentration of 2.5ug/mL, followed by 1% propofol at a constant rate of 200mg/h until LOC. LOC was defined as loss of eye opening to name calling and tapping on the forehead. Schnider’s PK model was used to calculate plasma end effect site propofol concentrations. RUGLOOP® was used to drive the drugs’ pumps and to collect data (every 5 s). Demographics, BIS and LOC, propofol consumption (volume infused, mL), were the recorded variables. Data was analyzed using Student’s t-test. P<0.05 for significance.

Results and Discussion: There were 17 patients in the male group (82±7 years, 76±11 kg, ASA 1–3) and 13 in the female group (45±20 years, 58±9 kg, ASA 1–4). Men were significantly older and heavier. Women required more propofol for LOC but propofol concentrations, time and BIS at LOC did not differ between the two groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Consec Conc Propofol mg/kg</th>
<th>Plasmatic Conc Propofol μg/mL</th>
<th>Total volume infused mL</th>
<th>BIS at LOC</th>
<th>Time to LOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3.6±1.2</td>
<td>7.5±1</td>
<td>1±0.34</td>
<td>7.5±2</td>
<td>73±13±4</td>
</tr>
<tr>
<td>Female</td>
<td>3.3±0.7</td>
<td>7±0.9</td>
<td>1.2±0.2*</td>
<td>7±1.3</td>
<td>68.6±12.7</td>
</tr>
</tbody>
</table>

*p<0.05.

Conclusion(s): In our study women require more propofol than men for induction of anesthesia. The fact that we found a difference in the dose of propofol required for LOC but not in propofol predicted concentrations, is probably because the Schnider’s PK model takes in account gender differences. One possible confounding factor in our study is age: men were older and this may influence the results. Our study suggests that there is a gender difference to propofol requirements at induction, a factor that is of clinical relevance. More studies must be done, using a bigger sample with closer ages, so that further conclusions can be taken.

References:

9AP3-1
The impact of rocuronium bromide on bacterial growth
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Background and Goal of Study: Drugs used in anaesthesia and intensive care may support bacterial growth (1). Rocuronium has a new antidote Sugammadex (Org 25969), that may increase its use. Rocuronium is available in multi dose vials that increase infection risk if contaminated. In this study we investigated the impact of rocuronium on bacterial growth at room temperature.

Materials and Methods: The growth of Staphylococcus aureus (ATCC 29232), Escherichia coli (ATCC 25922), Pseudomonas aeruginosa (ATCC 27853), clinical isolates of metallo-β-lactamase producing P. aeruginosa, MRSA, and ESBL. E. coli in rocuronium was investigated. Ten μL bacterial suspension was inoculated into 1 ml rocuronium bromide 10 mg mL⁻¹ (N.V. Organon, Oss, Holland) and kept at room temperature. The initial bacterial count

Table 1. Score of the “picking up matches”, orientation, sedation and sitting ability before and at specific time points after the anesthesia in the Control and the Physo group

<table>
<thead>
<tr>
<th>Group</th>
<th>Picking up matches</th>
<th>Orientation</th>
<th>Sedation</th>
<th>Sitting Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basline anesthesia</td>
<td>Control 9±4±5</td>
<td>4 (4.0-4.0)</td>
<td>40 (100.0)</td>
<td>40 (100.0)</td>
</tr>
<tr>
<td></td>
<td>Physio 9±2±3±4</td>
<td>4 (4.0-4.0)</td>
<td>40 (100.0)</td>
<td>40 (100.0)</td>
</tr>
<tr>
<td></td>
<td>P 0.798</td>
<td>1.000</td>
<td>0.798</td>
<td>1.000</td>
</tr>
<tr>
<td>15 min</td>
<td>Control 24±6±11±6</td>
<td>4 (4.0-4.0)</td>
<td>3 (3.0-3.0)</td>
<td>32 (80.0)</td>
</tr>
<tr>
<td></td>
<td>Physio 18±6±7±7</td>
<td>4 (4.0-4.0)</td>
<td>3 (3.0-3.0)</td>
<td>32 (80.0)</td>
</tr>
<tr>
<td></td>
<td>P 0.003</td>
<td>0.826</td>
<td>0.110</td>
<td>0.003</td>
</tr>
<tr>
<td>8 hours</td>
<td>Control 16±6±6±0</td>
<td>4 (4.0-4.0)</td>
<td>3 (3.0-3.0)</td>
<td>24 (60.0)</td>
</tr>
<tr>
<td></td>
<td>Physio 11±6±3±9</td>
<td>4 (4.0-4.0)</td>
<td>3 (3.0-3.0)</td>
<td>39 (97.5)</td>
</tr>
<tr>
<td></td>
<td>P &lt;0.001</td>
<td>0.001</td>
<td>1.000</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>24 hours</td>
<td>Control 11±6±4±7</td>
<td>4 (4.0-4.0)</td>
<td>3 (3.0-3.0)</td>
<td>37 (90.0)</td>
</tr>
<tr>
<td></td>
<td>Physio 8±6±3±4</td>
<td>4 (4.0-4.0)</td>
<td>3 (3.0-3.0)</td>
<td>40 (100.0)</td>
</tr>
<tr>
<td></td>
<td>P 0.008</td>
<td>0.317</td>
<td>1.000</td>
<td>0.241</td>
</tr>
</tbody>
</table>
was $10^2$ - $10^4$ colony forming units (cfu) mL$^{-1}$. At 0, 1, 2, 3, 4, and 6 hours 10μL was plated on Mueller – Hinton (MH) agar. Having incubated for 24 hours at 37°C the cfu was counted. The method was described in details (2). MH broth cultures were also applied. Statistical analysis: ANOVA.

**Results and Discussion**: Rocuronium is bactericidal for the examined P. aeruginosa strains within one hour. It is bacteriostatic for E. coli (ATCC) for 2 hours and S. aureus (ATCC) for 3 hours and for the examined multidrug resistant strains for 4 hours. Following the above mentioned time intervals the cfu were decreased in all strains. See cfu details in table 1.

<table>
<thead>
<tr>
<th>Product</th>
<th>ATCC 25922</th>
<th>ATCC 27853</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>clinical isolate</td>
<td>clinical isolate</td>
</tr>
<tr>
<td>Time (h)</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>cfu/mL</td>
<td>98.7±0.4</td>
<td>103.7±3.1</td>
</tr>
<tr>
<td>Time (h)</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>cfu/mL</td>
<td>76.3±6.2</td>
<td>81.3±12.2</td>
</tr>
<tr>
<td>Time (h)</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>cfu/mL</td>
<td>54.3±4.9</td>
<td>52.0±16.7</td>
</tr>
<tr>
<td>Time (h)</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>cfu/mL</td>
<td>49.0±8.4</td>
<td>37.3±18.2</td>
</tr>
<tr>
<td>Time (h)</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>cfu/mL</td>
<td>38.3±6.1</td>
<td>33.3±18.9</td>
</tr>
<tr>
<td>Time (h)</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>cfu/mL</td>
<td>10.3±3.3</td>
<td>12.3±3.6</td>
</tr>
</tbody>
</table>

Mean ± SEM. *Difference is significant from 0 hour. P < 0.05, ESBEL E.C.: extended spectrum beta-lactamase E. coli, MRSA: methicillin resistant S. aureus, M.P.a.: metallo-β-lactamase P. aeruginosa.

**Conclusion(s)**: Our results suggest that the use of rocuronium is safe as far as infection control is concerned when multiple dose vials are kept at room temperature.

**Disclosure**: Departmental support to buy the chemicals for the experiments.

**References**


**9AP3-2**

**Recovery from shallow rocuronium-induced neuromuscular blockade is consistently more rapid with sugammadex compared with neostigmine: Results from a pooled analysis of phase II and III studies**

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**Background and Goal of Study**: Sugammadex, a modified γ-cyclodextrin, is a selective relaxant binding agent which reverses the effects of the steroidal neuromuscular blocking agent, rocuronium, by encapsulation. A pooled analysis of Phase II and III studies was conducted to compare the efficacy of sugammadex with neostigmine and placebo for the reversal of shallow (i.e. at re-appearance of T$_2$) rocuronium-induced neuromuscular blockade (NMB) during maintenance anaesthesia for elective surgery.

**Materials and Methods**: Data were pooled from 13 Phase II and III studies of surgical patients (aged ≥18 years, ASA Class I-III) randomized to sugammadex or placebo when administered at re-appearance of T$_2$. In addition, variability of the proportion of subjects with ≥1 AE was similar for sugammadex (68%) and placebo (72%). AEs (regardless of relationship to study drug) occurring in ≥2% of sugammadex subjects and at least twice as frequently as in placebo subjects included anaesthetic complications (eg, movement, coughing, grimacing or suckling on the tracheal tube), indication of restoration of neuromuscular function and occurring mainly in studies where sugammadex was administered while anaesthesia continued. AEs occurring in placebo subjects at least twice as frequent as in sugammadex subjects included constipation, dysuria, paralysia, malaise, procedural complication, procedural nausea, pruritus, anaemia and ventricular extrasystoles. Most AEs were mild to moderate in intensity. A similar percentage of sugammadex subjects (58%) and placebo subjects (51%) experienced at least one serious AE.

**Conclusion(s)**: This pooled analysis of adverse events in 10 placebo-controlled trials suggests sugammadex is well tolerated for the reversal of rocuronium- or vecuronium-induced NMB.

**Disclosures**: This pooled analysis was supported by NV Organon, a part of Schering-Plough Corporation. Two of the authors are employees of NV Organon, a part of Schering-Plough Corporation.

**9AP3-3**

**Sugammadex is well tolerated for the reversal of rocuronium- or vecuronium-induced neuromuscular blockade in a pooled analysis of adverse events in 10 placebo-controlled trials**

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**Background and Goal of Study**: Sugammadex is a novel selective relaxant binding agent specifically designed for rapid reversal of neuromuscular blockade (NMB) induced by rocuronium or vecuronium. Data from 10 trials were pooled to compare the safety/tolerability of sugammadex with placebo for reversal of rocuronium- or vecuronium-induced NMB.

**Materials and Methods**: Adult surgical patients or healthy volunteers who received rocuronium or vecuronium for NMB in a Phase II-III placebo-controlled trial were included in this analysis. Subjects were treated with sugammadex (0.1-8.0 mg/kg) or placebo. Adverse events (AEs) were coded using MedDRA version 10.0 preferred terms.

**Results and Discussion**: In total, 640 subjects received sugammadex and 140 received placebo following NMB with rocuronium (sugammadex, n=528; placebo, n=116) or vecuronium (sugammadex, n=114; placebo, n=24). Demographic and baseline characteristics were generally similar for the sugammadex group compared with the placebo group. The proportion of subjects with ≥1 AE was similar for sugammadex (68%) and placebo (72%). AEs (regardless of relationship to study drug) occurring in ≥2% of sugammadex subjects and at least twice as frequent as in placebo subjects included anaesthetic complications (sugammadex 8.0%, placebo 1.4%) and cough (2.8 versus 1.4%). Anaesthetic complications includes signs of light anaesthesia (eg, movement, coughing, grimacing or suckling on the tracheal tube), indicating restoration of neuromuscular function and occurring mainly in studies where sugammadex was administered while anaesthesia continued. AEs occurring in placebo subjects at least twice as frequent as in sugammadex subjects included constipation, dysuria, paralysia, malaise, procedural complication, procedural nausea, pruritus, anaemia and ventricular extrasystoles. Most AEs were mild to moderate in intensity. A similar percentage of sugammadex subjects (58%) and placebo subjects (51%) experienced at least one serious AE.

**Conclusion(s)**: This pooled analysis of adverse events in 10 placebo-controlled trials suggests sugammadex is well tolerated for the reversal of rocuronium- or vecuronium-induced NMB.

**Disclosures**: This pooled analysis was supported by NV Organon, a part of Schering-Plough Corporation. Two of the authors are employees of NV Organon, a part of Schering-Plough Corporation.
was 26 min (SD 6), corresponding with the start of the continuous infusion at the rate of 5 μg/kg/min. Time needed to achieve a stable NMB at the preset value was 49 min (SD 13). Time needed to obtain a 0.9 train-of-four after the end of the infusion was 35 min (SD 9).

Conclusion(s): Although there are variations in the level of NMB, following start of administration, our results demonstrate that the system can provide stable NMB, consistent with surgery, despite considerable inter-individual variations in requested doses. Regarding time needed to achieve a stable level of NMB, the simple algorithm of rocuronium implemented in this closed loop system appears very usable for long duration procedures.

9AP3-5

The influence of a muscle relaxant on bispectral index during the propofol induction of anesthesia
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Background and Goal of Study: Electromyographic (EMG) activity influences electroencephalographic signals and the calculation on BIS (1). Neuroneuromuscular blockade may therefore reduce the bispectral index (BIS) during anesthesia, but there are contradictory reports about it (2,3). The purpose of this study was to investigate the effects of muscle relaxant on BIS and EMG activity during propofol induction of anesthesia.

Materials and Methods: In this prospective, randomized, double-blind study, healthy 48 patients undergoing elective surgery under general anesthesia were enrolled. All patients received effect-site targeted concentration of propofol by TCI system, titrated until loss of consciousness. At three minutes after loss of consciousness, the patients received a bolus injection of vecuronium (relaxant group, n = 24), or normal saline as a placebo (placebo group, n = 24). BIS, EMG activity and the first twitch (T1) in a train-of-four were measured before and up to 4 min after administration of vecuronium or placebo.

Results and Discussion: After administration of vecuronium or placebo, BIS significantly decreased in both groups (P < 0.05). However, the decreases in BIS was larger in the relaxant group than in the placebo group (Table 1) (P < 0.05). The decrease of EMG was not significantly different between the two groups after administration of vecuronium or placebo (Table 1).

Table 1. Changes of BIS, EMG and T1 before and 4 minutes after administration of muscle relaxant or placebo

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>BIS (%)</th>
<th>ΔBIS (dB)</th>
<th>EMG (dB)</th>
<th>ΔEMG (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxant (n = 24)</td>
<td>Before</td>
<td>96.2±7.6</td>
<td>56±6.4</td>
<td>30±2.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 min after</td>
<td>93.3±13.7</td>
<td>55±4.7</td>
<td>30±2.8</td>
<td>2.3±2.6</td>
</tr>
<tr>
<td>Placebo (n = 24)</td>
<td>Before</td>
<td>93.3±13.7</td>
<td>62±6.4</td>
<td>30±2.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 min after</td>
<td>96.0±5.0</td>
<td>49±6.4</td>
<td>29±1.8</td>
<td>1.2±2.8</td>
</tr>
</tbody>
</table>

ΔBIS: difference of BIS before and after administration of vecuronium or placebo, ΔEMG: difference of EMG before and after administration of vecuronium or placebo, *p < 0.05 vs before, †p < 0.05 vs placebo group.

Conclusion(s): During propofol induction of anesthesia, a muscle relaxant decreases BIS significantly without decrease of EMG activity.

References:

9AP3-6

Single intravenous high-dose sugammadex (up to 96 mg/kg) is generally safe and well tolerated in healthy volunteers
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Clinical Pharmacology & Kinetics, N.V. Organon, a part of Schering-Plough Corporation, Oss, Netherlands

Background and Goal of Study: Sugammadex is a γ-cyclodextrin specifically designed for reversal of neuromuscular blockade induced by rocuronium or vecuronium. Doses of up to 16 mg/kg have been shown to be well tolerated by surgical patients. The objective of this study was to assess the safety and tolerability of single high doses of IV sugammadex (up to 96 mg/kg) in healthy subjects.

Materials and Methods: This was a single-centre, randomised, double-blind crossover study in which healthy adult male and female volunteers received three single IV doses of sugammadex in ascending dose order (32, 64 and 96 mg/kg) and placebo each separated by a 1-week wash-out period. All subjects were to receive all four treatments, with placebo randomly interspersed with active doses. Safety was assessed by adverse events (AEs), 12 lead ECGs, vital signs and laboratory parameters. Blood samples and urine were collected predose and up to 48 h post dosing. Sugammadex concentrations were deter-

mined using a validated LC-MS-MS method, and used to determine pharmacokinetics of sugammadex in plasma and urine.

Results and Discussion: A total of 13 subjects were randomised (7 male, 6 female), 12 of whom received all four treatments. The most frequent AE considered to be treatment-related was dysgeusia (metallic or bitter taste perversity), for which 11 events were reported (32 mg/kg, n=2; 64 mg/kg, n=1; 96 mg/kg, n=8). Other treatment-related AEs occurring more than once were nausea (n=3), fatigue (n=2), dizziness (n=2), postural dizziness (n=2) and headache (n=2). AEs were generally mild and of limited duration and no serious AEs were reported.

One male subject was withdrawn because of an AE (parasthesia and vision disturbances of moderate intensity) during infusion of sugammadex (approx 8.4 mg/kg of 32 mg/kg dose received at time of withdrawal). Later skin flushing and rash occurred. All symptoms subsided without treatment. Follow-up skin tests indicated a probable allergic reaction to sugammadex or other cyclodextrin-like structures. No clinically relevant changes in vital signs, ECG recordings or laboratory parameters were reported, and all 12 lead ECGs were considered normal.

Conclusion(s): Sugammadex was safe and well tolerated in 12 out of 13 healthy volunteers at doses up to 96 mg/kg.

Disclosure: This study was supported by N.V. Organon, a part of Schering-Plough Corporation. The authors are employees of N.V. Organon, a part of Schering-Plough Corporation.

9AP3-7

Up-regulation of nicotinic acetylcholine receptors cannot compensate for the decreased release of acetylcholine following infection with botulinum toxin
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Background and Goal of Study: Systemic infection with botulinum toxin (BTX) can lead to respiratory failure, often necessitating mechanical ventilation. We have examined the time-dependant effects of BTX on muscle function and pharmacology including expression of nicotinic acetylcholine receptors (nAChRs). To model BTX infection, the toxin was injected into a single muscle (tibialis), due to the difficulties in maintaining an animal with mechanical ventilation.

Materials and Methods: After IRB approval, male SD rats (n=26) were injected with 2.5U of BTX into the tibialis muscle. The contralateral side received no injection and served to study distal effects. Another group of control animals (n=25) received an equivalent volume of saline. At 0, 4 and 16 days after injection, neuromuscular function, pharmacodynamics of atracurium, and nAChR number were evaluated.

Results and Discussion: On day 0, the tibialis muscle tensions and muscle mass did not differ between groups and sides. On day 4, there was complete neuromuscular paralysis on the BTX-injected side, while its contralateral, non-injected side showed a decrease in evoked muscle tension. On day 16, although evoked tensions could be generated on the toxin-injected side, muscle tensions, including muscle mass were decreased relative to the contralateral side and to saline injected controls. At day 16, Train-of-Four & tetanic fade were evident on the toxin-injected side. Normalized to muscle mass, the specific single twitch tension and specific tetanic tension were reduced on the contralateral side at day 4 and the toxin-injected side at day 16. The dose-response curve for atracurium on the injected side was shifted to the left at day 16, resulting in a lower ED50 together with a smaller slope. The ED50 values on the contralateral, non-injected side were also decreased at day 4 and 16. The atracurium plasma levels to maintain a steady-state 50% paralysis were significantly decreased in the toxin-injected group on day 16, nAChR numbers in the injected tibialis were significantly increased in the experimental groups on day 4 & 16.

Conclusion(s): This study documents that infection with BTX follows a time-course starting with complete paralysis to severely depressed muscle function including increased fatigability, and increased nAChR expression mimicking a denervation-state, and unexpectedly, increased sensitivity to atacurium. Muscle weakness was not only seen on the toxin-injected side, but also on the contralateral tibialis suggesting the spread of toxin.

9AP4-1

Premedication with oral pregabalin 150 mg reduces propofol sedation during retrobulbar anesthesia for vretectomy surgery
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Anesthesia and Ophthalmology, Cairo University and Zagazig University, Cairo, Egypt
Background and Goal of Study: Propofol is often used for sedation during local anesthesia for eye surgery. We investigated the effects of oral pregabalin (150 mg) 3 hours before surgery as a premedication drug on the propofol requirement and incidence of complications during sedation.

Materials and Methods: In a prospective randomized, controlled, and single-blinded study, 40 patients undergoing elective vireectomy surgery were randomly divided into control and pregabalin groups. Patients in the pregabalin group received oral 150 mg pregabalin 3 hours before scheduled time for surgery. After anesthesia was instituted with intravenous injection of bupivacaine 0.5% with hyaluronidase, we provided sedation using continuous infusions of propofol. The level of sedation was controlled at a level of respond to command by adjusting the infusion rate. During sedation, the propofol requirements and complications were recorded.

Results and Discussion: In the pregabalin group, the loading dose, steady state infusion rate, and overall infraction rate of propofol were 0.74 mg/kg, 2.16 mg/kg/min, and 3.12 mg/kg/hr, respectively, which were about 17% lower than those in the control group (P < 0.05). Moreover, pregabalin premedication had no effect on complications.

Conclusion(s): Pregabalin premedication reduced propofol requirements during sedation. These effects of oral propofol during local anesthesia for vireectomy surgery are considered beneficial for patients.

9AP4-2
Morphine-6-Glucuronide produces less nausea/vomiting than morphine despite equal analgesia
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Anesthesiology, Leiden University Medical Center, Leiden, Netherlands

Background and Goal of Study: M6G (morphine’s active metabolite) is currently being studied for use in acute postoperative pain. We assessed whether PCA M6G provides analgesia equivalent to morphine PCA and whether its use results in reduced PONV.

Materials and Methods: 62 patients undergoing elective open abdominal surgery were randomly assigned to receive M6G or morphine for postoperative pain relief. Initially the patients received M6G 30 mg/70 kg or morphine 10 mg/70 kg iv bolus 30-60 min before the end of surgery. Postoperatively the patients were started on PCA M6G or M6G when VAS scores were < 3.1 or were given an additional dose of iv M6G or M6G (15 mg/70 kg M6G and 5 mg/70 kg M6G). Additional opioid doses could be repeated once in a 30 min time interval. VAS measurements were next performed regularly during the next 48 h. In case the patient was nauseous, he or she received anti-emetic therapy (ondansetron 4 mg iv) upon his her request.

Results and Discussion: Of 60 evaluable patients 31 received M6G, 29 MOR (2 patients, 1 receiving MOR and 1 M6G, did not reach a VAS < 3.1). Pain scores were similar over time with mean time adjusted AUC of VAS MOR 2.8 (1.5) [mean (SD)] vs M6G 3.2 (2.5) (P = 0.48). Mean loading MOR dose was 14.4 (4.7) mg vs M6G 41.4 (12.3) mg; Mean PCA dose was MOR 83.6 (46.8) mg vs M6G 90.9 (66.9) mg. The incidence of nausea (vomiting) differed between treatments during the first 24 h postoperatively: MOR 68 (38%) % of patients were nauseous vs M6G 32 (7%) (P < 0.01); during the next 24-h there was no more difference between treatments. Similarly, anti-emetic treatment differed during the first 24 h postoperatively: 58% of patients on MOR required anti-emetic therapy vs M6G 19% (P < 0.0001); thereafter the was no more difference in anti-emetic use.

Conclusion(s): PCA M6G provides excellent postoperative analgesia and is non-superior to morphine. The observed difference in nausea/vomiting was apparent during the first 24 postoperative hours. This difference led to a 50% reduction in antiemetic use. The reason for an absence in nausea/vomiting during the second 24 h postoperatively may be related to localization of the patient and other non-opioid related causes of nausea. We conclude that due to the reduced side effect profile M6G is a superior analgesic compared to morphine.

Disclosure: The research unit where I work has received an educational grant from CofaS, the producer of M6G.

9AP4-3
Dose response curve of intravenous lidocaine on the depth of propofol anaesthesia assessed by the bispectral index (BIS) and the A-line ARX index (AAI)
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Background and Goal of Study: Intravenous lidocaine (LIDO) reduces sevoflurane [1] and propofol [2] requirements during BIS-guided anaesthesia. Whether this is due to a hypnotic or an analgesic effect remains open. We therefore sought a dose-response relationship between iv LIDO and the depth of propofol anaesthesia assessed by BIS and AAI (a proposed index of the depth of anaesthesia [3]) during thyroid surgery.

Materials and Methods: After IRB approval and written informed consent, 20 ASA I-II patients received propofol and remifentanil using TCI devices (Schnider’s and Minto’s models). Cis-atracurium was given to provide a TOF ratio of 1.0. After intubation, remifentanil was set at 3 ng/ml and propofol was adjusted to achieve a stable BIS value around 50. Just before skin incision, patients were randomly allocated into 4 groups of 5 patients each: A. Saline; B. LIDO bolus of 0.75 mg kg⁻¹ followed by an infusion of 1.0 mg kg⁻¹ h⁻¹; C. LIDO bolus of 1.5 mg kg⁻¹, infusion of 2 mg kg⁻¹ h⁻¹ and D. LIDO bolus of 3 mg kg⁻¹, infusion of 4 mg kg⁻¹ h⁻¹. BIS and AAI were continuously recorded during 20 min starting at incision, while propofol and remifentanil effect-site concentrations remained unchanged. LIDO plasma concentrations were measured at the end of the 20 min recording period. Least square linear regressions between LIDO and the maximum BIS or AAI value observed during the recording period were calculated.

Results and Discussion: Propofol effect-site concentrations were similar in the 4 groups (Overall: 2.29 [0.61] μg ml⁻¹). Significant linear relationships between clinically relevant LIDO concentrations and maximum BIS or AAI values were observed (Fig).

Conclusion(s): This study suggests that LIDO at clinically relevant concentrations produces a dose-dependent analgesic effect. As far as it has been shown that LIDO does not reduce BIS-guided propofol requirement in the absence of surgical stimulation [2], the herein observed effect of LIDO on BIS or AAI probably results from an analgesic effect, which would depress the arousal effect of surgical stimulation.

References:

9AP4-4
Effects of ropivacaine and bupivacaine on glutamate currents in cultured rat hippocampal neurons
L. Xu, Y. Jiang, H. Zhang
Anesthesiology, Peking University General Hospital, Beijing, China

Background and Goal of Study: The goal of the study was to observe and compare the effects of ropivacaine and bupivacaine on glutamate-evoked currents in cultured rat hippocampus neurons.

Materials and Methods: Rat hippocampus neurons were dissociated and cultured. Glutamate-evoked currents were recorded by whole cell patch clamp recording. Effects of ropivacaine and bupivacaine on glutamate-evoked currents were observed. Drugs were given by pressure ejection or application in the bath.

Results and Discussion: Glutamate (100 mmol L⁻¹) can activate inward currents in cultured rat hippocampus neurons and this currents could be locked by non-NMDA antagonists DNQX. At the concentration of 10, 50, 100 mmol L⁻¹, ropivacaine and bupivacaine all could obviously decrease glutamate-evoked currents in cultured rat hippocampus neurons. At higher concentration of 50 and 100 mmol L⁻¹, the reduced amplitude of glutamate currents by ropivacaine was larger than that of bupivacaine (P<0.01).

Conclusion(s): Ropivacaine and bupivacaine have obviously inhibition effect on glutamate-evoked currents in cultured rat hippocampus neurons. The inhibition effect of ropivacaine on glutamate-evoked currents was stronger than that of bupivacaine.

9AP4-5
The effect of antinoceptive dose of tramadol on blood glucose levels in rats
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Anesthesiology and Reanimation, Dokuz Eylul University Medical School, Izmir, Turkey

Background and Goal of Study: Reversal of the antinoceptive effects of tramadol by α₂-adrenergic antagonists suggests that tramadol achieves modula-
tion of pain through indirect activation of α2-adrenoceptors. Additionally, several in vitro studies have shown the role of α2-adrenoceptors in induction of hyperglycemia. The aim of this study was to investigate (a) the effect of tramadol on blood glucose levels and (b) the possible role of α2-adrenoceptors in this effect.

Materials and Methods: The study was performed after approval from the Ethics Committee of Research of Laboratory Animals of Dokuz Eylul University. Rats were anesthetized with diethyl-ether inhalation and catheterizations were performed. 25 Wistar male rats were assigned to four groups randomly and received the following drugs. Group I (n = 4) 200 ml normal saline. Group II (n = 7) anticonceptive dose of tramadol (1 mg/kg). Group III (n = 7) α2-adrenoceptor antagonist idazoxan (1mg/kg) 30 min. before tramadol. Group IV (n = 7) selective α1-adrenoceptor antagonist idazoxan (1mg/kg) 30 min. before tramadol. Measurement of blood glucose levels were made before injection of the study drug or the antagonists and at 30, 60, 90, and 120 minutes after administration of the drugs.

Results and Discussion: Normal saline did not cause a change in blood glucose levels. An elevation in blood glucose levels were observed starting at 30 minutes following administration of tramadol. There was no change in blood glucose levels after tramadol administration. Pretreatment with the antagonists, significantly attenuated tramadol-induced hyperglycemia. The results of this present study have shown that, an analgesic dose of tramadol causes hyperglycemia in rats and this effect can be abolished with yohimbine and idazoxan pretreatment. Similarly it was shown that decrease in the anticonceptive effect of tramadol was achieved by administration of α2-adrenoceptor antagonists yohimbine and idazoxan, in previous studies. Since it is advantageous to administer antagonist agents for the classification of receptor-mediated processes, we used the advantage of α2-agonists to evaluate the effect of tramadon on blood glucose levels.

Conclusion(s): As a conclusion, the results of the present study provide evidence that monoaminergic activity responsible for the anticonceptive effect of tramadol could also play a role in the hyperglycemic response to an anticonceptive dose of the drug.
9AP4-9
Influence of intraoperative opioid on postoperative pain and recovery after laparoscopic gastroplasty: Sufentanil TCI vs remifentanil TCI in morbid obesity
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Background and Goal of Study: The aim of this prospective randomized double-blind study was to compare the effects of target-controlled infusions (TCIs) of sufentanil and remifentanil on the quality of recovery and postoperative pain in patients undergoing laparoscopic gastroplasty.

Materials and Methods: Following institutional Ethics Committee approval, 95 morbidly obese patients who gave written informed consent were included. Patients received either sufentanil TCI (target: 0.3ng/ml; group S) or remifentanil TCI (target: 3ng/ml; group R) in combination with desflurane (O2/ar mixture; FIO2: 50%). Desflurane (5-6% end-tidal concentration) was adapted according to patients’ hemodynamic response. Opioids were discontinued at skin closure, and desflurane after repositioning of the patient. Speed of recovery was assessed by means of delay to tracheal extubation and eye opening on verbal request. Quality of recovery was assessed by means of delay to full recovery determined according to Aldrete post anesthesia recovery score (PARS), and by means of the ability to fully complete the trail making test part A (TMT) and the digit symbol substitution test (SSST). Postoperative pain was evaluated through the amount of IV piritramide required to maintain visual analogue pain score <3. Statistical analysis included unpaired Student’s t test and chi-square as appropriate. A p<0.05 was considered significant. Data are presented as mean ± SD.

Results and Discussion: Demographic and surgical characteristics were not different among groups.

<table>
<thead>
<tr>
<th>Group S (N=49)</th>
<th>Group R (N=46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evacuation (min)</td>
<td>16±10</td>
</tr>
<tr>
<td>Eye opening (min)</td>
<td>14±7</td>
</tr>
<tr>
<td>PARS (min)</td>
<td>13±5</td>
</tr>
<tr>
<td>TMT (min)</td>
<td>40±23</td>
</tr>
<tr>
<td>SSST (min)</td>
<td>48±28</td>
</tr>
<tr>
<td>4h-piritramide (mg)</td>
<td>12±8</td>
</tr>
</tbody>
</table>

*p<0.01 vs group S.

Conclusion(s): Recovery was faster but immediate postoperative pain was greater in Group R. Quality of recovery was similar in both groups. Based on these observations, theoretical advantages of remifentanil on sufentanil can be questioned when using TCI technology.

9AP4-10
Synergism between amitriptyline and TTX for sciatic nerve blockade: Electrophysiology and behaviour
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Background and Goal of Study: Amitriptyline, a tricyclic antidepressant known to have local anesthetic properties, exhibits significant neurotoxicity when injected at concentrations of 20 mM or higher for sciatic nerves blockade in rats. Tetrodotoxin, a naturally occurring Na+ channel blocker, displays synergism with amitriptyline. Determination of the pharmacokinetic or pharmacodynamic origin of this synergism is of great consequence, because the latter may reduce neurotoxicity by a mechanism of action based on blockade of different receptors. Because of a highly significant increase in block duration in vivo when tetrodotoxin was added to amitriptyline, and of some degree of synergism for the combination of amitriptyline and tetrodotoxin in the resting channel state, detailed histopathological investigations of amitriptyline in combination with tetrodotoxin in several animal models appear justified.

Materials and Methods: The left sciatic nerve of Sprague-Dawley rats was injected subfascially with 0.2 ml of amitriptyline at 1, 5, 10, and 20 mM alone and in combination with 20 μM tetrodotoxin. The duration of nociceptive and motor block was determined by reaction to pinch and force of push against a balance. The whole-cell variant of the patch-clamp method was used to measure inhibition of Na+ current in HEK cells with the same drugs.

Results and Discussion: For the combination of amitriptyline and tetrodotoxin, isobolographic analyses demonstrated a highly synergistic effect for the in vivo experiments. In vitro, a statistically significant synergism was found for the resting state, and a small amount of sub-additive effect was found for the inactivated state.
Results and Discussion: Depolarization of T1:T2 was enhanced under sevoflurane compared to TIVA. EDo2 and EDo3, values of both drugs were significantly lower under sevoflurane more than TIVA. Recovery index 25-75% and time to a TOF ratio of 0.70 were prolonged significantly by sevoflurane compared to TIVA. Hemodynamically, rocuronium and cisatracurium did not exert significant changes, but the interaction of the relaxants and the anesthetic agents resulted in statistically significant decline in some hemodynamic parameters at certain periods which are not clinically significant and required no medications.

Conclusion(s): We conclude that the effects of rocuronium and cisatracurium are significantly enhanced during sevoflurane compared with propofol anesthesia and the recovery is slower.

9AP5-2
Monitoring of neuromuscular block after administration of rocuronium in patients with diabetes mellitus
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Background and Goal of Study: In patients with diabetes mellitus, the function of motor nerve fibres and nerve endings may be impaired. We aimed to compare the onset and duration time of neuromuscular block after administration of rocuronium in diabetic and non-diabetic patients.

Materials and Methods: After obtaining Ethics Committee approval and informed consent, 30 patients with diabetes mellitus (DM) for less than 10 years and 30 non-diabetic patients, ASA I-II, aged 18-50 undergoing general anesthesia were enrolled in the study. Following standard monitoring, anesthesia was induced with fentanyl 2 μg kg⁻¹ and thiopental 5mg kg⁻¹. Anesthesia was maintained with nitrous oxide 66% in oxygen and isoflurane 0.7% end-tidal concentration. Monitoring of neuromuscular block was continued until the return of T2. Statistical analyses were performed using a statistical package (SPSS Windows 10.0). P <0.05 was considered statistically significant.

Results and Discussion: In the diabetic group, intubation time (112±40sec. in diabetic and 90±18sec. in non-diabetic patients), T2 recovery time (47±8min. in diabetic and 34±6min. in non-diabetic patients), and PTC were delayed. Haemodynamic parameters between the two groups were found to be similar.

Conclusion(s): In patients with DM, neuromuscular block must be monitored because of the impairment of the block and the time course of recovery when receiving rocuronium. These findings may be the results of the marked impairment of the neuromuscular junctions of diabetic patients.

9AP5-3
Evaluation of adductor pollicis and corrugator supercilii resistances to mivacurium infusion stabilized for four different paralysis levels
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Background and Goal of Study: Generally, the phenomenon of uneven “resistance” to muscle relaxants between different muscles was characterized in absence of stable muscle relaxant concentration. The aim of the present study is to evaluate the “resistance” of two different muscles - Adductor Pollicis (AP) vs Corrugator Superficialis (CS) - with two stimulation patterns - train of four (TOF) and posttetanic count (PTC) in the presence of stable mivacurium (MV) concentration.

Materials and Methods: After IEC approval, ten ASA I-II written consented adult patients scheduled for elective surgery were anesthetized (sufentanil/propofol), intubated, normoventilated and maintained normothermic. Train of four intubation was facilitated by 200 μg kg⁻¹. MV i.v. After partial AP paralysis recovery - tactile TOF count (TOFc) of 1 - was observed, a stable MV infusion rate/stable paralysis method was applied to quantify four predefined paralysis levels. AP and CS TOF count of 2 (TOFc2) and PTC of 2 (PTC2) responses were obtained and maintained. MV infusion rate and paralysis level were considered as stable if they remained constant for 4 consecutive time points separated by 5 min each. Different warming devices maintained the skin of thenar and supraciliary arch areas above 32.5°C and oropharynx mucosa above 35.9°C. For statistical analysis, non-parametric Friedman and Bonferroni corrected Wilcoxon sign tests for paired comparisons were used. A p-value of 0.05 was considered significant. Results are expressed as median (min-max).

Results and Discussion: Demographic data were: age 52 (26-63) years, weight 78 (50-86) kg, height 174 (152-184) cm, Sex (M/F) 6/4. The controlled temperatures were: 36.3 (36.0-36.8) °C for oropharynx, 34.2 (32.7-36.3) °C for the thenar skin and 35.6 (33.1-36.8) °C for superciliary arch skin. The MV requirements observed (μg.kg⁻¹.min⁻¹): AP-TOFc2 7.5 (4-11), CS-TOFc2 17 (9-23), AP-PTC2 14 (8-18) and CS-PTC2 22 (11-34) were significantly different [p<0.001 level – Friedman] as paired comparisons for the stimulation patterns used - AP-TOFc2 vs AP-PTC2 and AP-PTC2 vs CS-PTC2 [p<0.005- Bonferroni corrected Wilcoxon sign tests].

Conclusion(s): This study performed with a stable paralysis/stable infusion design produced new and simple quantitative data: MV stable requirements linked to specific paralysis levels. Such results confirmed for stable MV exposure and for two stimulation patterns that the CS “resistance” is substantially greater than the AP one.

References:

9AP5-5
Critical incident reports involving neuromuscular blockade: Analysis of the UK National Reporting and Learning System data from 2006
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Department of Anaesthesia, Royal Lancaster Infirmary, Lancaster, United Kingdom

Background and Goal of Study: Incident reporting is a key factor in improving patient safety in anaesthesia. The UK National Patient Safety Agency (NPSA) set up the National Reporting and Learning System (NRLS) to identify and learn from adverse incidents nationally. We aimed to analyse the incidents relating to neuromuscular blockade in anaesthesia

Materials and Methods: The NPSA provided us with a Microsoft Excel spreadsheet containing anonymised incidents arising in anaesthesia and surgery from the calendar year 2006, the first year in which all hospitals submitted data. We used the Systematised Nomenclature of Medicine, SNOMED CT® to identify relevant search terms. This has become the accepted clinical terminology of the NHS and comprises a structured list of terms for describing healthcare, creating a common language for clinicians and researchers as seen at http://www.connectingforhealth.nhs.uk/systemsandservices/data/snomed. Using the database’s ‘Find’ function, we used 13 key words (names of individual neuromuscular blocking drugs and words describing blockade) sequentially until no further records were identified. We also selected 1% of the total records randomly for manual review to check the precision of the electronic search.

Results and Discussion: The database contained 30724 reports. We found 163 incidents using the above search, 90 of which did not relate to neuromuscular blockade (false positives). The remaining 73 incidents (0.0023%) are classified below. The manual search of the randomly selected incidents revealed no false negatives.

<table>
<thead>
<tr>
<th>Degrees of harm by incident category</th>
<th>Number</th>
<th>No Harm</th>
<th>Low Harm</th>
<th>Moderate Harm</th>
<th>Severe Harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access/admin/transfer</td>
<td>1 (1.37%)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>4 (5.44%)</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Medical device/equipment</td>
<td>9 (12.33%)</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Medication</td>
<td>39 (53.42%)</td>
<td>26</td>
<td>10</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Treatment/procedure</td>
<td>25 (7.43%)</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Common themes included non-availability of drugs (12 incidents), drugs wrongly prescribed or given (12), potential drug allergy (9), possible awareness (7), reversal problems (5), prolonged apnoea (5) and the non-availability of nerve stimulators (5).

Conclusion(s): A small proportion of anaesthetic incidents in the NRLS involve neuromuscular blockade. SNOMED CT terminology appears to give sensitive but not specific results and manual scrutiny is necessary. The common themes, particularly non-availability of drugs or incorrect prescription/administration should be investigated further.

Acknowledgements: We would like to thank the NPSA for their assistance.

9AP5-6
Sugammadex restores spontaneous respiration after complete paralysis with rocuronium
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Background and Goal of Study: Intravenous bolus injection of a 4xED50 dose
of rocuronium causes complete paralysis, resulting in ventilatory arrest. This results in a rapid drop in arterial oxygen saturation. Sugammadex is a novel reversal agent which encapsulates rocuronium and vecuronium, resulting in rapid recovery from profound neuromuscular blockade (IM). The aim of this study was to determine whether administration of sugammadex can restore spontaneous ventilation after rocuronium-induced neuromuscular blockade in anaesthetised rats.

**Materials and Methods:** After induction of anaesthesia with 1.5 mg/kg urethane, catheters were placed in the carotid artery and jugular vein of spontaneously breathing male Sprague-Dawley rats for the administration of drugs, blood sampling and blood pressure measurements. Train-of-four (TOF) stimulation from the sciatic nerve resulted in M. gastrocnemius contractions. After steady-state muscle contractions were obtained, animals were paralysed with a 4×ED90 i.v. bolus dose of rocuronium (5.25 mmol/kg). One minute after administration of rocuronium, the animals received an i.v. bolus injection of sugammadex (22.96 mmol/kg) and the effects on arterial blood gases and muscle function were monitored. One group of 4 animals inhaled room air and one group of 4 animals was pre-oxygenated with 100% oxygen for 4 min. All values are expressed as Mean ± SEM.

**Results and Discussion:** One minute after administration of rocuronium all animals were completely paralysed. In animals breathing room air (Po2: 97±2 mmHg), the arterial oxygen saturation dropped from 95.4±0.3% to 13±4±1.1%. After injection of sugammadex, a TOF value of 0.9 was obtained after 0.8±0.2 min. Within 3 min of sugammadex administration, oxygen saturation was restored to 91±0.5%, returning to baseline values within 8±min. In the pre-oxygenated animals (Po2: 459±20 mmHg), oxygen saturation dropped from 100% to 24±0±7.8%, despite the pre-oxygenation. A TOF value of 0.9 occurred after 1.6±0.5 min and oxygen saturation increased to 81.9±0.9% after 3 min returning to baseline values after 4 min. The delayed recovery of the TOF ratio can be explained by the masked drop in blood pressure which occurred in one animal.

**Conclusion(s):** It is well known that neuromuscular blocking agents suppress the hypoxic chemoreflex. The present study shows that sugammadex not only rapidly restores neuromuscular function, but also restores spontaneous ventilation. This suggests that sugammadex reverses the suppression of the hypoxic chemoreflex.

**Disclosure:** Employee of Schering-Plough.

**9AP5-7**

**Administration of neostigmine does not prevent from post-operative residual curarisation in morbidly obese patients**

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**Background and Goal of Study:** Post-Operative Residual Curarisation (PORC) is a problem concerning postoperative care and patient’s safety. Modern non-depolarizing relaxants are considered to be safe. Recent reports under- line the importance of the incidence of their residual influence [1,2]. Train Of Four Ratio (TOFR) less than 0.7 in postoperative period is considered as PORC.

**Materials and Methods:** 45 morbidly obese (MO, BMI ≥ 35 kg/m²) pts were divided into 2 groups: receiving neostigmine (group 1) after anaesthesia or not (group 2). Patients were operated under general anaesthesia using atracurium or cisatracurium for muscle relaxation. On the basis of clinical assessment the anaesthesiologist decided of safe transfer the patient from OR after extubation to PACU. Patients were examined directly after arrival to the PACU (T1) and after 45 min (T2) by blinded investigator. Neuromuscular function was assessed with accelerometry with stimulation with TOF-GUARD device using TOF stimulation.

**Results and Discussion:** 29 pts received neostigmine at the end of anaesthesia and 16 pts did not. All pts data (mean, range): weight 126.67 kg (85-173), high 160 cm (152-195), BMI 43±6 kg/m² (35.49-55.88): duration of surgical procedure 87.24 min vs 101.88 min; percentage of all pts had TOFR < 0.7, TOFR 0.7-0.9 - 17.78%, and TOFR > 0.9 - 48.89%. Groups data: weight 129.45 kg vs 113.2 kg; high 169 cm vs 165 cm; BMI 43.86 kg/m² vs 35.49 kg/m²); duration of procedure 87.24 min vs 101.88 min; dose of atracurium: 82.11 mg vs 85 mg; cisatracurium: 14.67 mg vs 17.33 mg. In T1 33.3% of all pts had TOFR < 0.7, TOFR 0.7-0.9 - 17.78%, and TOFR > 0.9 - 48.89%. Groups data: weight 129.45 kg vs 113.2 kg; high 169 cm vs 165 cm; BMI 43.86 kg/m² vs 35.49 kg/m²); duration of procedure 87.24 min vs 101.88 min; dose of atracurium: 82.11 mg vs 85 mg; cisatracurium: 14.67 mg vs 17.33 mg. In T1 33.3% of all pts had TOFR < 0.7, TOFR 0.7-0.9 - 17.78%, and TOFR > 0.9 - 48.89%. Groups data: weight 129.45 kg vs 113.2 kg; high 169 cm vs 165 cm; BMI 43.86 kg/m² vs 35.49 kg/m²); duration of procedure 87.24 min vs 101.88 min; dose of atracurium: 82.11 mg vs 85 mg; cisatracurium: 14.67 mg vs 17.33 mg. In T1 33.3% of all pts had TOFR < 0.7, TOFR 0.7-0.9 - 17.78%, and TOFR > 0.9 - 48.89%. In T2 35.8% pts had TOFR < 0.7, TOFR 0.7-0.9 - 17.78%, and TOFR > 0.9 - 48.89%.

**Disclosure:** Employee of Schering-Plough.

**9AP5-8**

**Time difference between adductor pollicis and abdominal muscles at induction of muscle relaxation**

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**Background and Goal of Study:** The speed and depth of relaxation is not equal for all muscles. The abdominal relaxation is achieved by the relaxation of the diaphragm, the rectus abdominus and the transverse abdominus. The aim of this study was to measure the speed and depth of the relaxation in the hand and the abdomen using our new abdominal model.

**Materials and Methods:** Twelve patients, scheduled for laparoscopic surgery were included with approval of the hospital ethical committee. Anaesthesia was induced with Propofol 3 mg/kg, Sufentanil 0.20 μg/kg and maintained with Desflurane. The abdominal pressure volume relation (APVR) was measured as previously described [1]. The abdomen was inflated to a pressure of 15 mmHg and the abdominal volume was kept constant. Every patient was given two intravenous injection of 0.1 mg/kg rocuronium each with a five minute interval. The abdominal pressure and the response to a TOF stimulation of the adductor pollicis is measured continuously. Lag time is measured as the time after injection of rocuronium to the first twitch response on the adductor and to the first pressure drop on the abdomen. Onset time is measured as the time after injection of rocuronium to maximal twitch response on the adductor and to the maximal pressure drop on the abdomen. Peak effect is measured as the maximum depression of the twitch response and as the maximum abdominal pressure drop. Paired t test is used to analyse any difference between lag time and onset time and between the change in peak effect of the first and the second dose.

**Results and Discussion:** Table 1 gives the lag time and the onset time after the first dose of rocuronium and the peak effect after the first and the second dose of rocuronium. There is a significant difference in lag time and in onset time. The abdominal lag time is shorter and the abdominal onset time is longer than the one of the adductor pollicis.

**References:**


**9AP5-9**

**Single IV sugammadex doses up to 32 mg/kg alone or in combination with rocuronium or vecuronium are not associated with QTc prolongation**

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**Background and Goal of Study:** The selective relaxant binding agent, sugammadex, is a modified α-cyclodextrin with a novel mechanism of action, reversing the effects of the steroidal neuromuscular blocking agents (NMBAs) rocuronium and vecuronium by encapsulation. This thorough QTc study evaluated the effect of sugammadex alone and in combination with rocuronium or vecuronium on individually corrected QTc intervals.

**Materials and Methods:** This single-centre, double-blind, placebo-controlled randomized, 6-period cross-over thorough QTc study was designed according to the ICH-E14 guideline. Healthy volunteers (n=84, 18-45 years) were randomized to six treatment sequences, comprising single doses of placebo, mivacurium 400 mg, or one of the sugammadex doses ± NMBA shown in the Table. Triplicate electrocardiograms (ECGs) were collected at 13 time points after administration of trial medication and were evaluated manually by a central ECG lab. Blood samples were taken for pharmacokinetic assessments. Additional safety evaluations included adverse events, physical examination, vital
signs, clinical laboratory evaluations and observation for occurrence of neuromuscular blockade. A sample size of 72 volunteers was considered sufficient to support the primary objective.

**Results and Discussion:** In total, 84 volunteers were randomized and 80 completed the study. In the moxifloxacin group (positive control), the QTc prolongations vs placebo exceeded the ICH-E14 non-inferiority margin of 10 msec, confirming the assay sensitivity. In contrast, for the sugammadex 4 and 32 mg/kg groups alone and in combination with rocuronium or vecuronium, the upper limit of the 95% confidence interval was well below the 10 msec non-inferiority margin. Furthermore, the safety profile was comparable between the treatment groups.

**Conclusion(s):** Treatment with single IV doses of sugammadex at therapeutic (4 mg/kg) and supra-therapeutic (32 mg/kg) levels either with or without rocuronium or vecuronium was not associated with QTc prolongation based on the ICH-E14 guideline.

**Acknowledgements:** The study was conducted at CRS Clinical Research Services, Mönchberg/Abach GmbH, Germany; ECGs were analyzed centrally at MDS Centralized Laboratory & ECG ganMed GmbH, Germany.

**Disclosure:** Four of the authors are employees of Organon, a part of Schering-Plough Corporation. This study was supported by N.V. Organon, a part of Schering-Plough Corporation.

### 9AP5-10

**Reversal of shallow vecuronium-induced neuromuscular blockade is achieved more rapidly with sugammadex than with neostigmine: A pooled analysis of phase II and III clinical trials**

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**Background and Goal of Study:** Acetylcholinesterase inhibitors are traditionally used for reversal of neuromuscular blockade (NMB), but these have a slow onset of action and may be associated with adverse events. Sugammadex is a modified y-cyclodextrin specifically designed to reverse effects of the steroidal neuromuscular blocking agents, such as vecuronium, by encapsulation. We report results of a pooled analysis of Phase II and III clinical trials comparing the efficacy of sugammadex with neostigmine for the reversal of shallow vecuronium-induced NMB.

**Materials and Methods:** Data were pooled from four randomised studies of surgical patients (aged ≥18 years; ASA Class I–II) who received sugammadex 2mg/kg, or neostigmine 50μg/kg (with glycopyrronium 10μg/kg) or placebo for reversal of vecuronium-induced NMB. NMB was monitored continuously during surgery using acceleromyography. The reversal agent was administered at reappearance of TOF; after the last dose of vecuronium. Primary efficacy variable was time from start of sugammadex, neostigmine or placebo administration to attaining a train-of-four (TOF) ratio of 0.9. Times to recovery of TOF ratios of 0.8 and 0.7 were also recorded.

**Results and Discussion:** The intent-to-treat (ITT) population comprised 75 patients receiving sugammadex, 45 receiving neostigmine and 24 receiving placebo. The median time to recovery of the TOF ratio of 0.9 was faster with sugammadex (2.3min) compared with neostigmine (18.9min) and placebo (73.3min) as were the times to recovery of TOF ratios of 0.8 and 0.7 (Table). In the sugammadex group, the median time to recovery of the TOF ratio of 0.9 was similar in patients receiving only an intubating dose of vecuronium (2.0min) or those receiving intubating plus maintenance doses of vecuronium (3.0min).

**Conclusion(s):** Sugammadex achieves considerably faster reversal of shallow vecuronium-induced NMB compared with neostigmine or placebo.

**Disclosure:** Two of the authors are employees of Organon, a part of Schering-Plough Corporation. This pooled analysis was supported by NV Organon, a part of Schering-Plough Corporation.

**References:**


### 9AP6-1

**Photoplethysmographic time-course effects in the face after intravenous general anaesthesia**

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**Background and Goal of Study:** To describe and compare the photoplethysmographic time-course effects after induction of general anaesthesia [1] on the face with propofol (P) or etomidate (E).

**Materials and Methods:** We measured the ear (e) and nose (n) blood flow in 40 patients (ASA I–II) before anaesthetic induction and 5', 10' and 20' after induction. Blood flow was recorded by digital photoplethysmography (PhP) [2]. Anaesthesia was provided with fentanyl 0.1 mg, cisatracurium 0.15 mg kg⁻¹ and allocated hypnotic. After endotracheal intubation anaesthesia was maintained with oxygen-nitrous oxide (35%).

**Results and Discussion:** There are arteriovenous fistulas (AVF) in the nose and the ear. The PhP is a way to know the grade of vasodilatation in this areas when the patient was anesthetized [3]. The behaviour of AVF in the face could not be the same when the anaesthetic agent scheduled was propofol or etomidate.

**Table 1. Photoplethysmography data after anaesthetic induction**

<table>
<thead>
<tr>
<th>Anatomic location</th>
<th>Hypotonic</th>
<th>Minute 0</th>
<th>Minute 5</th>
<th>Minute 10</th>
<th>Minute 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear (mV/V)</td>
<td>Propofol</td>
<td>2.9±1.6</td>
<td>5.3±4.2</td>
<td>7.4±2.3</td>
<td>8.2±2.5</td>
</tr>
<tr>
<td></td>
<td>Etomidate</td>
<td>2.2±0.8</td>
<td>3.7±0.8</td>
<td>4.5±1.0</td>
<td>5.1±0.8</td>
</tr>
<tr>
<td>Nose (mV/V)</td>
<td>Propofol</td>
<td>13.7±4.9</td>
<td>15.4±4.1</td>
<td>10.5±2.6</td>
<td>9.1±2.0</td>
</tr>
<tr>
<td></td>
<td>Etomidate</td>
<td>8.1±3.0</td>
<td>9.1±3.1</td>
<td>7.8±3.2</td>
<td>7.6±3.0</td>
</tr>
</tbody>
</table>

**Data measured at mV/V (mean±SD). *p < 0.05.**

**Conclusion(s):** We conclude that general anaesthesia induced by propofol and etomidate impairs an immediately increase on PhP in the nose and the ear. The vasodilatation on the nose was more intense for the group (P), but there is not different on the ear for both groups.

**References:**


### 9AP6-2

**Comparison of prophylactic oral dimenhydrinate and oral ondansetron for immediate, postoperative nausea and vomiting after laparoscopic surgery**

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**Background and Goal of Study:** To compare between oral dimenhydrinate and oral ondansetron on the incidence of requested antiemetic, post operative nausea and vomiting (PONV) score including patient satisfaction with PONV management.

**Materials and Methods:** This study was double blind randomized, control trial. We included female patients scheduled for diagnostic laparoscopy, between 18 – 65 years old. Patients, who smoked, received antihistamines and hormonal therapy, had a history of motion sickness or gastrointestinal disease, a BMI >35, or menstruation at the time of the study, were excluded. Patients were randomly allocated by block randomization into two groups: 1) 50 mg oral dimenhydrinate; or 2) 8 mg oral ondansetron. Each patient received this as two tablets, either of the study drugs or a placebo prepared in the phar-
lactic antiemetic treatment for PONV management was not statistically different.

Results and Discussion: We enrolled 101 patients in the study. Demographics were similar between the treatment groups. Neither of both groups needed rescue antiemetics. Nausea and vomiting score (p>0.05) and sedation score (p=0.52) were comparable between both groups. There was no statistical difference in satisfaction vis-à-vis the relief of PONV (95%CI -4.96, 2.67).

Conclusion(s): Our data shows that oral dicyclomine can prevent PONV in the immediate postoperative period. Level of patient satisfaction with prophylactic antiemetic treatment for PONV management was not statistically different.

9AP6-3
The effects of propofol on myotonic reaction in skeletal muscle
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Background and Goal of Study: In the skeletal muscle, chloride channels are essential for the electrical stabilization of the membrane potential. This is illustrated by several myotonic muscle disorders associated with decreased chloride conductance [1]. Propofol shows direct relaxant effects on skeletal muscle [2]. Apart of several case reports on the safe use of propofol in patients with myotonia, literature on this topic remains scarce. We therefore wanted to test the effects of propofol on myotonic muscle in an in-vitro experimental setting.

Materials and Methods: Rectus abdominis muscle biopsies were obtained from anesthetized (thiopental) normal swine, dissected and then investigated following: 4uM, 8uM, 16uM, 32uM, 64uM, 128uM, 256uM, 512uM. For controls fol/intralipid (n=11), propofol/DMSO (n=10), intralipid (n=10) or DMSO (n=10) as stimulations). The chloride channel blocker 9-AC (64uM) was added. Every 10 minutes, various bundles were exposed to increasing concentrations of propofol/intralipid (n=11), propofol/DMSO (n=10), intralipid (n=10) or DMSO (n=10) as following: 4uM, 8uM, 16uM, 32uM, 64uM, 128uM, 256uM, 512uM. For controls we used both muscle bundles which were treated with 9-AC alone (n=19), as well as those without any treatment (n=30).

Results and Discussion: Treatment with 9-AC lead to a myotonic reaction (after-twitch contractions). The area under the curve (AUC) increased significantly after treatment with 9-AC as compared to control (p<0.001). Treatment with propofol/intralipid and propofol/DMSO >64uM reversed the myotonic reaction (p<0.01; figure 1). This was not the case with either intralipid or DMSO alone.

Figure 1

Conclusion(s): In the setting of in-vitro contracture testing, specific blockage of voltage-gated chloride channels leads to appearance of after-twitch contractions, representing myotonic discharges. Propofol dissolved in intralipid, as well as propofol dissolved in DMSO reversed these effects. Whether voltage-gated sodium and/or chloride channels are involved in this finding, remains unclear and deserves further study.

References:

9AP6-4
Nitric oxide mediates the efficacy of vasopressin vasoconstriction during late but not early anaphylaxis
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Background and Goal of Study: Arginine vasopressin (AVP) may have beneficial vasoconstrictive effects during late anaphylaxis. As nitric oxide (NO) is probably a critical mediator during vasoplosogic states and anaphylaxis, we hypothesized that the augmented vasoconstrictive effect of AVP during late as opposed to early anaphylaxis is in part mediated by NO.

Materials and Methods: Studies were approved by Columbia U. Ovalbumin-sensitized Brown Norway rats were anesthetized, tracheotomized and mechanically ventilated. The carotid artery and jugular vein were cannulated for blood pressure monitoring and administration of saline/ovalbumin and fluid maintenance (Ringer solution), respectively. Acatas were removed from control rats at 5 min or at early (5 min) or late (30 min) anaphylaxis time points. Thoracic aortic rings (n= 8 from each rat) were equilibrated under resting tension (2.5 g) for 1h in KH buffer with continuous digital recordings of tensions. Aortic rings from control rats or early or late anaphylaxis groups (n = 6) were contracted with AVP (10-5 to 10-2) with or without L-NAME pretreatment. If L-NAME pre-treatment induced a significant difference in AVP contractile effects, additional studies were performed in aortic rings pretreated with selective eNOS and iNOS inhibitors (L-NO, L-NIL respectively). Results are presented as mean ± SEM and were analyzed by ANOVA with Fisher’s post-test with p < 0.05 taken as significant.

Results and Discussion: AVP induced similar contractile responses in the presence or absence of L-NAME in aortic rings from control (EC50: 2.7±0.6 nM, Emax: 2.3±0.3 nM respectively; p = NS) or early anaphylaxis rats (EC50: 1.9±0.2 nM, Emax: 1.6±0.4 nM respectively; p = NS). In contrast, in aortic rings removed during late anaphylaxis, pretreatment with L-NAME decreased the responsiveness to AVP (AVP: 2.9±0.3 nM, 0.6±0.2 nM, for ± L-NAME, respectively; p < 0.05). Moreover, aortic rings from late anaphylactic rats pretreated with L-NIL had a decreased responsiveness to AVP (EC50: 1.7±0.2 nM, Emax: 1.0±0.1 nM for +/- L-NIL, respectively; p < 0.05) and pre-treatment with L-NIL decreased the subsequent contractile effect of AVP (Emax: 0.5±0.1 g, Emax: 0.1±0.2 g for L-NIL and non-L+NIL respectively; p < 0.05).

Conclusion(s): The potent vascular smooth muscle contraction induced by AVP during late but not early anaphylaxis involves both the endothelial and constitutive isoforms of nitric oxide synthase.

References:

9AP6-5
The prophylactic effect of haloperidol plus ondansetron on postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy
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Department of Anesthesiology, Chi-Mei Medical Center, Tainan, Taiwan

Background and Goal of Study: Haloperidol, a major tranquilizer, has been found to have a potent antiemetic effect on postoperative nausea and vomiting (PONV), but the prophylactic effect of haloperidol plus ondansetron on PONV has not been evaluated.

Materials and Methods: Two hundred and ten patients (n=70 in each of three groups) scheduled for a laparoscopic cholecystectomy were enrolled in a randomized and double-blind clinical trial. Patients were randomly to receive intramuscular haloperidol 2 mg plus intravenous saline 2 ml (group H), intramuscular haloperidol 2 mg plus intravenous ondansetron 4 mg (group H+O) 30 minutes before the conclusion of surgery. The complete response rate to treatment (no PONV, no antiemetic rescue), incidences of postoperative nausea and vomiting (PONV), nausea scores, the needs of rescue medication, patientsatisfaction score and adverse events over 24-hr were compared.

Results and Discussion: At 24 h post-operation, the H+O group had the highest complete response rate to treatment (79%, P<0.05, as compared with group H (61%) and group O (60%). The patients' satisfaction score was highest at H+O group (8.3±1.8, P<0.05), as compared with group H (7.0±2.4)and group O (7.2±2.5). Besides, the H+O group had the lowest nausea score (1.2±2.5, P<0.05), as compared with group H (2.4±3.3) but not significant difference from group O (2.2±3.1). The adverse events were not different in all groups.

Table 1. Incidences at PONV, antiemetic rescue, and score of nausea and satisfaction

<table>
<thead>
<tr>
<th>24 postopuration</th>
<th>H</th>
<th>O</th>
<th>H+O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>64</td>
<td>65</td>
<td>63</td>
</tr>
<tr>
<td>Nausea (h, %)</td>
<td>11 (17)</td>
<td>12 (18)</td>
<td>8 (12)</td>
</tr>
<tr>
<td>Vomiting (h, %)</td>
<td>14 (20)</td>
<td>12 (18)</td>
<td>5 (7)</td>
</tr>
<tr>
<td>Total PONV (h, %)</td>
<td>25 (39)</td>
<td>24 (37)</td>
<td>13 (21)</td>
</tr>
<tr>
<td>Rescue (h, %)</td>
<td>18 (29)</td>
<td>14 (22)</td>
<td>6 (9)</td>
</tr>
<tr>
<td>Nausea score (mean ± sd)</td>
<td>2.4±3.3</td>
<td>2.2±2.4</td>
<td>1.2±2.6</td>
</tr>
<tr>
<td>Complete response (h, %)</td>
<td>30 (48)</td>
<td>39 (60)</td>
<td>50 (78)</td>
</tr>
<tr>
<td>Satisfaction score (mean ± sd)</td>
<td>7.0±2.4</td>
<td>7.2±2.5</td>
<td>8.3±1.8</td>
</tr>
</tbody>
</table>

*p<0.05 as compared with group H+O.
either drug used alone, without increasing the adverse events. 

Materials and Methods: A 2 year old boy’s anti-epileptic medication was changed from Sodium Valproate to Carbamazepine. Initially the child appeared to be more sleepy and unsteady on his feet. He later developed fever, cutaneous bullae, vesicles, petechiae and a purpuric rash. He lapsed into multi-organ failure within 24 hours. A provisional diagnosis of Thiopentone and Carbamazepine cross-reactivity was made, and he was treated with intravenous immunoglobulin and plasma exchange and steroids. He recovered gradually, was extubated a week later and made a full recovery.

Results and Discussion: Cross-reactivity between aromatic anti-epileptic compounds is well known (phenytoin, carbamazepine, oxcarbazepine and phenobarbital). Once a patient has a hypersensitivity to one aromatic anti-epileptic, exposure to another can cause an even more severe reaction [1]. This has been attributed to the arene oxide metabolites of the aromatic benzene ring they share, which can act as hapitens, leading to a hypersensitivity reaction [1]. Since Thiopentone, like Phenobarbital, is a barbituric acid derivative and shares a benzene ring, it may also play a role in anti-epileptic cross-reactivity and trigger a hypersensitivity reaction.

Conclusion(s): This report highlights the potential risk of administering Thiopentone for induction of anaesthesia to patients on aromatic anti-epileptic compounds. We are of the opinion that, though further studies are required to explore this link, the potential hazard needs to be recognised and the option of using alternative induction agents must be explored.

References:

9AP6-7
Neuroprotective effects of propofol in a model of traumatic brain injury
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Background and Goal of Study: Propofol (2,6-diisopropylphenol) has been shown to be neuroprotective in in vitro models of ischaemia-reperfusion brain injury [1,2]. Its potential benefit in mechanical traumatic injury of the brain remains unclear.

Materials and Methods: For this in vitro study we used hippocampal slice cultures from mice pups as previously described [3]. On day 14 after preparation, baseline fluorescence imaging was performed and the slices were subjected to focal mechanical brain trauma with a reproducible impact energy of 5.25 μJ on the CA1 region of the hippocampus. Afterwards the slices were exposed to different concentrations of propofol (10, 30, 50, 75, 100 and 200μM) dissolved in 0.1% DMSC (Dimethyl sulfoxide, solvent for lipophilic propofol) and kept in culture for 72h until final fluorescence imaging. The extent of the neuronal injury was detected using propidium iodide (4.5μM), a staining agent that is membrane-impermeable and only enters damaged cells. Here it forms highly fluorescent complexes with nuclear DNA. The tissue trauma was defined as the increase of fluorescence over the slice and normalized against the trauma control group. An average of n=16 slices was included in each group.

Results and Discussion: The control data in Figure 1 demonstrates that a significant tissue trauma could be observed in the trauma group when compared to the group without trauma. 0.1 Vol-% DMSC had no effect on the extent of the trauma.

Figure 1. Tissue trauma in controls (mean ± SEM).

Figure 2. Tissue trauma in presence of different concentrations of propofol (mean ± SEM).

Conclusion(s): Propofol showed a dose-dependent neuroprotective effect in an in vitro model of traumatic brain injury.

References:

9AP6-8
Effects of intraperitoneal (IP) different doses of ketamine on cognitive function in aged rats
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Department of Anesthesiology, The First Affiliated Hospital of Nanjing Medical University, Nanjing, Jiangsu Province, China

Background and Goal of Study: Alzheimer disease of the elderly has become a big headache of the worldwide. And the number of aged patients who need surgery is increasing now. This study is to investigate the effects of different doses of ketamine on spatial cognitive function and the expression of mRNA and protein of N-methyl-D-aspartate (NMDA) receptor subunits NR1 and NR2B in the hippocampus of aged rats.

Materials and Methods: Forty rats aged 18 months were randomly divided into 4 groups:control group (N, n=10); subanesthetic ketamine group 1 (K1, n=10); subanesthetic ketamine group 2 (K2, n=10); anesthetic ketamine group (K3, n=10).The animals in K1, K2 and K3 groups received intraperitoneal (IP) ketamine 10 mg kg⁻¹, 20 mg kg⁻¹ and 100 mg kg⁻¹ respectively once a day for 3 days whereas the animals in control group received IP normal saline 2 ml instead. One day after the last drug administration the animals underwent Morris water maze test 4 times a day for 3 consecutive days. The animals were killed within 1 hour after the last test for determination of NR1 and NR2B mRNA expression in the hippocampus using RT-PCR. The NR1 and NR2B subunit protein expression were detected with immunohistochemistry.

Fluorescence Imaging: The latency period and swimming distance of water maze test on the 2nd and 3rd days were significantly longer in group K3 than in control group (P<0.05). And the details of Morris water maze test can be refereed to table1. The NR2B mRNA and protein expressions in group K3 significantly decreased than those in control group (P<0.01), whereas the protein expression of NR2B subunit in group K1 increased dramatically (P<0.05).
Conclusion(s): Anesthetic ketamine inhibits spatial cognitive function in aged rats whereas subanesthetic ketamine doesn’t. The MDMA receptor subunit NMDA2B may be involved in the cognitive function while NRG1 seems not.

9AP6-9
A comparison at loss and return of response to verbal command of values for propofol, remifentanil, state and response entropy values in patients with severe heart failure
T. Hoff, N. Ducrocq, E. Junke, T. Fuchs-Buder, D. Longrois
Anaesthesia and Intensive Care, Centre Hospitalier Universitaire de Nancy, Vandoeuvre-les-Nancy, France

Background and Goal of Study: Target-controlled infusion (TCI) for propofol and remifentanil has been used for many years in Europe but there are relatively few reports concerning TCI in patients with severe heart failure. The aim of this observational study was to report TCI as well as EEG-derived depth of anesthesia values for patients with severe heart failure.

Materials and Methods: This is an observational study of patients with severe heart failure (NYHA class II and IV; on chronic beta-blocker therapy) that underwent anesthesia for implantation of internal cardioverter-defibrillator (ICD) with cardiac resynchronisation therapy. All monitoring variables were recorded using the RUGLOOP® II software (Demed, Tense, Belgium). Induction and maintenance of anesthesia was performed with TCI of propofol (model of Schindler) and remifentanil (model of Mintos) using a Fresenius Primea Base (Fresenius Vial Infusion Systems, Briesen, France) titrated to maintain state (SE) and response (RE) entropy values (M-Entropy® module; GE Healthcare, Finland) between 40-50. Propofol was given first and when loss of response to verbal contact (LRVC) occurred, remifentanil was started. When predicted effect site (Ce) remifentanil concentration was between 4-5 ng/ml, tracheal intubation (facilitated with atracurium) was performed. After the last ICD internal shock, propofol and remifentanil were stopped. Emergence from anesthesia was defined as return of response (eye opening) to verbal command (RRVC). Results are expressed as median (interquartile range or IQR).

Results and Discussion: We analysed 20 patients (15 males), aged 65 (59-73) years with left ventricular ejection fractions of 0.25 (0.18-0.3). Values for Ce remifentanil, SE, RE, heart rate and mean arterial pressure values are given in the Table.

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td><strong>LRVC</strong></td>
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<tr>
<td>Propofol Ce (µg/ml)</td>
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<tr>
<td>Remifentanil Ce (ng/ml)</td>
</tr>
<tr>
<td>SE values</td>
</tr>
<tr>
<td>RE values</td>
</tr>
<tr>
<td>MAP (mm Hg)</td>
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<tr>
<td>HR (bpm)</td>
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</table>

Conclusion(s): The Ce values for propofol and remifentanil observed in this study at LRVC and RRVC are comparable to those reported by other authors in patients without (severe) heart failure. These results suggest that TCI of propofol and remifentanil can be used in patients with severe heart failure.

9AP6-10
Comparison between two formulations of propofol
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Background and Goal of Study: Propofol has been firmly established as the most frequently used intravenous induction agent in Greece. The objective of this study was to compare the incidence of moderate-severe discomfort at induction of anesthesia between long-chain triglyceride preparation (Fresenius) and medium-chain triglyceride preparation (Fresenius).

<table>
<thead>
<tr>
<th>Table 1</th>
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<tr>
<td><strong>Group</strong></td>
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<tr>
<td>Latency period (S)</td>
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<tr>
<td>K1</td>
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<tr>
<td>K2</td>
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Conclusion(s): Compared to the 1st day, P<0.05, P<0.01, compared to control group, P<0.05.

Materials and Methods: 40 patients ASA II-III listed for elective procedures were consented and randomized to receive either induction agent. A standard dose was used for induction of anesthesia (10 mg) and patients were questioned after 20 sec about discomfort. Discomfort was recorded as none, mild, moderate, or severe. If the patients reported no discomfort we follow the induction and the question was repeated in the next 20 sec until contact was lost. If the patients complained for discomfort, we stopped the induction, we added 2 mg Lidocaine in the induction agent and we follow again the procedures. After induction of anesthesia, patients reported fentanyl, ondansetron, neuromuscular blocking agent and inhalation anaesthetic agent.

Results and Discussion: There was seen to be a 51% reduction in moderate-severe discomfort with medium-chain triglyceride preparation (Fresenius) compared with long-chain triglyceride preparation (Fresenius) with p<0.005. There was a 65% reduction in severe discomfort with medium-chain triglyceride preparation propofol compared with long-chain triglyceride preparation propofol with p<0.004. For the static results we used student t-test where p is statistically significant when less than is 0.005.

Conclusion(s): There is a significant decrease in the incidence of discomfort with medium-chain triglyceride preparation propofol compared with long-chain triglyceride preparation propofol, which reported as a severe discomfort.
Pharmacology

Postoperative renal function profiles

<table>
<thead>
<tr>
<th></th>
<th>Control (n=14)</th>
<th>Diltiazem (n=16)</th>
</tr>
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<tbody>
<tr>
<td>Pneumoperitoneum time (min)</td>
<td>312±76</td>
<td>279±44</td>
</tr>
<tr>
<td>Operation time (min)</td>
<td>184±59</td>
<td>195±53</td>
</tr>
<tr>
<td>Total fluid infused (ml)</td>
<td>During surgery 221±750</td>
<td>186±710</td>
</tr>
<tr>
<td></td>
<td>Postoperative 2 hr 375±239</td>
<td>481±295</td>
</tr>
<tr>
<td>CO (mg/min)</td>
<td>During surgery 49±3±24.2</td>
<td>81±6±50.6</td>
</tr>
<tr>
<td></td>
<td>Postoperative 2 hr 59±4±40.8</td>
<td>74±3±35.2</td>
</tr>
<tr>
<td>Urea output (m/min)</td>
<td>During surgery 0.98±0.71</td>
<td>1.22±0.64</td>
</tr>
<tr>
<td></td>
<td>Postoperative 2 hr 2.28±2.3</td>
<td>3.55±2.23</td>
</tr>
</tbody>
</table>

Values are mean ± SD. Control group: patients with intravenous normal saline; Diltiazem group: patients with intravenous diltiazem. Ccr: creatinine clearance. *P < 0.05, compared with control group. † P < 0.05, compared with intraoperative values within the group.

between two group. *P<0.05, compared with the baseline value (T1) within the group.

Conclusion(s): Low dose diltiazem infusion during pneumoperitoneum prevented the decrease in creatinine clearance and resulted in rapid recovery of urine output after surgery in patients undergoing laparoscopic surgery.

9AP7-3
Effects of esmolol and lidocaine on hemodynamic and BIS changes due to tracheal intubation during sevoflurane induction

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Background and Goal of Study: In this randomized, double-blind, controlled study, we investigated the effect of the short-acting β1-adrenoceptor antagonists esmolol and IV lidocaine on the hemodynamic and bispectral index in responses to induction of general anesthesia and endotracheal intubation under general anesthesia with sevoflurane alone.

Materials and Methods: 60 patients were randomly assigned to the control, esmolol, and lidocaine groups (n = 20 each). Two minutes before the induction of anesthesia, patients received either a bolus of saline, esmolol 2 mg/kg or lidocaine 1.5 mg/kg. Anesthesia was induced with sevoflurane and oxygen via a face mask by using a semiclosed circle system with a total gas flow of 4 L/min. The concentration of sevoflurane was 7.0%. When the end-tidal concentration of sevoflurane reached 1.3 MAC, the topical anesthesia of larynx and pharynx was performed with 4% dicaine. Then the trachea was intubated, and the lungs were ventilated with sevoflurane. Vecuronium 0.1mg/kg IV was given immediately after intubation. MAP, HR, and BIS were recorded before the induction, immediately before laryngoscopy, 1 min, 3 min, 5 min, 10 min after intubation.

Results and Discussion: There was no difference in the demographic data among the three groups. The maximum increase in mean arterial pressure were lower in the lidocaine (28% ± 6%) and esmolol (24% ± 5%) groups than in the control group (46% ± 5%) (P < 0.05). The increases in heart rate after intubation were similar in the control (44% ± 6%) and lidocaine (41% ± 10%) groups, but lower in the esmolol group (19% ± 5%) (P < 0.05). BIS was between 96 and 98 for all patients at baseline. After administration of lidocaine, BIS at 1 min after induction and preintubation in the lidocaine group were significantly lower compared with the control group and esmolol group (P < 0.05). There were no differences in BIS between the control group and esmolol group before laryngoscopy (43±5, and 48±4 in the control, and esmolol groups, respectively). BIS increased significantly in the control group (65±12) and lidocaine group (61±12; P < 0.05) 1 min after intubation, whereas it remained unchanged in the esmolol group (45±9).

Conclusion(s): The administration of IV lidocaine (1.5 mg/kg) can suppress only the increase in arterial pressure after endotracheal intubation, but also prevented BIS increases in response to laryngoscopy and tracheal intubation in patients anaesthetized with sevoflurane.

9AP7-4
Potentiation of the inotropic effect of isoproterenol by naloxone in vitro: A non-opiate receptor mechanism

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Background and Goal of Study: The aim of this study was to define the mechanism of non-opiate receptor-mediated action of naloxone, which potentiates the inotropic effect of isoproterenol on the myocardium.

Materials and Methods: With approval of the Yonsei University College of Medicine Animal Research Committee, cardiac papillary muscle of the right ventricle was obtained from male guinea pigs (300-400 g) under sevoflurane anesthesia. Peak force and maximum rate of force development (dF/dt-max) were measured. Cumulative concentration-response curves for isoproterenol as well as for forskolin and 2-isobutyrylthiothyamine (IBMX) were obtained. The enhancement of contractions by naloxone in the presence of isoproterenol was further confirmed by sequentially applying increasing concentrations of naloxone in the presence of EC50 of isoproterenol as well as forskolin and IBMX. For cAMP assays, cardiac muscle was homogenized and centrifuged to separate a membranous protein fraction. Naloxone-induced changes in cAMP in the presence of EC50 of isoproterenol or forskolin were measured with cAMP assay kit. In electrophysiological studies, action potential, delayed outward K+ current (Ito), inward rectifier K+ current (Ikr), and L-type Ca2+ current (ICa,L) were measured.

Results and Discussion: Naloxone (30 μM) produced a leftward shift of the isoproterenol concentration-response curve (0.01-2 μM). While naloxone (30 μM) produced a leftward shift of the forskolin concentration-response curve (0.01-2 μM) until 3 μM concentration, markedly enhanced contraction was observed from 10 to 30 μM concentration ranges. Naloxone had no effect on the IBMX concentration-response curve. Concentration-related enhancement of contractile forces following sequential application of naloxone (10, 30, and 300 μM) in the presence of isoproterenol was shown. Naloxone did not alter the cAMP levels induced by application of EC50 of isoproterenol or forskolin. Naloxone (30 μM) in the presence of isoproterenol, prolonged APD50 and APD90, while the amplitude and resting membrane potential was unchanged. Naloxone significantly reduced peak outward Ito, by 80-30% of isoproterenol-treated group, but did not alter the Ito1 from -140 mV to 0 mV. At a membrane potential of +10 mV, naloxone increased the Ito1 by 26±3%. Conclusion(s): Enhancement of myocardial contractility by naloxone in the presence of isoproterenol is, at least in part, likely due to inhibition of delayed outward K+ current, resulting in a secondary increase of inward Ca2+ current.
ative settings. It was reported to be neuroprotective in cerebral ischemia. The aim of the study was to evaluate the effects of dexmedetomidine on ischemia-reperfusion injury of epicardial island flaps of rats.

**Materials and Methods:** Eighty Wistar rats in 4 groups (n=20) were used. Each group was subdivided into two equal groups. Under ketamine and xylazine anesthesia, superficial epicardial island flaps were elevated. In Groups 1a and 1b, the flaps were sutured back without ischemic insult. In Groups 2a and 2b, the arteries and veins in the pedicles were clamped for 12 hours and then reperfused. In Groups 1 and 2, intraperitoneal saline was administered 45 min before ischemia and 45 min before reperfusion. Intraperitoneal 10 μg/kg dexmedetomidine was administered 45 min before ischemia and 45 min before reperfusion in Group 3a and 3b. Intraperitoneal 30 μg/kg dexmedetomidine was administered 45 min before ischemia and 45 min before reperfusion in Group 4a and 4b. The animals in Groups 1a, 2a, 3a and 4a were sacrificed after tissue sampling of the flaps 12 hours after the reperfusion. The animals in Groups 1b, 2b, 3b and 4b were observed for 7 days after reperfusion. At the end of the 7th day the necrotic area ratios were calculated with AUTOCAD. After tissue sampling, the rats were sacrificed. Nitric oxide (NO), malondialdehyde (MDA) and myeloperoxidase (MPO) activity were assessed in the samples. Kousal Walls one way ANOVA and Mann Whitney U-tests were used for statistical analysis.

**Results and Discussion:** NO, MDA and MPO activity levels were significantly higher in Group 2a compared to Group 1a. The levels were found to be lower in Group 3a and Group 4a compared to Group 2a. MDA levels in Group 4a were apparently lower than Group 3a, although NO and MPO levels were similar. NO, MDA and MPO activity levels were significantly higher in Group 2b compared to Group 1b. The levels were lower in Group 3b and Group 4b compared to Group 2b. NO levels were significantly lower in Group 4b compared to Group 2b at the 7th day. Flap necrosis area was found to be higher in Group 2b; whereas, administration of dexmedetomidine significantly reduced necrosis in Group 3b and 4b compared to Group 2b.

**Conclusion(s):** We conclude that administration of dexmedetomidine before ischemia and reperfusion periods, can reduce ischemia-reperfusion injury of flaps and has a beneficial effect on flap survival.

**9AP7-6**

**Effect of opioids on inflammatory response in cardiac surgery patients undergoing cardiopulmonary bypass.** Fentanyl vs. remifentanil S. Kivak, H. Baer, W. Kim, H. Lee, S. Kim

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**Background and Goal of Study:** Inflammation plays a pivotal role in the pathogenesis of organ dysfunction after cardiopulmonary bypass (CPB). It has been well known that neutrophils played a central role in initiating acute inflammatory responses. Recently, we reported that remifentanil attenuated neutrophil activation such as the inflammatory cytokine (TNF-α, IL-6 and IL-8) activation through a P38 and ERΚ1/2 pathways unlike other opioids. The aim of this study was to investigate whether remifentanil has effects on the inflammatory process in cardiac surgery patients undergoing CPB.

**Materials and Methods:** Sixty adult patients undergoing cardiac surgery with CPB were randomized to two groups by using opioid: remifentanil group (n = 30), fentanyl group (n = 30). Blood samples for measurements of TNF-α, IL-6 and IL-8 and MDA were taken from the arterial line in both groups at 6 different time points: t0 (baseline), just before aortic clamping (T1), just after aortic declamping (T2), 5 (T3), 15 (T4), 30 (T5), and 60 (T6) min after aortic declamping. According to Datas and Results: TNF-α, IL-6 and IL-8 and MDA plasma levels increased in both groups after aortic declamping, with a higher increase in the fentanyl group. (p < 0.05).

**Conclusion(s):** Our results suggested that remifentanil has advantage as the anesthetic agent during cardiac surgery attenuating inflammatory response caused by CPB.

**9AP7-7**

**Comparison of epinephrine, norepinephrine and vasopressin with local anesthetics on contraction responses in isolated thoracic aortas.** S. Fujikawa, S. Kurashige, M. Mizogami, K. Takakura

Anesthesiology, Ashik University School of Dentistry; Miyako, Gifu, Japan

**Background and Goal of Study:** It has been well known that the failure to achieve satisfactory anesthesia following the administration of local anesthetics in acute inflammatory tissues, and several hypotheses to explain this phenomenon have been, such as reduction in the pH of inflammatory tissues. Vasodilation of the inflammatory area is also one of the hypotheses. Although vasoconstrictors are usually added to local anesthetics to prolong the anesthetic duration, it has been unknown how the vasoconstrictors with local anesthetics act to vessels dilated in inflammatory tissues. We investigated the responses of several vasoconstrictors with a local anesthetic in inflammatory vessels.

**Materials and Methods:** We isolated thoracic aorta from Wister rats. The arteries were cut into rings of approximately 3-4 mm in length. The ring was stretched by a pair of hooks in an organ bath (5 ml) filled with Krebs-Henseleit solution (37°, pH = 7.4). After lipopoly saccharide (LPS, 1 μg/mL) treatment, vasoconstrictors, epinephrine (AP), norepinephrine (NE) and vasopressin (AVP), were applied in a cumulative manner between the concentrations of 10⁻⁹ to 10⁻⁵ M with or without lidocaine (10⁻⁷ M). The changes of isometric vasoconstrictions were recorded continuously with an amplifier system by using the PCD-30A computer system.

**Results and Discussion:** The concentration-dependent vasconstrictions produced by EP, NE, AVP were attenuated by LPS treatment in a time-dependent manner. The attenuation was less in EP-produced vasoconstrictions as compared with NE or AVP-induced ones. Also under the presence of lidocaine, EP produced vasoconstrictions more than another drugs.

**Conclusion(s):** These results indicate that EP might be an optimal vasoconstrictor to add when lidocaine is injected into inflammatory tissues.

References:

**9AP7-8**

**A comparison between sevoflurane, desflurane and total intravenous anesthesia on oxidative status during off-pump coronary artery bypass grafting surgery**

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Anesthesiology, Turkiye Yuksek Ihtisas, Ankara, Turkey

**Background and Goal of Study:** In this study we aimed to investigate the effects of sevoflurane, desflurane and total intravenous anesthesia (TIVA) on oxidative status in patients undergoing off-pump coronary artery bypass surgery (CABG) [1].

**Materials and Methods:** We investigated 45 patients who underwent off-pump CABG surgery and divided into three groups (n=15). Fentanyl, midazolam and rocuronium bromide were used for induction in all groups. As for maintenance in Group I; sevoflurane (1 MAC) and in Group II; desflurane (1 MAC) were used all through the operation. In group III; TIVA with fentanyl bolus doses were used. Blood samples for malondialdehyde (MDA), catalase (CAT), total sulfhydryl groups (SH), protein carbonyl contents (PC) and total antioxidant capacity (TAC) were drawn before anesthesia induction (T1), before coronary occlusion (T2) and at the end of the surgery (T3). Statistical analyses were performed by Anova and Friedman tests, p < 0.05 is considered as statistically significant.

**Results and Discussion:** In Group I; although TAC was increased at T2 with respect to T1 (p = 0.05). It did not increased at T3. In Group II TAC was significantly increased at T2 with respect to T1 (p < 0.01) and at T3 with respect to T2 (p < 0.05). In Group III TAC was significantly increased at T2 with respect to T1 (p < 0.05) and at T3 with respect to T2 (p < 0.01). CAT, SH, PC, MDA levels did not changed during surgery in all groups. Despite of the increments of TAC in desflurane and TIVA groups before coronary occlusion and at the end of the surgery, sevoflurane anesthesia increased TAC only before coronary occlusion.

**Conclusion(s):** The incremental effect on TAC before coronary occlusion time made us to consider sevoflurane as not an oxidative but an antioxidant supporting agent.

References:

**9AP7-9**

**Effects of propofol on potassium currents in artery smooth muscles**

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**Background and Goal of Study:** The goal of the study was to investigate the effects of propofol on potassium currents in pulmonary artery smooth muscle cells of normotensive and hypertensive rats.

**Materials and Methods:** The effects of propofol on potassium currents in smooth muscle cells derived from normotensive and hypertensive rats pulmonary arteries were observed by patch clamping (whole cell configuration) after application of the drug in the bath.

**Results and Discussion:** The potassium current-voltage curves (I-V curves) of smooth muscle cells derived from normotensive and pulmonary hypertensive rats pulmonary arteries were up-ward shifted by propofol (50 and 100 μM/L).
Compared with control group, within 5 minutes after application of the drug, the current amplitude could increase to (120.7±10.8%), (112.9±5.0%) (P < 0.01) and (125.5±6.2%), (122.2±7.8%) (P < 0.01) of initial current amplitude respectively.

Conclusion(s): The out-ward potassium currents in smooth muscle cells derived from normotensive and pulmonary hypertensive rats could be increased by propofol. This may be one of the mechanisms that propofol can decrease pulmonary vascular tension and dilate pulmonary vessel.

9AP7-10
Comparison of effects of fentanyl, remifentanil and dexmedetomidine on hemodynamic parameters and neuromuscular blockade
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Background and Goal of Study: Opioids are frequently used for balanced anaesthesia. They provide a stable hemodynamic state during induction and intubation. Dexmedetomidine, an α₂ agonist, has analgesic effect via central mechanisms. Both opioids and dexmedetomidine have no direct effect on neuromuscular junction. In this study we aimed to compare the effects of fentanyl, remifentanil and dexmedetomidine on hemodynamic parameters, neuromuscular block and muscle relaxation.

Materials and Methods: After approval of ethics committee, 18-70 years old, ASA I-II patients were enrolled to study. Heart rates, mean arterial pressures, SpO2 and TOF values of patients were recorded 10 min before induction, 1 min after induction and intubation, and every 5 min during surgery. Times to reach TOF 0% (T0) and TOF 25% (T25) were also recorded. Intubation quality was assessed using Intubation Quality Scoring Scale. In fentanyl group (Group F, n=33), fentanyl 1.5 mcg/kg was given 10 min before induction and additional 50 mcg boluses were administered as needed during surgery. In remifentanil group (Group R, n=25), remifentanil 1 mcg/kg was infused in 10 minutes before induction and 1 mcg/kg/min infusion was continued till the end of surgery. Thiopentonal 5 mg/kg was used for induction of anaesthesia, vecuronium bromide 0.1 mg/kg was given for neuromuscular blockade and 2% sevoflurane in 50% N2O:O2 mixture was used for maintenance of anaesthesia.

Results and Discussion: Heart rates and mean arterial pressures were significantly higher in Group D, compared with Group R after induction and intubation (p=0.04, p<0.01). TOF 0% times were similar between groups, T25 times were 54.6±13.3, 56.9±10.4 and 70.5±25.2 minutes in Groups F, R and D respectively. T25 time was significantly longer in Group D than in Groups F and R (p=0.03 and p=0.02). Intubation quality was similar in all groups. In animals dexmedetomidine is capable of inducing muscle flaccidity. Dexmedetomidine may alter renal and hepatic blood flow and distribution volume of drugs. It shows shorter chloride and etomidate which are structurally similar to dexmedetomidine competitively and noncompetitively block muscle type nicotinic acetylcholine receptors.

Conclusion(s): In our study, dexmedetomidine enhanced the neuromuscular block of vecuronium. This result may be due to several mechanisms which needs further investigation.

9AP8-1
Increased propofol requirement after repeated administration for anaesthesia
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Background and Goal of Study: Development of tolerance to the sedative effect of propofol was reported after long-term infusion in intensive care.1 We investigated the propofol requirement after repeated administration for anaesthesia.

Materials and Methods: After IRB approval and written consent, anaesthesia with propofol and remifentanil, S-ketamine or saline was performed in 22 volunteers (7±13 kg, 52.8±6 yrs., 12 male, 10 female) in a randomized cross-over design on three sessions with an interval of 6 months between each session. The EEG was recorded (Dr-Cr), and the median frequency (MEF) and spectral edge frequency (SEF) were determined. Propofol was administered as target controlled infusion (TCI) with an initial target concentration of 6 μg/ml to allow the application of a laryngeal mask. Subsequently, remifentanil (TCI: 7 ng/ml), S-ketamine (TCI: 0.1 μg/ml) or saline (10 μl/ml) were administered for 60 min. After stop of the second drug, propofol was continued for further 30 min. The endpoints of MEF and SEF as well as the corresponding target concentrations and infusion rates of propofol were determined from the last 10 min of the first period, where only propofol was administered (duration: 50±10 min). The sessions were compared by the t-Test for paired samples with Bonferroni correction.

Results and Discussion: Whereas baseline values and endpoints of MEF and SEF did not differ between the sessions, there was a significant increase of propofol target concentration and infusion rate in the third session.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline MEF [Hz]</th>
<th>Baseline SEF [μg/ml]</th>
<th>Endpoint MEF [Hz]</th>
<th>Endpoint SEF [μg/ml]</th>
<th>Endpoint propofol target [μg/ml]</th>
<th>Endpoint propofol infusion [mg/kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>9.3±0.7</td>
<td>19.7±3.4</td>
<td>13.8±0.7</td>
<td>4.6±0.7</td>
<td>0.01±0.0</td>
<td>10.1±1.5</td>
</tr>
<tr>
<td>Session 2</td>
<td>9.2±0.8</td>
<td>20.4±3.6</td>
<td>13.8±0.6</td>
<td>4.6±0.4</td>
<td>0.02±0.0</td>
<td>10.2±1.0</td>
</tr>
<tr>
<td>Session 3</td>
<td>9.1±0.8</td>
<td>20.0±2.6</td>
<td>14.1±1.5</td>
<td>5.2±0.8</td>
<td>0.02±0.0</td>
<td>11.8±2.0</td>
</tr>
</tbody>
</table>

Mean ± SD, **p<0.01 vs session 1, *p<0.05 vs session 1, #p<0.05 vs session 2

Conclusion(s): There was an increase of propofol requirement after repeated administration. This apparent development of tolerance may be caused by changes in pharmacokinetics and/or -dynamics of propofol, and may also be relevant for clinical use.

References:

9AP8-2
Influence of glucose and insulin on the protective effect of Alanine against liver reperfusion injury
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Background and Goal of Study: Fasting increases liver ischemia-reperfusion (IR) injury.1 Alanine (Ala) has shown to improve survival of hepatocytes exposed to IR.2 This study investigated whether the protective effect of Ala against warm liver IR is dependent of the presence of glucose and/or insulin.

Materials and Methods: Wistar rats (150-200g fasted for ± 16 hours were anaesthetised, the portal vein cannulated, the liver removed and immediately perfused (5 m/min, 37°C), in a closed ex vivo system with HBSS and C2. The 3 experimental phases consisted in perfusion for 15 min, warm ischaemia for 60 min, and reperfusion during 60 min. Animals were divided into 4 groups (n = 5): control (glucose 1g/l and insulin 35 IU/l), and Ala 10 g/l groups, with or without 1g/l glucose or 35 IU/l insulin. Glucose, lactate, enzymes, K+, dienes and trienes were analyzed in perfusate from 0 to 135 min. Mean ± SD. ANOVA.

Results and Discussion: Results at 135 min are presented in Table 1. Glucose and insulin did not improve the protective effect of Ala against IR injury.

Table 1: Biological variables at 135 min

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gluc 1g/l + Insulin</th>
<th>Ala 10g/l</th>
<th>Ala 10g/l + Gluc 1g/l</th>
<th>Ala 10g/l + Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose (mg/dl)</td>
<td>84±3.2</td>
<td>134*</td>
<td>113±3</td>
<td>17±1*</td>
</tr>
<tr>
<td>Lactate (mg/dl)</td>
<td>3.9±3.6</td>
<td>4.8±1.3</td>
<td>6.9±2.3</td>
<td>5.0±0.9</td>
</tr>
<tr>
<td>K+ (mEq/l)</td>
<td>11.9±0.6</td>
<td>8.2±0.7*</td>
<td>9.3±0.8#</td>
<td>8.4±0.5*</td>
</tr>
<tr>
<td>AST (IU/l)</td>
<td>1,147±121</td>
<td>243±64*</td>
<td>168±95*</td>
<td>150±28*</td>
</tr>
<tr>
<td>ALT (IU/l)</td>
<td>787±612</td>
<td>198±44*</td>
<td>121±76*</td>
<td>80±34*</td>
</tr>
<tr>
<td>LDH (IU/l)</td>
<td>8,880±4,546</td>
<td>2,769±468*</td>
<td>1,664±915*</td>
<td>1,751±56*</td>
</tr>
<tr>
<td>Dienes (%)</td>
<td>40±3</td>
<td>31±11*</td>
<td>24±4</td>
<td>28±1*</td>
</tr>
<tr>
<td>Trienes (%)</td>
<td>20±2</td>
<td>15±3*</td>
<td>14±2</td>
<td>13±1*</td>
</tr>
</tbody>
</table>

* P<0.05 vs Gluc 1g/l + Insulin.

Conclusion(s): The protective effect of Ala against normothermic liver IR injury is independent of the presence of glucose and/or insulin.

References:

9AP8-3
Repeated intermittent etomidate dosing does not suppress adrenal function
P. Lebowitz, S. Cohen, S. Weisberg, B. Wyszynski, C. Ramesar
Anesthesiology, Montefiore Med Ctr/Albert Einstein Col Med, Bronx, New York, USA

Background and Goal of Study: The IV infusion of etomidate (E) for sedation of critically ill patients has been associated with increased mortality attributed to adrenocortical suppression. E given to non-critically ill patients, either as a...
Results and Discussion: Nine patients were enrolled in the study, four of whom randomized to E and five to M. The mean number of ECT treatments proves nerve conduction velocity in diabetic polyneuropathy. Thus, is beneficial metabolism action of alpha lipoic acid. It also stimulates glucose uptake and improves insulin sensitivity. In Group A, after the start of surgery there was a gradual decrease in the plasma glucose level in group B (0.9±0.3 mmol/l) postoperatively.

\begin{table}[h]
\centering
\begin{tabular}{lccc}
\hline
Variables & Fasting (n=10) & Fed (n=10) & P-Value \\
\hline
Glucose (mg/dl) & 85±22 & 154±19 & < 0.001 \\
Lactate (mg/dl) & 2.5±4.3 & 98.1±34.3 & < 0.001 \\
K+ (mEq/l) & 7.7±0.5 & 6.3±1.3 & 0.109 \\
AST (IU/I) & 372±163 & 105±89 & 0.009 \\
ALT (IU/I) & 58±69 & 11±10 & 0.077 \\
LDH (IU/I) & 4.114±2.088 & 626±858 & 0.009 \\
\hline
\end{tabular}
\caption{Biological variables at 135 min}
\end{table}

Conclusion(s): In fed rats, liver injury was moderate, whereas hepatocytosis integrity was notably impaired in fasting animals after paracetamol administration. These results might indicate the possibility that nutritional support could be part of a prevention strategy in clinical conditions where livers are exposed to potentially hepatotoxic drugs, like paracetamol.

References:

9AP8-7
Intraoperative infusion of amino acids prevents intraoperative hypothermia and only minimally the postoperative one
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Department of Anaesthesia, Agion General Hospital, Agion, Greece

Background and Goal of Study: Amino acids infusion is known to prevent perioperative hypothermia during general anaesthesia as a result of increased thermogenesis [1]. This study was designed to see if the intraoperative infusion of amino acids prevents postoperative hypothermia.

Materials and Methods: After institutional approval and informed consent, fifty patients scheduled to undergo open abdominal surgery were randomly divided into two groups. Group A (n = 25) received 600 U Berlition® diluted in 0.9% 500 ml NaCl i.v. (placebo). Both groups underwent spinal anesthesia with isobaric 0.5% bupivacaine and were given 0.5% 1 ml diazepam as premedication. The infusion started after the induction of anaesthesia and the placement of a Swan - Ganz catheter and lasted for two hours. Core temperature was measured continuously from this catheter.

Results and Discussion: Patient characteristics, anaesthetic management, anaesthesia and surgery time and hemodynamic data were similar in the two groups. Shivering abatement was noted in the amino acid group. Core tem-
perature and energy expenditure increased in the study group, but only for the first hour after the emergence from anaesthesia.

Table 1. Comparison of Core temperature and Energy expenditure measurements in the postoperative period

<table>
<thead>
<tr>
<th>Study group</th>
<th>Control group</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mean±SD)</td>
<td>(mean±SD)</td>
<td></td>
</tr>
<tr>
<td>Core temperature (°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.1 (0.29)</td>
<td>35.7 (0.23)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1 hour after</td>
<td>1710 (242)</td>
<td>1250 (219)</td>
</tr>
<tr>
<td>Isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.6 (0.26)</td>
<td>36.0 (0.22)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>2 hours after</td>
<td>1510 (248)</td>
<td>1390 (222)</td>
</tr>
</tbody>
</table>

Conclusion(s): Intraperative infusion of amino acids has an anti-hypothermic effect by increasing metabolic heat production and abolishing shivering. The intraoperative reduction of hypothermia was however minimally extended into the postoperative period, no more than an hour.

References:

9AP8-7 Influence of MTHFR gene polymorphisms on homocysteine concentrations after nitrous oxide anesthesia

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Background and Goal of Study: Mutations in the MTHFR gene (677C>T, 1298A>C) cause elevated homocysteine levels and have been linked to devas-
tating neurological outcomes after nitrous oxide anaesthesia. This study tested the hypothesis that patients with common MTHFR 677C>T or 1298A>C mutations develop higher homocysteine levels after nitrous oxide anesthesia than wild-type patients.

Materials and Methods: In this prospective observational cohort study with blinded, Mendelian randomization, we included 140 healthy patients undergo-
ing elective surgery. All patients received 66% nitrous oxide. The main outcome variable plasma total homocysteine as well as folate, vitamin B12, and holo-
transcobalamin II was measured before, during and after surgery. After comple-
tion of the study, all patients were tested for their MTHFR 677C>T or 1298A>C genotypes.

Results and Discussion: Patients with a homoyzgyous MTHFR 677C>T or 1298A>C mutation (n=25) developed higher plasma homocysteine concentra-
tions (14.9 μmol/L [10.0–26.4], median [interquartile range]) than wild-type or heterozygous patients (9.3 μmol/L [7.5–15.5], n = 115). The change in homo-
cysteine after nitrous oxide anesthesia was tripled in homozygous patients com-
pared to wild-type (5.6 μmol/L [+60%]) vs. 1.8 μmol/L (+22%).

Our results show that the administration of IV midazolam before induction sig-
ificantly reduced the amount of propofol required for LOC. The sparing effect of midazolam, translated for our average 68kg patient in a 45% reduction on the amount of propofol required for induction. As expected, plasma concentration were similar, since they do not reflect the hypnotic effect. The fact that BIS at LOC did not differ is not surprising, since BIS provides a direct measure of the effects of anaesthetics on the brain.

References:

9AP8-8 Co-induction of anaesthesia with midazolam: Reduced propofol effect-site concentration and time to LOC, no changes in Bis

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Background and Goal of Study: Benzodiazepines may decrease the amount of hypnotic needed to loss of consciousness (LOC)1,2. This retrospective study shows the differences in propofol consumption between two groups with and without premedication.

Materials and Methods: Patients scheduled for surgery under general anaes-
thesia were divided in 2 groups: Group A received 2mg IV midazolam before induction and Group B did not. Anaesthesia induction was the same in the 2 groups: remifentanil was given by TCI to achieve a predicted effect site concen-
tration of 2.5ng/mL (Minto’s Pk model), after which 1% propofol was started at a constant rate of 200μL/h until LOC (defined as loss of eye opening to name calling and taping on the forehead). Schneider’s Pk model was used to predict propofol Ce concentrations. RugoLoop2 software was used to drive the syringe pumps and to collect data. Demographic variables (age and weight), BIS at LOC, propofol consumption (volume infused, mL), predicted cerebral and plas-
matic concentrations of propofol were analyzed. Data was mean±SD, statistics used Mann-Whitney and t-test with significance for P<0.05.

Results and Discussion: There were 30 patients in Group A (55±16 years, 68±14 kg, ASA 1-4, 17 males) and 30 in Group B (49±9 years, 68±15 kg, ASA 1-3, 15 males). Age was higher in Group A (P<0.05). Results are shown in table 1.

Table 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Cerebral conc. Propofol (μg/mL)</th>
<th>Plasma conc. Propofol (μg/mL)</th>
<th>Propofol (mg/kg)</th>
<th>BIS at LOC</th>
<th>Time at LOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>3.5±0.3</td>
<td>7.9±0.9</td>
<td>1.1±0.3</td>
<td>71.6±0.2</td>
<td>124±6</td>
</tr>
<tr>
<td>Group B</td>
<td>5.1±1.2*</td>
<td>7.4±1.3</td>
<td>1.6±0.4*</td>
<td>67.8±1.5</td>
<td>190±6*</td>
</tr>
</tbody>
</table>

Conclusion(s): Co-induction of anaesthesia with midazolam: Reduced propofol effect-site concentration and time to LOC, no changes in Bis

9AP8-9 Oral intake of amino acids reduces hypothermia during anaesthesia in patients

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Background and Goal of Study: Intravenous amino acids infusion prevents postoperative hypothermia. However, amino acids solution may not be appro-
priate during surgery because of imbalance of electrolytes and high osmotic pressure. We showed that oral amino acids prevent hypothermia in a rat model (1). In this study, therefore, we examined the effect of oral intake of amino acids before anaesthesia on the body temperature in patients undergoing total hip arthroplasty.

Materials and Methods: Patients undergoing total hip arthroplasty (ASA-PS: II, 50–80 year-old) were enrolled in this study. Two hours before anaes-
thetic induction, patients received 150 mL of a balanced amino acid solution (Amparen®: 100g/L, 400kcal), or saline orally (AA group and saline group, re-
spectively). Anaesthesia was induced with midazolam, fentanyl and vecuronium and maintained by sevoflurane in oxygen and fentanyl. Room temperature was maintained at 25°C, and tympanic, esophageal and rectal temperatures with a centigrade scale were measured every 20 min for 180 min after anaesthetic induction. Difference between the temperature at each time and the baseline (or temperature at the first measurement) was also calculated to evaluate the
Results and Discussion: Sixteen patients were studied; AA group (n=8) and saline group (n=8). Thympnic temperature decreased for 3 hours from the start of anesthetic induction in both groups; AA group: 36.7±0.4°C to 36.0±0.3°C, saline group: 36.2±0.4°C to 35.4±0.3°C. The temperature of AA group was significantly higher than that of saline group for the study period. Esophageal temperature decreased for 3 hours; AA group: 36.3±0.1°C to 36.0±0.3°C, saline group: 36.4±0.5°C to 35.7±0.2°C. It was higher in AA group except at the first measurement, but the differences between two groups did not reach statistical significance. However, decreasing rate of AA group was significantly smaller than that of saline group. Rectal temperature decreased for 3 hours; AA group: 36.7±0.4°C to 36.2±0.4°C, saline group: 36.7±0.2°C to 35.9±0.1°C. There were no significant differences between two groups in both actual temperature and decreasing rate.

Conclusion(s): Oral intake of amino acids partly prevented hypothermia during general anesthesia. Further evaluation of the dosage is required to ensure its usefulness.

References:

9AP8-10
Efficacy of insulin glargine in perioperative glucose control
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Background and Goal of Study: Glargine as a basal insulin has a longer duration of action with no pronounced peak. Goal of study is to check the effect of insulin glargine through the comparison of insulin glargine versus glucose-insulin-potassium (GIK) on perioperative glucose control in insulin-treated type 2 diabetics.

Materials and Methods: design: prospective, blind randomized trial. patients: 30 insulin-treated type 2 diabetics, 40-80 years old, subjected to femoral to pedal bypass or below knee amputation under general anesthesia. Interventions: Group IG (insulin glargine, n=15) was treated with GIK infusion (125mU/hr). Measurements: Glucose: every 30 minutes during surgery and 1 hour after extubation, Potassium: every 1 hour during surgery and 2 hours after extubation. Statistical analysis: unpaired t-test.

Results and Discussion: There were no significant differences between two groups in clinical characteristics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Glargine (n=15)</th>
<th>GIK (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>60±11.09</td>
<td>66±11.25</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>22±4.20</td>
<td>20±4.86</td>
</tr>
<tr>
<td>DM Duration (min)</td>
<td>12±8.75</td>
<td>15±4.92</td>
</tr>
<tr>
<td>Duration of Anesthesia (min)</td>
<td>185±55.42</td>
<td>160±48.05</td>
</tr>
<tr>
<td>HbAtc (%)</td>
<td>7±1.18</td>
<td>7±1.76</td>
</tr>
<tr>
<td>c-peptide (m mol/L)</td>
<td>2.2±1.72</td>
<td>2.4±2.34</td>
</tr>
<tr>
<td>Insulin (μU/mL)</td>
<td>16.7±25.11</td>
<td>14±20.78</td>
</tr>
<tr>
<td>Potassium (mEq/L)</td>
<td>4.4±0.45</td>
<td>4.4±0.50</td>
</tr>
<tr>
<td>Glargine dose (mU)</td>
<td>18±4.30</td>
<td>18±4.30</td>
</tr>
<tr>
<td>Fasting Glucose (mg/dL)</td>
<td>110±28.42</td>
<td>90±18.41</td>
</tr>
</tbody>
</table>

Values are mean ±SD.

There were no significant difference in the time course of plasma glucose and potassium levels during and after surgery between two groups.

Figure 1. Glucose levels during and after surgery.

Figure 2. Serum potassium during and after surgery.

Conclusion(s): Insulin glargine is as effective as the GIK regimen for perioperative glucose management in type 2 diabetics.

9AP9-1
Contributors to interindividual variability of tramadol disposition in the first months of life
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Background and Goal of Study: Tramadol is increasingly prescribed as an analgesic, but data on contributors to the between individual variability of tramadol clearance and O-demethyl tramadol (M1) formation in young infants are limited (1).

Materials and Methods: A population pharmacokinetic analysis of tramadol and M1 was undertaken using non-linear mixed effects models (NONMEM) in preterm neonates and young infants. Covariate analysis included weight, postmenstrual age (PMA), postnatal age (PNA), creatinaemia, (cardiac) surgery, cardiopathy and cytochrome (CYP)2D6 genotype, based on the CYP2D6 activity score. Tramadol was administered as part of routine clinical care (2).

Results and Discussion: There were 593 observations collected in 57 patients (25-54 weeks PMA). Tramadol clearance was described using a two-compartment, zero order input, first order elimination linear model. An additional compartment was used to characterize M1. Tramadol clearance at term age was 17.1 L/h/70kg (CV 37.2%). Size (37.8%) and PMA (27.3%) contribute to this variability. M1 formation clearance was 4.11 L/h/70kg (CV 110.9%) at term age. Size and PMA were the major contributors (52.7%) while the CYP2D6 activity score contribute 6.4% to this variability.

Conclusion(s): Tramadol clearance and the contributors of its variability confirm earlier reports, while M1 formation variability is part explained by size, PMA and CYP2D6 activity score. M1 formation clearance is very low in preterm neonates independent of the CYP2D6 activity score with a subsequent rapid maturation. The slope of this increase depends on the CYP2D6 polymorphisms. The current observations suggest a limited μ-opioid receptor-mediated analgesic effect of M1 in preterm neonates and a CYP2D6 polymorphisms dependent effect in term neonates and young infants.

References:

9AP9-2
Advanced age and target controlled infusion systems: Part I of a cohort study comparing young and elderly patients
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Background and Goal of Study: Target controlled infusion systems are commonly used in daily clinical practice. However, little is known on the impact of age on effect site concentrations that are needed to achieve loss of consciousness.

Materials and Methods: In this first part of a two parts cohort study, we compared elderly (>65 years) and young patients (<40 years) undergoing surgery. All received a target controlled propofol infusion using the pharmacokinetic model by Schnider et al. Depth of sedation was evaluated at baseline and after each 0.5 μg ml⁻¹ increase of the estimated propofol effect site concentration using the 0 to 5-point Observer Assessment of Alertness/Sedation (OAA/S) scale. A score <2 (absence of response to mild prodding or shaking) was regarded as loss of consciousness.

Results and Discussion: Thirty-five elderly (age range, 67-96 years) and 34
young adults (19-40 years) were analyzed. Elderly patients were shorter than young patients. At propofol effect site concentrations between 1 and 3 μg m⁻¹, elderly patients had significantly lower OAA/S scores compared with young patients. At 2.5 μg m⁻¹, 17 elderly (48.6%) had lost consciousness compared with 4 young patients (11.8%); P<0.0022. At 3 μg m⁻¹, 33 elderly (94.3%) had lost consciousness compared with 13 young patients (48.2%); P<0.0001.

Materials and Methods: In a randomized, double-blinded study, 42 ASA I-II adults were assigned to one of four group.

Demographic data

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>R0</th>
<th>R2</th>
<th>R4</th>
<th>R6</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.4±9.6</td>
<td>39.6±7.0</td>
<td>42.4±7.7</td>
<td>40.6±9.9</td>
<td></td>
</tr>
<tr>
<td>Sex (Male:Female)</td>
<td>5:5</td>
<td>3:8</td>
<td>5:6</td>
<td>5:7</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>160.6±7.0</td>
<td>169.7±6.1</td>
<td>161.7±7.3</td>
<td>163.6±10.3</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>58.9±8.1</td>
<td>58.0±8.4</td>
<td>62.6±10.9</td>
<td>62.8±12.7</td>
</tr>
</tbody>
</table>

Values are mean±standard deviation except sex. R0,R2,R4 and R6:Effect-site concentration of remifentanil at 0,2,4 and 6ng/ml each. No statistical significance.

Each group received effect-site-controlled infusion of R at 0,2,4,6ng/ml (n=8, 11, 11, 12) and propofol 2mg/kg. Trachea was intubated after 3 minutes of manual breathing support. Intubating conditions were assessed by the score. Jaw relaxation (0-2), position of vocal cords (0-2) and patient response (0-2) were scored and summed, 5 or more score was considered as smooth intubation. The vital signs, end-tidal concentration of desflurane and response of patients were recorded before intubation for 3 minutes and until 2 minutes post-intubation every 1 minute. The ECo was calculated at 50% of provoking hypotension and at 95% successful rate of smooth intubation with logistic regression.

Results and Discussion: The results of logistic regression stated that 95% ECo of R for smooth intubation was 8.0 (95% confidence intervals CI): 5.0-14.3) ng/ml and 50% ECo for provoking hypotension was 5.0 (95% CI: 2.6-9.7) ng/ml.

Conclusion(s): The R at 8.0mg/ml provided smooth intubation but provoked hypotension. Consequently, we recommend the careful observation of blood pressure with the use of R and the evaluation of the suitable measures to maintain blood pressure for nonrelaxant intubation.

9AP9-4

Effect of the mode of administration of inhaled anaesthetics on the interpretation of the F40/F0 curve – Gasman® simulation

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Background and Goal of Study: The F40/F0 curve describes how the partial pressure of an inhaled anaesthetic in the alveoli (P40) approaches that in the inspired mixture (F0). The effects of blood solubility, cardiac output (CO), and ventilation on the F40/F0 curve are often thought of as reflecting how these factors affect wash-in of the central nervous system (CNS) and therefore speed of induction, because F4 is the partial pressure that will be attained in the CNS (F40[CNS]). However, because these classical F40/F0 curves are based on the use of a constant F4, they may not reflect the underlying organ kinetics in the same way when F4 is kept constant by manipulating F0. Using Gasman®, we examined whether changes in solubility, CO, and ventilation affect the relationship between the F40/F0 curve and F40[CNS] differently when either F0 or F4 is kept constant.

Materials and Methods: Using Gasman®, we studied the effects of blood solubility (desflurane vs. isoflurane), CO (5 or 10 L.min⁻¹), and minute ventilation (4...
or 8 L·min⁻¹) on \( F_A, F_I, F_{A/F_I} \), and \( F_{VRG} \) under two different conditions: constant \( F_I \) and constant \( F_A \). Results and Discussion: see figures 1–3. Regardless of whether \( F_I \) or \( F_A \) was kept constant (Figs A, with "L" for constant \( F_A \)) and "L" for constant \( F_I \), the \( F_{A/F_I} \) curves (labeled "L") are shifted upwards when blood solubility decreases (Fig1), CO decreases (Fig2), or ventilation increases (Fig3). With \( F_I \) control, a lower blood solubility or higher ventilation results in a higher \( F_{VRG} \), and a higher CO results in a lower \( F_{VRG} \) (Fig3). With \( F_A \) control, a difference in blood solubility has only a minimal effect on \( F_{VRG} \); an increase in CO hastens the rise of \( F_{VRG} \) to the same plateau value; and a change in ventilation has minimal effect on \( F_{VRG} \).

Conclusion(s): Despite having similar effects on the \( F_{A/F_I} \) curve, the effects of blood solubility, CO, and ventilation on the \( F_{VRG} \) differ when either \( F_I \) or \( F_A \) are kept constant. Care has to be taken to make any inferences from the \( F_{A/F_I} \) curve regarding the effect of these parameters on depth of anaesthesia or speed of induction. The introduction of end-expired closed-loop feedback administration of inhaled anaesthetics makes this distinction clinically relevant.

9AP9-5
Interactions of remifentanil and propofol on bispectral index and adequate dose combination for gastrectomy operation: Analysis by dose-effect curve, isobologram, and combination index
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Background and Goal of Study: Propofol and remifentanil are commonly co-administered for total intravenous anesthesia, and synergism has been assumed between the two drugs. However, the degree of synergism and adequate dose combination are not well established. Therefore, we measured the interactions of the two drugs on hypnotic effects by dose-effect curve, isobologram, and combination index (CI).

Materials and Methods: Patients (age 55–75 and ASA 1–2) undergoing gastrectomy operation were randomly assigned into the single administration groups (the P and R group, \( N=20 \) each) and co-administration groups (the P1R1, P1R2, and P2R1 groups, \( N=12 \) each). Firstly, to obtain the ED50 of remifentanil or propofol and combination index (BIS) reached 40 by a target-controlled infusion during the steady operational period (the P and R groups). Based on the ED50 of single drug, propofol and remifentanil were co-administered incrementally in a 1:1, 1:2, or 2:1 potent ratio (the P1R1, P1R2, and P2R1 groups), and the dose-effect curves, isobologram, and CI were produced. Hemodynamic stability while maintaining BIS 40–50 and the recovery time were also compared between the co-administration groups.

Results and Discussion: The P1R1 group and the P2R1 group showed synergism at ED50 and ED90, respectively. Other groups showed merely additive action or even antagonism.

The ED50 was 3.34 mg/ml of propofol and 2.41 ng/ml of remifentanil in the P2R1 group.

Conclusion(s): The best combinations of propofol and remifentanil is equipotent co-administration for the sedative dose (ED50) and propofol dominant co-administration for hypnotic dose (ED90).

9AP9-6
Determination of sevoflurane pharmacokinetics during cardiopulmonary bypass
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Background and Goal of Study: The pharmacokinetics of the volatile anaesthetic sevoflurane during inhalation is well defined by the inspired/alveolar ratio. However, during cardiopulmonary bypass (CPB) sevoflurane is administered through the membrane oxygenator and the exact concentration of sevoflurane in the arterial and venous blood during CPB remains still unclear. The goal of the study is to determine the uptake of sevoflurane through the oxygenator in arterial and venous blood of CPB patients.

Materials and Methods: In patients undergoing on-pump elective cardiac surgery \( n=48 \), fifteen minutes after aortic clamp, 1% sevoflurane was vaporized using the CPB device. Subsequently, 5 ml blood samples were drawn from the arterial and venous port of the CPB oxygenator at t=0, 2, 4, 8, 16, 24, 32, 40 min, 5 min after aortic clamp release and at the end of CPB. The amount of sevoflurane in the blood samples was measured with a gaschromatograph using the headspace method at 37°C in duplicate. The concentration of

Abstract 9AP9-5 – Figures 1–3

Figure 1

| Table 1: ED50, ED90, CI and DRI |
|-------------------|------------------|------------------|
|                   | ED50            | ED90            |
|                   | CI              | DRI             |
|                   | ED50            | ED90            |
| Single drug       | 1.34 (0.98–1.62) | 4.73 (3.75–6.03) |
|                   | 1.93 (1.52–2.45) | 12.99 (10.30–14.73) |
| Group P1R1        | 0.72 (0.42–1.27) | 5.99 (4.66–8.49) |
|                   | 0.94 (0.37–1.85) | 2.34 (1.41–4.20) |
| Group P1R2        | 0.42 (0.30–0.59) | 2.97 (2.01–3.83) |
|                   | 0.89 (0.42–1.85) | 3.34 (2.02–4.20) |
| Group P2R1        | 0.34 (0.18–0.52) | 2.41 (1.41–3.52) |
|                   | 0.99 (0.80–1.25) | 2.41 (1.41–3.52) |

Values are mean (95% confidence limit) or (SD). CI: combination index; DRI: dose reduction index. P: propofol; R: remifentanil. The P1R2 group showed lower blood pressures and heart rate. The recovery time was similar among the groups.

Conclusion(s): The best combinations of propofol and remifentanil is equipotent co-administration for the sedative dose (ED50) and propofol dominant co-administration for hypnotic dose (ED90).
Sevoflurane was calculated from sevoflurane and sevoflurane-blood reference curves.

Results and Discussion: Two-phase exponential fitting revealed that at the arterial port sevoflurane uptake rapidly increased (half-time 0.5 min, 0.11±0.03 mM) and reached a steady state at a value of 0.18±0.05 mM (half-time 12.9 min). At the venous port sevoflurane uptake was slower and mono-exponential curve fitting revealed that a steady state was reached at 0.13±0.01 mM with half-time of 12.1 min. Our overall blood-gas solubility coefficient for sevoflurane at 37°C was 0.62±0.10.

Conclusion(s): Sevoflurane uptake through the oxygenator takes longer than expected from inhalation studies. Future research will focus on the sevoflurane wash-in and wash out concentration curves in the arterial, venous and volatile compartments of patients during craniotomy.

9AP9-7

Effects of obesity on wash-in and wash-out kinetics of desflurane
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Background and Goal of Study: Desflurane is the least lipid-soluble inhaled anaesthetic. However, reports comparing its kinetics in obese and non-obese patients are lacking. The aim of this study was to evaluate the effects of morbidity obesity on the wash-in and wash-out curves of desflurane.

Materials and Methods: The wash-in and wash-out curves of desflurane were determined in seven morbidly obese patients undergoing laparoscopic cholecystectomy. These curves were compared to measurements in seven non-obese patients undergoing laparoscopic cholecystectomy. All patients were premedicated with midazolam 0.05 mg/kg. Induction to anaesthesia was achieved with propofol 2 mg/kg, fentanyl 2 mcg/kg, and rocuronium 0.6 mg/kg. Maintenance of anaesthesia was achieved with desflurane and remifentanil, whereas morphine 0.1 mg/kg was administered 20 minutes before the end of surgery for postoperative analgesia. After endotracheal intubation and stabilization of the ventilatory variables, (FiO2 50%, RR 12 min⁻¹, F G F5Lm i n⁻¹, Vt 8 ml kg⁻¹, PEEP 5 mBar) desflurane was administered at an inspired concentration (Fi) of 7%. This concentration was chosen to maintain anaesthesia with 1mac of desflurane. The end-tidal (Fₜₐ) concentration of desflurane was measured with the Agent Analyser IRIA of the anaesthetic apparatus (Primus Draeger) whose function is based on infrared absorption. The Fi/Fₜₐ ratio of desflurane was measured for 10 minutes. At that point a steady state of the end-tidal concentration of desflurane was achieved. At the end of the operation desflurane was discontinued and the Fi/Fₜₐ ratio was recorded until the patients of both groups made purposeful movements or opened their eyes. Statistical analysis was performed with two-way ANOVA for repeated measures and Bonferroni post hoc test.

Results and Discussion: The Fi/Fₜₐ ratio was significantly higher in the obese patients on the 1 and 1.5 minutes of the wash-in curve. Regarding the wash-out curve, the Fi/Fₜₐ was significantly greater for non-obese patients only at 0.5 minutes after discontinuation of the agent.

Conclusion(s): Due to low lipid solubility, desflurane displays similar wash-in and wash-out kinetics in obese and non-obese patients.

9AP9-8

The higher the propofol concentration needed for loss of consciousness the larger its difference to the concentrations required at maintenance, using TCI and BIS guided anesthesia
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Background and Goal of Study: The goals of this study were: to quantify the difference between propofol Ce at LOC and maintenance, with and without surgical stimulus (SS); to examine the relationship between that difference and PropCe needed for LOC, the larger the difference between this and the concentration required for maintenance, without and with surgical stimulus.

Materials and Methods: The HM consists on an artificial neural network combined with a curve fitting algorithm: the network produces the initial parameter estimate based on some data collected from the patient and the fitting algorithm refines on-line this estimate [1]. Data were collected from 13 real patients that underwent general anesthesia (propofol, fentanyl, atracurium) using an automatic closed-loop control system [2] (60±16 kg). The results obtained with the HM provide a better performance for predicting the individual maintenance dose than those obtained using a classical curve fitting (CFA) algorithm (HM error % varies from 0.7 to 6.7, mean value = 3.5 (± 2.2) and CFA error % varies from 2.7 to 18.0, mean value = 10.2 (± 4.7)).

The higher the RemiCe at LOC, the larger the difference between this and the concentrations required for maintenance.

Abstract 9AP9-9 – Table 1. Average (Av) values for each analysis period

<table>
<thead>
<tr>
<th>LOC</th>
<th>Maintenance Without SS</th>
<th>Maintenance With SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PropCe (µg/ml)</td>
<td>RemiCe (ng/ml)</td>
<td>AvBIS</td>
</tr>
<tr>
<td>Maintenance Without SS</td>
<td>Maintenance With SS</td>
<td></td>
</tr>
<tr>
<td>3.7±1.2#</td>
<td>2.5</td>
<td>46.9±7.6</td>
</tr>
<tr>
<td>AvPropCe (µg/ml)</td>
<td>AvRemiCe (ng/ml)</td>
<td>AvBIS</td>
</tr>
<tr>
<td>2.3±0.8†</td>
<td>1.1±0.6†</td>
<td>47.4±7.2</td>
</tr>
<tr>
<td>2.4±0.8†</td>
<td>3.6±1.3†</td>
<td>46.3±4.2</td>
</tr>
</tbody>
</table>

References:
Figure 2 shows doses in steady-state predicted by the hybrid method after the first 10 minutes (red) and the real dose in steady-state (black). The prediction error is 6.7%.

Conclusion(s): The application of the HM in the context of TCI leads to good results in the prediction of the individual response. This approach is useful for description and control purposes, and it motivates the application to other drugs common in anaesthetic practice.

Acknowledgements: FCT for PhD grant, UMA and IDEA-PTDC/EEA-ACR/69288/2006.

References:

Paediatric Anaesthesia and Intensive Care

10AP1-1
Induction time required for successful laryngeal mask airway insertion with sevoflurane and no muscle relaxant in children

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Background and Goal of Study: The laryngeal mask airway (LMA) is a simple, easy to use and safe method for airway control in children. The authors therefore designed a study that could determine, with meaningful confidence intervals, the time required for successful insertion of LMA in 95% of children by using 8% inspired sevoflurane and no muscle relaxant.

Materials and Methods: Forty-six patients, ASA physical status I or II, aged 12 – 108 mo who were scheduled to undergo elective surgery were included. Patients received 5 mg/kg of thiopental and 0.02mg/kg of atropine intravenously. After loss of the eye reflex, anesthesia circuit prefilled with 8% dialized sevoflurane in 100% O2 were applied. The classic LMA (size 2) insertion was attempted after a predetermined induction time. A probit analysis was used to determine the induction time required to achieve 50% and 95% success rates during LMA insertion.

Demographic data are as follows (values are mean ± SD or number of patients): sex (F:M): 22:24; age (yr): 4.5 ± 1.6; weight: 17.9 ± 2.9.

Table 2. The results of Laryngeal Mask Airway Placement

<table>
<thead>
<tr>
<th>Group</th>
<th>Success</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT2 (n = 10)</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>FT2.5 (n = 13)</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>FT (n = 11)</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>FT3.5 (n = 7)</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

Conclusion(s): Ninety five percent success can be obtained with approximately 208 seconds for ages one to 9 years with classic LMA (size 2). The induction time can vary by LMA size and induction methods. Therefore further studies using different sized LMA and induction methods are needed.

10AP1-2
The optimal dose of remifentanil for laryngeal mask airway insertion during propofol induction without a neuromuscular blocker in children

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Background and Goal of Study: The purpose of this study was to determine the optimal dose of remifentanil required for successful insertion of laryngeal
mask airway (LMA) during propofol induction without a neuromuscular blocker in pediatric patients.

Materials and Methods: Twenty-six children, aged 3-10 years, undergoing general anesthesia for short ambulatory surgery were recruited. Predetermined dose of remifentanil was injected over 30 s, followed by propofol 2.5 mg kg$^{-1}$ over 10 s. The dose of remifentanil was determined by modified Dixon’s up-and-down method, starting from 0.5 μg kg$^{-1}$ (0.1 μg kg$^{-1}$ as a step size). LMA insertion was attempted 90 s after the end of remifentanil injection and the response of patients was classified as either ‘movement’ or ‘no movement’.

Results and Discussion: The mean (SD) dose of remifentanil for successful LMA insertion in 50% of children was 0.56 (0.07) μg kg$^{-1}$. From probit analysis, ED$_{50}$ and ED$_{95}$ values (95% confidence limits) of remifentanil were 0.52 μg kg$^{-1}$ (0.42-0.62 μg kg$^{-1}$) and 0.71 μg kg$^{-1}$ (0.61-1.40 μg kg$^{-1}$), respectively.

Conclusion(s): The optimal dose of remifentanil to facilitate successful LMA insertion was 0.56 (0.71) μg kg$^{-1}$ in 50% of children during propofol induction without a neuromuscular blocker.

Dose-response curve from the probit analysis of individual remifentanil dose and the reaction to LMA insertion in the patients. The dose of remifentanil at which there was a 50% and 96% probability of successful LMA insertion were 0.52 μg kg$^{-1}$ and 0.71 μg kg$^{-1}$, respectively (open circles).

Conclusion(s): The optimal dose of remifentanil to facilitate successful LMA insertion was 0.56 (0.71) μg kg$^{-1}$ in 50% of children during propofol induction without a neuromuscular blocker.

10AP1-3
The effect of pre-operative skull block for pediatric moyamoya disease

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Background and Goal of Study: Stable hemodynamics, normocapnea, and adequate analgesia are considered to be very important factors in the reduction of ischemic neurologic complications in pediatric encephalo-duro-arterio-myo-synangiosis (EDAS) operations for the treatment of moyamoya disease. Pre-operative skull block may provide adequate analgesia and calm awakening with less opioid consumption, thereby reducing side effects such as nausea and vomiting, hypo- or hyperventilation, and post-operative morbidity.

Materials and Methods: Pediatric patients (age 3-13) undergoing EDAS for moyamoya disease were randomly allocated into the NB (n=18) group and the control group (n=21). The NB group received nerve block with 0.25% bupivacaine 6-8 ml mixed with 20-40 mg methylprednisolone on the supraorbital, supratrochlear, auriculotemporal, and posterior auricular nerve before operation.

Results and Discussion: In the NB group, the systolic blood pressure was lower during the operation, even when a lower sevoflurane concentration was used, and discharge from the post-anesthetic care unit (PACU) was more rapid than the control group. The odds ratio of the control group for delirious awakening was 4.9 compared to the NB group. In addition, the pain and analgesic requirement was higher for the control group than the NB group during the PACU stay. Table 1 shows the review of the control group for the incidence of morbidity (cerebral infarction and reversible ischemic neurologic deficits) during the first 24 hours following the operation were 3.2 compared to the NB group. However, the CO$_2$ retention in the PACU, and the incidence of nausea and vomiting during the first 24 hours after the operation did not differ between the two groups.

Conclusion(s): The use of skull block during EDAS operation provided calm awakening, better analgesia, and reduced post-operative morbidity.

10AP1-4
High incidence of pediatric tonsillectomy morbidity due to pain in 2008: An exaggerating statement or an annoying fact?

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Background and Goal of Study: In the past decades there have been steady advances in anesthesia. Yet management of the most common and most studied surgical procedure performed in children, tonsillectomy, has remained inadequate. The purpose of this study was to determine the incidence of pain, pain experience and home management strategies from the parents’ point of view.

Materials and Methods: In this prospective study, we recruited 114 children from the ASA physical status I and II, between 1 and 12 years scheduled to undergo tonsillectomy. Anesthetic care and surgical technique were standardized. Intraoperative analgesic was provided with sufentanil, paracetamol, dexamethasone and parecoxib. Remifentanil was used during emergence. All subjects received the routine postoperative advice and a three-day prescription of paracetamol and codeine ads rectally. Data with regard to pain scores, quality of pain control, need for rescue analgesia, sleeping disorder, and time to return to normal diet and activities were collected by telephone interviews made daily on day 1 to 3 postoperatively and by clinical review on day 7.

Results and Discussion: All subjects fulfilled the criteria being discharged home the same day. Early postoperative pain was well controlled, with 98% of the children having minimal pain on the day of surgery. Pain scores were generally highest through the first 2 postoperative days. However, only 83% of subjects received paracetamol and codeine rectally at the dose prescribed. In 94 subjects (82%) a rescue analgesic was needed to be administered in order to maintain adequate analgesia. In 9 children (7%), pain management was properly controlled without the need for rescue analgesic. About 10% did not receive an adequate analgesic despite significant high pain scores persisting through the several consecutive days. Younger children were less likely to receive analgesic at all time. One week after surgery, 7% of the children was still in pain but 93% had resumed a normal diet, activities, and sleeping pattern.

Conclusion(s): These results support the hypothesis of high incidence of pediatric tonsillectomy pain at home. They express concerns for suboptimal parental
assessments of children’s pain as well. In order to approach a “painless tonsillectomy”, it appears that children probably require a more aggressive pain strategy. In addition, a better teaching and understanding of pain perception and management to the parents seems to be warranted to improve pediatric tonsillectomy outcome.

10AP1-5
Can relationship between cerebrospinal fluid volume and weight explain variations of spinal anesthesia duration in neonates? A descriptive, MRI study
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Background and Goal of Study: Spinal anesthesia (SA) is significantly shorter in ex premies than in term infants when given on a fixed mg/kg basis of bupivacaine and clonidine (1). From our published data, we plotted individual SA duration against weight in 137 neonates: we found a significant, but weak, positive correlation between weight and SA duration ($p < 0.0001$, $r^2 = 0.13$). The decrease in cerebrospinal fluid volume (CSFvol) between neonates (10 ml/kg) and infants (4ml/kg) (2), could be an explanation for that. We tested the hypothesis that a rapid decrease of CSFvol (ml/kg) in the neonatal period could account for the observed shift of SA duration.

Materials and Methods: Sixty seven neonates, aged 30 to 60 weeks post conception, scheduled for SA, had an awake MRI (Siemens 1.5 Tesla), with parental consent. Axial, contiguous, 0.5 cm thick, T2 scans were carried out on the whole spine (T1-S5). Surface (cm$^2$) of subdural fluid and medulla were measured from circular ROI analysis. Total CSFvol contained in the spine was the sum of (subdural fluid-medulla) surface x 0.5. CSFvol was plotted individually against gender, term, birthweight, gestational age and actual weight. For statistical analysis, Pearson’s rank correlation was performed after a normal distribution was attested according to the Shapiro-Wilk test.

Results and Discussion: 54 neonates (37 male, 17 female) completed the study. Poor quality images did not allow measures in 13 patients. CSFvol was well correlated to both weight (figure) and gestational age ($r^2=0.78$ and 0.77 respectively). The relationship between weight and CSFvol is described as: CSF (ml/kg)= 2.13 kg + 0.03. CSFvol is poorly correlated to post natal age ($r^2=0.44$) and not correlated to gender or birthterm ($p=0.56$, Student’s t test).

Conclusion(s): A decrease in CSFvol (ml/kg) was not found in neonates, and thus cannot explain a correlation between weight and SA duration. CSFvol was measured = 2.2 ml/kg.

Acknowledgements: Special thanks to the MRI staff for their kind availability.

References:
1 Clonidine added to bupivacaine in neonatal spinal anesthesia: a prospective comparison on the evoked responses into 4 categories by a blinded reviewer: A) laryngospasm (complete glottic closure lasting >10s on the video images), B) expiratory reflex, C) cough reflex, D) spasmodic panting. Statistical analyses: McNemar’s test. A $P$-value $< 0.05$ is considered statistically significant.

Results and Discussion: Incidences of the various respiratory reflex responses are shown in the figure.

10AP1-6
Laryngospasm is depressed by intravenous lidocaine in children anaesthetized with sevoflurane
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Background and Goal of Study: Laryngospasm with consecutive hypoxemia is common and often more severe in children than in adults. In order to reduce the occurrence of laryngospasm, the administration of i.v. lidocaine has been advocated. However, its effectiveness in preventing or attenuating laryngospasm is controversial. This uncertainty may be explained by the fact that the determination of laryngospasm can be difficult under study conditions and that the effect might be short lasting. The purpose of the study was to evaluate respiratory responses to laryngeal irritation in a clinical model after administration of i.v. lidocaine in anaesthetized children and to test whether these effects were transient.

Materials and Methods: Approval by the IRB, written parental informed consent. 40 children; 3-7 years. Premedication: Midazolam 0.3mg/kg. Inhalational induction with sevoflurane, insertion of a LMA. Maintenance of anaesthesia with 2.5% sevoflurane under spontaneous breathing. Insertion of a fiberoptic bronchoscope via the LMA and placement of the tip above the glottis. Recording of video images simultaneously with respiratory parameters (tidal gas flow and airway pressure). Before, 2 min, and 10 min after administration of 2 mg/kg i.v. lidocaine stimulation of laryngeal mucosa by spraying the vocal cords with 0.25ml of distilled water via the endoscope’s suction channel. Classification of the evoked responses into 4 categories by a blinded reviewer: A) laryngospasm (complete glottic closure lasting >10s on the video images), B) expiratory reflex, C) cough reflex, D) spasmodic panting. Statistical analyses: McNemar’s test. A $P$-value $<0.05$ is considered statistically significant.

Results and Discussion: Incidences of the various respiratory reflex responses are shown in the figure.

Conclusion(s): The results of the present study demonstrated that the intra-venous administration of 2mg/kg lidocaine resulted in a significant reduction of the incidence of laryngospasm. While this effect was traceable 2 min after the administration, this effect was already blunted after 10 min.

Acknowledgements: Supported by the Swiss National Science Foundation.

References:
1 Anesth Analg 1978; 57: 506.
3 Anesthesiology 2005; 103: 1142.

10AP1-7
Clinical and endoscopic comparison of the single use laryngeal mask (AuraOnce™), with the flexible laryngeal mask (AuraFlex™) in three different positions of the head
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Background and Goal of Study: Clinical and endoscopic performance of a laryngeal mask can be modified if the patient’s neck is flexed or extended. The aim of the study is to compare clinical and endoscopic parameters of these two devices in three different positions of the head (neutral, extension and flexion).

Materials and Methods: 61 pediatric patients were enrolled in this study. They were divided into two groups: Group A (single use LM): n=32, age 48±16, weight 16,03±3,35. Group B (flexible LM): n= 29, age 44±20, weight 15,5±3,22. After inhalatorial induction, we inserted a # 2 LM. Under spontaneous ventilation, we measured leak pressure and evaluate glottic view with a 3.8 fibroscope. Glottic view was classified into three different groups (complete, partial or poor). Leak pressure and glottic view were evaluated in each position (neutral, extension and flexion).

Results and Discussion: Many studies compare different devices in neutral position, but these may change if we extend or flex the neck. Goldman described important leak pressure changes (up to 50%) when we move the patient’s head. Endoscopic view is also modified, improving the glotic view as the neck is extended. Results are presented in tables 1 and 2.

<table>
<thead>
<tr>
<th>Extension</th>
<th>Neutral</th>
<th>Flexion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal pressure (mmHg)</td>
<td>15,56±1,93</td>
<td>21,75±2,74</td>
</tr>
<tr>
<td>Endoscopic view 1 (n and %)</td>
<td>10 (40,9%)</td>
<td>4 (12,5%)</td>
</tr>
<tr>
<td>Endoscopic view 2 (n and %)</td>
<td>12 (47,6%)</td>
<td>14 (44,8%)</td>
</tr>
<tr>
<td>Endoscopic view 3 (n and %)</td>
<td>5 (15,6%)</td>
<td>14 (43,8%)</td>
</tr>
</tbody>
</table>
Table 2. Reinforced group results

<table>
<thead>
<tr>
<th></th>
<th>Extension</th>
<th>Neutral</th>
<th>Raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal pressure (mmHg)</td>
<td>18.3±2.5</td>
<td>24.0±5.0</td>
<td>30.1±2.3</td>
</tr>
<tr>
<td>Complete endoscopic view (n and %)</td>
<td>7 (24.1%)</td>
<td>4 (13.8%)</td>
<td>3 (10.3%)</td>
</tr>
<tr>
<td>Partial endoscopic view (n and %)</td>
<td>15 (51.7%)</td>
<td>16 (52.6%)</td>
<td>13 (44.8%)</td>
</tr>
<tr>
<td>Poor endoscopic view (n and %)</td>
<td>7 (24.1%)</td>
<td>9 (29.0%)</td>
<td>13 (44.8%)</td>
</tr>
</tbody>
</table>

Conclusion(s): Clinical and endoscopic evaluation of a laryngeal mask can be modified if we change the position of the head. These changes are relevant, and can reach up to 50% in A group, while seems to be lower in the flexible group. Endoscopic view is also modified in both groups but more in the single use group than in flexible one. It seems that the flexibility of the tube permits better fitting of the mask to pharynx anatomy, when patient’s neck is extended or flexed.

References:

10AP1-8
Oral administration of tramadol improves pediatric tonsillectomy pain
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Background and Goal of Study: In spite of numerous published data dealing with post-tonsillectomy pain, the search for an ideal analgesic has remained challenging. Tramadol is reported to be an effective analgesic. The aim of the present study was to determine whether the use of tramadol would lead to improved pediatric tonsillectomy pain at home.

Materials and Methods: We recruited 206 children between 1 and 12 years scheduled to undergo tonsillectomy. Subjects were randomly assigned into two groups. Group paracetamol, codeine (n=92) received the routine postoperative advice and a three-day prescription of paracetamol and codeine qids rectally. Group tramadol (n=114) received in addition tramadol oral to be administered as needed. Anesthetic care and surgical technique were standardized. Intraoperative analgesia was provided with sufentanil, paracetamol, dexamethasone and panceoix. Data with regard to pain scores, time to first food intake, nausea, vomiting, and hemorrhage were collected by telephone calls made daily on day 1 to 3 postoperatively and by clinical review on day 7. Visual Analogue Scale was applied to assess postoperative pain. Statistical tests consisted of ANOVA, Student’s t-test, and Mann-Whitney U-test.

Results and Discussion: No difference was found in the demographic data. As shown in table, pain scores of tramadol group were significantly lower during the first 2 postoperative days. Children of tramadol group significantly drank and ate more quickly than did the children of group paracetamol, codeine. None of the subjects reported postoperative hemorrhage.

Comparison of pain scores, time to first food intake and incidence of nausea and vomiting in tramadol and paracetamol, codeine groups

<table>
<thead>
<tr>
<th></th>
<th>Tramadol group</th>
<th>Paracetamol, codeine group</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS on day 1</td>
<td>3.2±0.5</td>
<td>5.8±0.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>VAS on day 2</td>
<td>2.1±0.8</td>
<td>4.1±0.6</td>
<td>0.009</td>
</tr>
<tr>
<td>VAS on day 3</td>
<td>1.8±0.9</td>
<td>2.6±0.5</td>
<td>0.06</td>
</tr>
<tr>
<td>Time to liquid (hrs)</td>
<td>8.5±0.6</td>
<td>10.2±1.7</td>
<td>0.05</td>
</tr>
<tr>
<td>Time to solid (hrs)</td>
<td>12.7±1.5</td>
<td>17.4±4.3</td>
<td>0.03</td>
</tr>
<tr>
<td>Nausea, n (%)</td>
<td>16 (14)</td>
<td>11 (12)</td>
<td>0.5</td>
</tr>
<tr>
<td>Vomiting, n (%)</td>
<td>9 (10)</td>
<td>13 (11)</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Results are expressed in mean ± 1 standard deviation. VAS: Visual Analogue Scale, hrs: hours.

Conclusion(s): These data suggest that oral administration of tramadol following pediatric tonsillectomy provided efficient pain relief without significant side effects. However, further studies are warranted in order to develop a standard protocol to achieve maximum recovery facilities.

10AP1-9
The minimal local anesthetic concentration of ropivacaine for caudal analgesia in children
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Background and Goal of Study: Ropivacaine (Ropi), a new long-acting local anesthetic is used for caudal analgesia in children with a concentration varying between 0.1 and 0.5%. The aim of this study was to determine the minimum local analgesic concentration (MLAC) of Ropi to provide effective caudal analgesia in children undergoing general anesthesia.

Materials and Methods: Following institutional Ethics Committee approval and parental informed consent, 30 ASA 1-2 children undergoing lower abdominal surgery were included in this prospective randomized double-blind study. General anesthesia was maintained with sevoflurane (0.5 MAC end-tidal). Each child received 1 mg/kg of Ropi solution through a caudal catheter. The first child received Ropi 0.16%, and subsequent concentrations were determined by the analgesic response of the previous patient to the initial skin incision by the use of Dixon’s up-and-down sequential allocation. Testing interval was set at 0.02%.

Results and Discussion: Of the 30 children entering the study, two were rejected because of technical problem. Mean age was 4 yr (1-8 yr), mean weight 16.6 kg (10-25 kg) and mean height 103 cm (77-124). MLAC or ED50 was found to be 0.1229% (95%CI 0.1104-0.1353) when using the Dixon and Mood approach (1).

Similar results were obtained through the Choi and Wetherill approach (2): 0.1263% (95%CI 0.1091-0.1435).

Conclusion(s): In the conditions of our study, MLAC or ED50 of Ropi to provide effective caudal analgesia in children undergoing general anesthesia with 0.5 MAC sevoflurane is between 0.10 and 0.135%.

References:

10AP2-2
Single center study on trends in hepatic enzymes during repeated intravenous administration of paracetamol in neonates
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Background and Goal of Study: An intravenous (iv) formulation of paracetamol (Perfalgan/Perfusalgan) is available, but remains off label in patients below 10 kg although pharmacokinetic study during repeated intravenous administration was documented and dosing regimes were suggested (1,2,3). We therefore assessed hepatic tolerance of iv paracetamol in neonates and young infants.

Materials and Methods: In a single centre retrospective study, clinical data and hepatic enzyme profiles (ALT, AST, yGT) were collected in patients born and admitted between 01/01/2006 and 01/10/2007. Clinical data (age, duration of treatment) were extracted and hepatic enzyme profiles were retrieved from 2 days before initiation until 2 days after iv paracetamol was stopped. Mann-Whitney U test was used to compare observations before, during and after iv treatment and correlations ( spearman rank) of hepatic enzymes with duration of treatment were investigated.

Results and Discussion: Information on 2360 administrations in 189 cases (postmenstrual age 38 (range 30–55) weeks, postnatal age 5 (1-182) days) were analysed. Duration of administration was 48 (4-480) hours. ALT, AST and yGT results were available in 485, 491 and 156 occasions. There was no significant increase in ALT, AST or yGT when pre-treatment observations (n=310) were compared with observations during (n=648) or during after (n=173) treatment, nor was there a significant increase in any of the liver enzymes during administration.

Conclusion(s): The current observations on 2360 administrations in 189 (preterm) neonates strongly suggest that iv paracetamol does not alter hepatic enzymes during or after iv administration in this specific population.

References:
10AP2-3
Comparison of prothrombin time values of standard laboratory test and two point-of-care devices

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Background and Goal of Study: In children, blood tests lead to two problems: venous access may be challenging and the required amount of blood is comparatively large, especially in newborns or small infants and when testing repeatedly. With the aim to minimize sampling difficulties and size, we compared the standard laboratory prothrombin time (PT) test with two point-of-care methods for PT, where the blood samples can be taken from capillary blood.

Materials and Methods: We compared PT with CoaguCheck XS Plus® (Roche Diagnostics, Basel, Switzerland) and HemoSense® (HemoSense Inc., USA) to the standard laboratory test of PT in plasma. Blood samples from pediatric ICU patients were drawn from either an arterial or (central) venous line or by direct venipuncture and tested with all three methods. No exclusion criteria were applied. Analyses included Bland & Altman plots and calculation of Spearman’s correlation coefficients.

Results and Discussion: We report the results from the first 15 pediatric ICU patients, with a total of 46 measurements. Patient demographics: male 5, female 10, median age 1.5 months (min 0 days, max 12 years), median height 53 cm (min 39 cm, max 170 cm), median weight 4000 gr (min 1230 g, max 57 kg). Lowest comparison of the point-of-care devices to the standard laboratory test showed a correlation of r = 0.85 for CoaguCheck and r = 0.88 for HemoSense, respectively. The Bland-Altman analysis showed a mean difference of -0.196 (SD 10.9) and -0.214 (SD 13.8) between the standard test and Coagucheck and HemoSense, respectively (figure 1). With the HemoSense, four failures were observed, whereas the CoaguCheck always delivered results.

Conclusion(s): Testing with both point-of-care devices from capillary blood may prove valuable in order to minimize sampling difficulties and size. Especially in preoperative screening for coagulopathies PT results near or below the lower value of normal (as well as suspicious personal or family history of bleeding disorder) should prompt venous blood sampling for full standard coagulation check. Further on, point-of-care measurements during surgery could serve as an intraoperative trend monitoring, saving valuable time in decisions on substituting blood products.

10AP2-4
Optimization of the fluid management and blood transfusion strategies during adolescent scoliosis correction with the use of pedicle screws

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Background and Goal of Study: Pedicle screws use in idiopathic scoliosis surgery has been shown to improve the curve correction and allow a surgeon to fuse less motion segments compared to the hook fixation. The downsides of the technique is significant increase in blood loss which makes these cases more difficult to manage. The goal of the study is to show that optimization of fluid management and blood transfusion strategies together with other blood conservation techniques can decrease intra and postoperative complications, eliminate the need for homologous blood transfusion.

Materials and Methods: 56 patients undergoing posterior spinal fusion with instrumentation were enrolled in prospective, randomized study. All patients were 14-16 years old females, wt. 50-60 kg, with preoperative hematocrit 35-38%, who underwent 12-14 segments correction. The same anesthetic and surgical techniques were used and standardized indications for the blood transfusion applied to all patients. First group of 34 patients received Aminocaproic acid during the procedure. Intraoperative crystalloids use was limited to 7-7.5 cc/kg/h and combined with colloids to maintain adequate intravascular volume, urine output and hemodynamic stability. The second group of 22 patients also received Aminocaproic acid but only crystalloids were used to compensate for the blood loss before blood transfusion was initiated.

Conclusion(s): Optimization of the fluid management and use of the other blood conservation techniques allows early extubation, significant decrease in postoperative complications and elimination of homologous blood transfusion in adolescent idiopathic scoliosis correction with pedicle screws.

10AP2-5
Does 6% HES 130/0.4 alter renal function in children undergoing cardiac surgery? A comparison with 4% albumin

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Anesthesiology, CHU Brugmann-HUDERF, Brussels, Belgium

Background and Goal of Study: Recent studies have raised concern about possible deleterious effects of hydroxyethyl starch (HES) on renal function. This prospective randomized study compared the effects of 6% HES 130/0.4 (Voluven®) and 4% albumin on renal function in children undergoing cardiac surgery for congenital heart disease repair.

Materials and Methods: Following institutional Ethics Committee approval and parental informed consent, 119 children (1-162 months) were randomized to receive up to 50 ml/kg of either HES 130/0.4 (HES; n=60) or albumin (Alb; n=59) for peroperative volume replacement including priming for the cardiopulmonary bypass circuit. Lactate Ringer’s was used for further peroperative volume needs. In the postoperative period, albumin was the only colloid used to reach routine haemodynamic goals. Renal function was assessed in the preoperative and the postoperative period by measurements of blood urea and creatinine, and by calculation of glomerular filtration rate (GFR) (1,2). Statistical analysis included a two way analysis of variances for repeated measurements followed by a Tukey post hoc test. A p<0.05 was considered significant. Data are presented as mean ± SD.

Results and Discussion: Demographic and surgical characteristics were not different among groups. Volume of peroperative colloid was 46.0±8.4 ml/kg in the Alb group and 45.2±12.0 ml/kg in the HES group.

Table 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Preop</th>
<th>Postop</th>
<th>POD1</th>
<th>POD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea (mg/d)</td>
<td>Alb</td>
<td>25±10</td>
<td>28±9</td>
<td>26±9</td>
</tr>
<tr>
<td></td>
<td>HES</td>
<td>27±11</td>
<td>24±7</td>
<td>29±10</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>Alb</td>
<td>0.03±0.11</td>
<td>0.30±0.11</td>
<td>0.31±0.10</td>
</tr>
<tr>
<td></td>
<td>HES</td>
<td>0.06±0.14</td>
<td>0.28±0.11</td>
<td>0.33±0.11</td>
</tr>
<tr>
<td>GFR (ml/min 1.73m²)</td>
<td>Alb</td>
<td>130±42</td>
<td>130±28</td>
<td>130±47</td>
</tr>
<tr>
<td></td>
<td>HES</td>
<td>126±45</td>
<td>158±49</td>
<td>134±50</td>
</tr>
</tbody>
</table>

POD: postoperative day.

None of the patients required renal replacement therapy.

Conclusion(s): In the conditions of our study, HES 130/0.4, as Albumin, did not seem to alter global renal function.
Arterial blood pressure was not major contributor of the change in cerebral blood flow during mild or moderate hypothermic cardiopulmonary bypass in the pediatric cardiac surgery

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Background and Goal of Study: It has been reported that change in cerebral blood flow (CBF) was dependent on the change in mean arterial blood pressure (MAP) during adult cardiopulmonary bypass (CPB) (1). It was also reported that CBF was associated with MAP during deep hypothermic CPB in children (2). However, the relation between the CBF and MAP seems still unclear during the mild or moderate hypothermic CPB in the pediatric cardiac surgery. In this study, we measured the change in CBF velocity (CBFV) by using transcranial Doppler (TCD) under the constant pump flow rate during the mild or moderate hypothermic CPB in children and evaluated the relation between the CBFV and MAP. We also evaluated the contribution of other factors such as blood gas and body temperature.

Materials and Methods: After institutional approval and parental informed consent, 12 pediatric patients (1-66 months) undergoing elective cardiac surgery were studied. After a steady non-pulsatile CPB pump flow rate of 150 mL/min/kg was established during mild and moderate hypothermic CPB, CBFV in the middle cerebral artery was measured by using transcranial Doppler. Mean CBFV (Vm) was recorded every 15 min concurrently with MAP, nasopharyngeal temperature (Trasos), PaO2, PaCO2 and hemoglobin since just after the steady CPB pump flow rate was obtained (T0).

Results and Discussion: Seventy-four measurement points were obtained. When the value of Vm was regarded as 100% at T0, those values were changed from 41% to 149% during CPB even under the constant pump flow rate. This change was not correlated with the change in MAP (Correlation coefficient (R): 0.14, P = 0.23) (Figure 1). Changes in PaO2, PaCO2 and hemoglobin were not also significantly correlated. However, significant correlation with change in Trasos was observed (R: 0.58, P < 0.01).

Conclusion(s): Our study suggested that change in pediatric CBFV is independent on the change in MAP during mild or moderate hypothermic cardiopulmonary bypass. Rather, nasopharyngeal temperature, which is regarded as indicator of brain temperature may contribute it more.

References:

Arterial blood pressure was not major contributor of the change in cerebral blood flow during mild or moderate hypothermic cardiopulmonary bypass in the pediatric cardiac surgery

Y. Morimoto, K. Tsuruga, K. Hisano, T. Hashimoto, K. Takita
Anesthesiology and Critical Care Medicine, Hokkaido Univ. Grad. Sch. of Medicine, Sapporo, Japan

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References:
10AP3-1

A novel method for assessing conscious sedation efficacy in children

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Background and Goal of Study: There are several ways to assess conscious sedation. The Ramsay score (RS) or the Ohio State Behavior Rating Score (OSBRS) use a clinician’s subjective assessment of the patient’s sedation. The RS also poorly defines undersedation. The OSBRS does describe poor sedation (4: crying and struggling throughout). However, it is sometimes difficult to establish a score when the patient’s response changes during the procedure. Although the BIS monitor is non-subjective, using EEG analysis for its assessment, it does not describe undersedation well. For research purposes a better way to assess the adequacy/variability of sedation non-subjectively is needed. The aim of this study was to compare the recovery from anesthesia using propofol infusions: for children with or without developmental delay undergoing anesthesia for elective MRI scans.

Materials and Methods: A Niosleep™ noiselogging device was used to record the noise level in the procedure room. The microphone was placed 1 m from the patient’s head. The noise level was assessed every second. An observer used the OSBRS to assess the procedure. Noise was assessed for 2 mins on entry, during the procedure and 3 mins before exit.

Results and Discussion: After IRB approval and informed consent, 11 patients receiving 1 mg/kg PO midazolam were recruited. The noise logged data and OSBRS are shown in Table 1.

Table 1. Individual Patient Noise Levels and OSBRS

<table>
<thead>
<tr>
<th>Case</th>
<th>Entry OSBRS</th>
<th>Exit OSBRS</th>
<th>% procedure dB &lt; 60</th>
<th>% procedure dB &gt; 60</th>
<th>OSBRS procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>83</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>69</td>
<td>1</td>
<td>71</td>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td>3</td>
<td>72</td>
<td>1</td>
<td>77</td>
<td>2</td>
<td>57</td>
</tr>
<tr>
<td>4</td>
<td>85</td>
<td>2</td>
<td>79</td>
<td>2</td>
<td>39</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
<td>1</td>
<td>72</td>
<td>1</td>
<td>71</td>
</tr>
<tr>
<td>6</td>
<td>68</td>
<td>1</td>
<td>67</td>
<td>1</td>
<td>91</td>
</tr>
<tr>
<td>7</td>
<td>83</td>
<td>2</td>
<td>78</td>
<td>2</td>
<td>59</td>
</tr>
<tr>
<td>8</td>
<td>77</td>
<td>1</td>
<td>71</td>
<td>2</td>
<td>65</td>
</tr>
<tr>
<td>9</td>
<td>67</td>
<td>1</td>
<td>67</td>
<td>1</td>
<td>59</td>
</tr>
<tr>
<td>10</td>
<td>66</td>
<td>1</td>
<td>62</td>
<td>2</td>
<td>90</td>
</tr>
<tr>
<td>11</td>
<td>70</td>
<td>1</td>
<td>73</td>
<td>1</td>
<td>66</td>
</tr>
<tr>
<td>Mean</td>
<td>72.1</td>
<td>1.2</td>
<td>72.1</td>
<td>1.5</td>
<td>67</td>
</tr>
</tbody>
</table>

*p < NS

Most patients were quiet on entry and exit from the procedure, with the corresponding OSBRS. A lot of noise level variation occurred during the procedure, noise logger example shown in figure 1. Those patients who cried and struggled throughout (OSBRS = 4) spent more of the procedure at higher dB.

Conclusion(s): The noiselogger demonstrated a large variation in the noise level during the procedure. The noise level appeared to mirror the observed OSBRS.

10AP3-2

Does developmental delay prolong recovery from anesthesia in children?

C. Heard, M. Harutunians, J. Houck, P. Joshi, J. Lerman
Department of Pediatric Anesthesiology, Women & Children’s Hospital of Buffalo, Buffalo, New York, USA

Background and Goal of Study: Anesthesia is sometimes required for children with some form of developmental delay. The acquisition of MRI images in younger children often requires the use of anesthesia. Patient’s with developmental delay (DD) often require MRI scans. It may be difficult to accurately assess patients with developmental delay due to a lack of cooperation and immature behavior. This may make anesthesia more difficult to titrate and this could result in delayed anesthesia recovery. The aim of this study was to compare the recovery from anesthesia using propofol infusions: for children with or without developmental delay undergoing anesthesia for elective MRI scans.

Materials and Methods: After IRB approval from our institution, parental consent and patient assent (if appropriate) was obtained. All patients were anesthetized with a sevoflurane inhalation induction, IV placement and then anesthesia was maintained with a propofol infusion at 300 mcg/kg/min reduced to 250 mcg/kg/min after 10 minutes. Adjusted as necessary after this. Routine monitoring included ECG, NIBP, ETCO2 and pulse oximetry. All patients received supplemental O2 by nasal cannula. The patients were assessed by a research nurse both pre and postoperatively.

Results and Discussion: 53 patients were recruited for the study. Patient demographics are shown in table 1.

Table 1. Demographics (mean ± SD)

<table>
<thead>
<tr>
<th>Number</th>
<th>Age</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Patients</td>
<td>53</td>
<td>4.5±2.6</td>
</tr>
<tr>
<td>Normal Development</td>
<td>34</td>
<td>4.3±2.6</td>
</tr>
<tr>
<td>Developmental Delay</td>
<td>19</td>
<td>5.0±2.4</td>
</tr>
</tbody>
</table>

The average age of all patients was 4.5 years. 19 patients had developmental delay (10 mild, 6 moderate, 3 severe). Procedure and recovery times are shown in table 2.

Table 2. Procedure/Recovery times (mean ± SD)

<table>
<thead>
<tr>
<th>Induction</th>
<th>MRI</th>
<th>PACU</th>
<th>Day Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Patients</td>
<td>3±1</td>
<td>46±14</td>
<td>34±7</td>
</tr>
<tr>
<td>Normal Development</td>
<td>3±1</td>
<td>50±14</td>
<td>34±7</td>
</tr>
<tr>
<td>Developmental Delay</td>
<td>3±1</td>
<td>40±12</td>
<td>35±18</td>
</tr>
</tbody>
</table>

The average scan took 46 mins, with a PACU time of 34 mins, and a day unit time of 39 mins. There were no significant differences between the 2 groups with respect to recovery or discharge time. The scan times for all patients during DD was shorter by 10 mins. There was no patient movement in any of the scans. On follow up phone call 1 patient in the DD group had difficulty sleeping, no other problems or complaints noted.

References:
Conclusion(s): For patients with DD there appears to be no difference in the recovery characteristics or complication rates compared to children with normal development when using propofol based anesthesia for MRI scans.

10AP3-3
Predicting behavior during oral conscious sedation in the pediatric dental patient
H. Gregg, P. Creighton, C. Heard
Pediatric Dentistry, Women & Children’s Hospital of Buffalo, Buffalo, New York, USA

Background and Goal of Study: Oral conscious sedation is an alternative to general anesthesia for the non-cooperative pediatric dental patient. Conscious sedation is associated with a significant (30%) failure rate. A number of investigators have attempted to predict the success of conscious sedation. The aim of this study was to evaluate a combined assessment, generated by parental questionnaire (Temperament Attachment Score) in conjunction with a pre-procedural evaluation (Behavior Interaction Score) by the examining dentist in predicting conscious sedation outcomes.

Materials and Methods: Healthy (ASA I/II) pediatric dental patients scheduled for conscious sedation dentistry (Frankl score 1-2) were enrolled. Patient temperament was evaluated both by the parent using the Temperament Analysis- Behavior Score (TAS) questionnaire and the dentist using the Interaction Behavior Score (IBS) prior to treatment, with 1 mg/kg PO midazolam. Response to treatment was evaluated at intervals during the course of the procedure using the (OSBRS) behavior score. Successful completion of the procedure was also documented. Procedural sedation response and outcomes versus pre-procedural evaluation are subjected to ROC analysis.

Results and Discussion: After IRB approval and informed consent 11 patients were recruited. 7 patient’s sedation was assessed as unsatisfactory (OSBRS = 3, 4). Patient data are shown in table 1.

Table 1. Patient data (mean ± SD).

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (yrs)</th>
<th>Weight (kg)</th>
<th>Delay (days)</th>
<th>IBS Temp. Attach.</th>
<th>TAS</th>
<th>Proc Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfactory (n=4)</td>
<td>3.4±0.6</td>
<td>19±5±19</td>
<td>6±8±6</td>
<td>5±1</td>
<td>1±6</td>
<td>7±5</td>
</tr>
<tr>
<td>Unsatisfactory (n=7)</td>
<td>3.0±1.2</td>
<td>16±8±4</td>
<td>5±9±4</td>
<td>6±3</td>
<td>15±2</td>
<td>9±4</td>
</tr>
</tbody>
</table>

There was no difference between the groups with respect to: Age, Delay in procedure, IBS and duration of the procedure with the ability to predict sedation response. Both components of the TAS by ROC analysis (OROS 0.75-0.81) were predictive of poor sedation. An attachment score of 9 was 75% sens/71% spec. A test score of 13 was 100% sens/75% spec. A TAS of 24 was 71% sens/74% spec. of predicting an unsatisfactory sedation. There was no difference in the TAS on referral compared to the TAS from the day of procedure.

Conclusion(s): The success of sedation using 1mg/kg midazolam was poor (<50%). This failure of sedation appeared to be best predicted by the TAS. This score highlights children with prior poor medical experiences or those that are “clinging” in nature. The parent assessed TAS score appears to be repeatable. The IBS did not add to the predicitive capability of the TAS.

10AP3-4
Comparative study between mask nebulisation and oral administration of midazolam for premedication in children
O. Kaabachi, R. Duzenli, Z. Hajij, K. Ras, W. Koubba
Anesthesiology Intensive Care, Kasserth Orthopedic Institute, Tunis, Tunisia

Background and Goal of Study: Premedication with midazolam 0.5 mg/kg orally administered 30 min preoperatively, is effective in reducing separation and induction anxiety in children (1). Intranasal route provides faster sedation and no adverse effects in adult (3). We designed the following study to evaluate the advantages of Midazolam given via a nebulizer mask in children.

Materials and Methods: After ethics Committee approval and informed parental consent, we randomized 80 children, 2 to 7 years old, to one of 3 groups: group O (n=28) received 0.5 mg/kg oral Midazolam (5 mg/ml parental formulation with addititve) and group I received inhaled nasally Midazolam either 0.5 mg/kg in group I (n=27) or 1 mg/kg in group II (n=25) (up to 5 ml with normal saline) nebulized in 100% oxygen 12 l/min through a nebulizer mask during 10 min. We assessed the children for sedation and anxiety every 5 min for 20: the quality of parental separation (10 minutes after oral administration and at the end of nebulization), the acceptance of intravenous access and facial mask for induction using a 4-point scales. Scores 3-4 were considered as optimal sedation and anoxia, easy separation and smooth induction. We noted complications: desaturations, agitation, coughing, vomiting. Ordinal data were analyzed using non parametric tests. Categorical data were analyzed using Fischer exact test. P < 0.05 was considered as significant.

Results and Discussion: Sedation and anxiety scores were significantly lower only in group I2 for 20 min. Optimal sedation score and anoxia at separation were significantly frequent in group I2 (55% vs 16.6% (O) vs 12.5% (I1); p<0.001 and 68% vs 27% (O) vs 37.5% (I1); p=0.035). Parental separation was easier in group I2, 72% vs 41% (O) vs 48% (I1) (p=0.036). There was no difference regarding acceptance of either facial mask or IV access. No adverse effect has been reported.

Conclusion(s): According to our data, mask nebulisation with 1 mg kg−1 Midazolam seems to be an effective, rapid and safe route for premedication in children. Further studies are needed to confirm these results.

References:

10AP3-5
Children’s heart rate, mean arterial pressure, Aline™ ARX-index and Bispectral Index™ in physiological sleep
Department of Anaesthesiology and Intensive Care Medicine, University of Leipzig, Leipzig, Germany

Background and Goal of Study: Currently there is no proven data which shows that the declared targets of heart rate, mean arterial pressure (MAP), Aline™ ARX-Index (AAL) and Bispectral Index™ (BIS) for an optimal depth of hypnosis/sleep from adults are equal to these in children. Aim of this study is to detect age-based targets of these important parameters for selected age-groups of children by means of physiological sleep.

Materials and Methods: With approval of our ethics committee 30 children (age 3-11) were recruited to participate in this prospective study. The heart rate and the MAP were detected in awake children and in deep sleep. According to this in group a (n=17) the AAL and in group b (n=13) the BIS were captured simultaneously. All children stay in the department of paediatric surgery at the University of Leipzig. The investigation normally took place on the evening before discharge from hospital, without the effect of sedative medication. There were no children with known neurological disorders or decrease of hearing. The testing was build-on two parts which were realised in the time between 19 and 24 o’clock. After installing the monitoring a first simultaneous measurement of heart rate, MAP, AAL and BIS in awake state was performed. After that the monitoring systems were deactivated and the children where leaving alone for going to sleep. 3 hours later the children where monitored in deep sleep again.

Results and Discussion: Haemodynamic and neuropsychological parameters went down significantly in deep sleep.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Awake state</th>
<th>Deep sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate (n=30)</td>
<td>100,5 mmHg (±18,6)</td>
<td>78,5 mmHg (±14,6)</td>
</tr>
<tr>
<td>MAP (n=30)</td>
<td>82,4 mmHg (±6,3)</td>
<td>64,9 mmHg (±5,6)</td>
</tr>
<tr>
<td>AAL (n=17)</td>
<td>77,6 (±8,9)</td>
<td>20,5 (±5,2)</td>
</tr>
<tr>
<td>BIS (n=13)</td>
<td>97,1 (±1,2)</td>
<td>34,2 (±6,4)</td>
</tr>
</tbody>
</table>

Conclusion(s): The usually declared intraoperative BIS-indices from 40-60 are not comparable to our detected parameters in children’s deep sleep [23–46]. Therefore we conclude that the data could be the goal of intraoperative BIS-values in childhood.

References:

10AP3-6
The incidence of awareness during general anesthesia in children
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Background and Goal of Study: Intraoperative awareness is an anesthesia complication and occurs when a patient becomes conscious during a procedure performed under general anesthesia and subsequently has recall of these events. Compared to adults, awareness with recall during general anesthesia during procedures performed under general anesthesia and subsequently has recall of these events.
Obstetric Anaesthesia

11AP1-2
New aspects of risk assessment for development of deep venous thromboembolism in pregnant
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Anaesthesiology and Intensive Care, Odessa State Medical University, Odessa, Ukraine

Background and Goal of Study: The purpose of the study is estimation of the efficacy of the upper limb double ischemia test for rapid in vivo diagnosis of coagulopathies in pregnant.

Materials and Methods: Double local ischemia tests of upper limb were performed in 158 healthy pregnant women, 143 mild preeclamptic women, and 112 severe preeclamptic women in active labor. Objective testing included compression ultrasound, impedance plethysmography, ventilation-perfusion scanning, computed tomography scanning, and pulmonary angiography. Vascelloscopy (Medorhord -4 analyzer) screening of blood coagulation was also performed.

Results and Discussion: The incidence of thrombophilia of 15% in preeclamptic women (38 of 255) and 5% (8 of 158) in healthy pregnant women were confirmed in group of patients without clinical manifestation of DVT. Severe preeclamptic patients were significantly hypercoagulable when compared to the other study groups. 6 (5%) severe preeclamptic women had an abnormal coagulation profile, whereas 95% of mild preeclamptic women had a normal coagulation profile. Based on difference of the blood coagulation system response to ischemia test we verified 5 groups of reactivity. 3 of them are normal type including compensated, subcompensated and hypercompensated groups respectively. 2 others are pathologic: decompenated and emaciated. In those of potential risk of DVT development and 1 month after surgery. Cases of awareness were rated as “awareness”, “possible awareness” or “not awareness” by four independent adjudicators. If all four adjudicators rated a case as “awareness”, then it was classified as a “true awareness”. The relationship between awareness and management of anesthesia was examined.

References:

11AP1-3
The first national survey of obstetric anaesthesia/analgesia practice in Belgium
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Department of Anaesthesiology, UZLeuven - KULeuven, Leuven, Belgium

Background and Goal of Study: Limited data is available on obstetric anaesthesia (OBA) practice in Belgium. Two surveys on OBA practice in Flanders exist, but there is a paucity in data for the country (1,2). The present survey aimed to update and gather new information, as well as compile for the 1st time data for the whole of Belgium.

Materials and Methods: In 2007, a questionnaire was sent to the directors of obstetrics/anaesthesia departments of 117 hospitals with an obstetric unit in Belgium. If no reply was received a reminder was sent. Finally, non-responders were contacted by phone.

Results and Discussion: Out of 117 questionnaires, 116 replies were received (99.1% response rate), covering 117,712 deliveries for 2006. The Caesarean section (CS) rate was 18.4% (5-34%). CS was usually performed in the main operating theatre. In 42 institutions, CS was performed in the labour and delivery ward (19%). In 31% of units planned CS received no acid aspiration prophylaxis, while for emergency CS acid aspiration prophylaxis was omitted in 49% of units. Single shot spinal accounted for 48% of anaesthetics given for CS, in 30% combined spinal epidural (CSE) was used, in 4% general anaesthesia was used, while epidural anaesthesia was used in 18% of cases. Hyperbaric bupivacaine was used in a dose between 6 and 12.5 mg was used for spinal or CSE anaesthesia, usually combined with intrathecal sufentanil (1.5 – 10 mcg). Of those women having planned vaginal delivery, 65% received neuromuscular blockage. In 15 units CSE anaesthesia for labour was the standard (13%), whilst it was used on indication in a further 34 units (29%). The local anaesthetic used for labour pain relief was ropivacaine in 81%, levobupivacaine in 14% and bupivacaine in 5% of units. In 86% of units an opioid (sufentanil exclusively) was added to the anaesthetic mixture.

11AP1-4
Effects of epidural clonidine and neostigmine on the quality of epidural labour analgesia using a local anaesthetic/opioid mixture: A placebo-controlled, double-blind trial
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Department of Anaesthesiology, UZLeuven - KULeuven, Leuven, Belgium

Background and Goal of Study: Intrathecal (IT) neostigmine (N) and clonidine (C) prolong IT labour analgesia (3,4). Previously it was demonstrated that epidural N and C prolong spinal labour analgesia (5). This study evaluates whether epidural C and N improve the quality of combined spinal epidural (CSE) analgesia using a ropivacaine (R) and sufentanin (S) mixture.

Materials and Methods: Following ethics committee approval and written consent, 100 singleton, vertex presenting pregnancies in labour, were randomized to 2 groups. Initial spinal analgesia was initiated with 3.5 mg R and 1.5 μg S. Fifteen min after spinal injection, 10 ml study solution was administered epidurally. In the P-group, the study solution was plain saline and in the NC-group it was 500 μg N and 75 μg C dissolved in saline. Epidural analgesia was maintained using patient controlled epidural analgesia (PCA). Primary outcome parameters were the occurrence of breakthrough pain, local anaesthetic consumption and patient assessment of quality of analgesia using a visual analogue scale. Fisher exact test was used to compare the proportion of women having breakthrough pain. A two-sample Wilcoxon test was used to compare hourly R consumption. Appropriate statistical tests were used for all other variables.

Results and Discussion: No intergroup differences in demographics, side-effects, obstetric and neonatal outcome were noted. Epidural N and C reduced the incidence of breakthrough pain in the NC-group (8% in the NC-group versus 36% in the P-group, p<0.05). Hourly R consumption was reduced in the NC-group (11.6±4.2 mg/h versus 17.2±5.3 mg/h in the P-group, p<0.05). Patient satisfaction increased in the NC-group (87.5±versus 88±11 in the P-group, p<0.05).
11AP1-5
Parity and cervical dilation affect the quality and the intensity of McGill Questionnaire’s pain descriptors
S. Stirparo, M. Camorcia, G. Valentini, A. Farcomeni, G. Capogna
Anesthesiology, Città di Roma Hospital, Roma, Italy

Background and Goal of Study: Labor pain is a complex, subjective, multidimensional experience. The short form of the McGill Pain Questionnaire (SF-MPQ) correlates consistently and significantly with the standard form and is a useful tool in situations in which the standard MPQ takes too long to administer, yet qualitative information is desired. This study evaluates and compares the characteristics of pain during early and late labor in nulliparous (N) and multiparous (M) women using a modified SF-MPQ.

Materials and Methods: After informed consent we interviewed 200 consecutive parturients in active spontaneous labor, divided in 4 groups according to parity (nulliparous/parous) and stage of labor (less or more than 5 cm cervical dilation). The main component of the SF-MPQ consists of 15 descriptors (11 sensory; 4 affective) which are rated on an intensity scale as 0 = none, 1 = mild, 2 = moderate or 3 = severe. For the purpose of this study we used a modified SF-MPQ which included the 23 most frequently words chosen to describe labor pain (pain descriptors). Statistical analysis was performed by logistic ANOVA model, Kruskal-Wallis, Chi-square and Spearman rank correlation.

Results and Discussion: Data were recorded from 169 parturients. 116 were nulliparas (74 with a cervical dilation <5 cm and 41 >5 cm) and 53 multiparas (32 with a cervical dilation <5 cm and 21 >5 cm). Of the 23 pain descriptors the most frequently used (>50%) were: cramping, pulling, hot, stinging, aching, heavy, itching, exhausting and unbearable. Tiring and exhausting descriptors were mostly used by nulliparous (P<0.001). The intensity of cramping, stinging and aching was greater in nulliparous (P<0.001) and the intensity of stinging, aching and heavy increased as labor progressed (P<0.001) in both groups. Pattern of pain during labor evaluated by visual analog scale have been reported to be different in nulliparous as compared to multiparous women. Consistent findings indicate greater sensory pain during early labor in primiparous women than multiparous women. In this study we demonstrated that affective and cognitive components of labor pain are most frequently and better described by a restricted number of words (pain descriptors) and may be affected by some obstetrical variables.

Conclusion(s): Parity and cervical dilation affect the quality and intensity of cognitive labor pain descriptors.

References:

11AP1-6
Psychological and physiological factors affecting the assessment of labor pain
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Background and Goal of Study: A number of psychological and physiological factors could be involved in assessing labor pain. This study evaluates the intensity of labor pain in nulliparous (N) and multiparous (M) women and its relationship with the level of education, attendance to childbirth preparation classes, previous pain experience, dysmenorrhea and previous labor epidural experience.

Materials and Methods: After informed consent we evaluated 200 consecutive parturients in active, spontaneous labor, divided in 4 groups according to parity and stage of labor. Pain was assessed by both Visual Analogue Pain Scale(VAPS) (0-100) and Present Pain Intensity (PPI) (0-5) administered during a painful uterine contraction. Statistical analysis was performed by logistic ANOVA model, Kruskal-Wallis, Chi-square and Spearman rank correlation.

Results and Discussion: Data were recorded from 169 parturients. 116 were nulliparas (74 with a cervical dilation <5 cm and 41 >5 cm) and 53 multiparas (32 with a cervical dilation <5 cm and 21 >5 cm). Mean intensity of pain (VAPS and PPI) increased increasing cervical dilation in both N and M. VAPS and PPI were strongly correlated (P<0.001; r=0.63). Lower (≤2) fetal station was associated with greater pain scores in nulliparous (P<0.026). Previous pain experience was correlated with lower pain scores during labor and this correlation was more significant in multiparous (P<0.002).

Conclusion(s): This study confirms previous findings indicating that the mean intensity of labor pain increases with greater cervical dilation. We noted a perfect correlation between the two more used tools to evaluate labor pain, the VAPS and the PPI. In addition, our results suggest that previous pain experience, but not previous labor epidural experience, may affect sensory pain perception during labor particularly in multiparous women.

References:
Labour epidural resting – Reduced by an audit cycle

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Background and Goal of Study: Epidurals performed during labour are re-
sisted for reasons like inadequate analgesia, complete failure or catheter slip-
ping or falling out. Resting for inadequate analgesia or complete failure are un-
avoidable. The resting for catheters falling or slipping out is avoidable when the
 catheterer is properly fixed; thereby reducing resting related morbidity. An audit
 cycle has identified the cause and reduced the incidence of slipped catheters in
 our labour ward.

Materials and Methods: Using a proforma, we looked retrospectively at 200
 epidurals in our database, to ascertain the number of epidural catheters slipping
 or falling out. A prospective audit was then performed over 2 months, looking at
 total number of epidurals performed, resting rate, reasons for resting and the
 epidural fixing device used. During this period, Epifix (Unomedical) and Lock-II™
 [Portex®], Smith Medical International) fixing devices were used according to
 the preference of the anaesthetist. A second prospective audit was performed
 extension (LA-EVE) in order to improve the spinal anesthesia spread and addi-
 tionally improve the analgesic effect of the local anesthetic.

Results and Discussion: The initial retrospective audit to ascertain the rate
 of slipped epidural catheters revealed a rate of 5%, 10 of the 200 epidural catheters.
The first prospective audit showed that of the 288 epidurals performed
 over a month, 21 (7.6%) were removed. The second prospective audit to ascertain the rate of
 epidural falling or slipping out revealed a rate of 5%, 10 of the 200 epidural catheters.
Sixteen (5.2%) were due to the choice of the epidural fixing device and thereby
 reducing complications related to epidural resting.

Based on the above results, use of Epifix was stopped and the second prospec-
tive audit was performed for 1 month when only Lock-II™ was used to fix epidu-
 ral catheters on the labour ward. During this period we had only 1 of 111 epidu-
rals removed for catheters falling out, a rate of less than 1%.

Conclusion(s): There are published evidence supporting Lock-II™ as a better
 epidural fixing device than Epifix [1,2]. Our audit cycle clearly demonstrated that
 Epifix was associated with catheters slipping out and led to a change in choice of
 epidural fixing device and thereby reducing complications related to epidural
 resting.

Combined spinal epidural technique with two different low
doses of spinal L-bupivacaine and epidural L-bupivacaine
extension. A randomized controlled trial

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Background and Goal of Study: Anesthesia with combined spinal-epidural
(CSE) anesthesia using low dose for cesarean section (CS) can contribute to
haemodynamic maternal stability. We used epidural local anesthetic for volume
extension (LA-EVE) in order to improve the spinal anesthesia spread and addi-
tive effect of the local anesthetic.

Materials and Methods: After ethics committee approval, a randomized con-
trolled trial was performed on women scheduled for CS in a tertiary hospital.
We assigned the patients in one of two groups: group LB-5 with spinal hyper-
bacine L-bupivacaine 5 mg plus fentanyl 25 μg and group LB-3,75 with spinal
hyperbaric L-Bupivacaine 3,75 mg plus fentanyl 18 μg. LA-EVE was performed
with 10 mL of L-bupivacaine 0.25%. We defined maternal hemodynamic stabil-
ity with hypotension rate and neonatal wellbeing. Hypotension was considered
as 20% fall in systolic blood pressure and neonatal wellbeing when pH was
<3.15.

Results and Discussion: In our global maternal hypotension incidence was
32.25% (31.3% LB-3,75 and 33.3% LB-5). We didn’t find statistically different
in hypotension, fetal pH, Apgar test, demographic characteristics, surgery time,
cause of CS, previous abdominal surgery and side effects between our groups.
The need of rescue was 25.5% in LB-3,75 and 11.8% in LB-5 (p>0.05). The
success of the technique was independent to the previous abdominal surgery
in LB-3,75; need of rescue analgesia in those patients without previous surgery
was 53.8% vs 46.2%; but in group LB-5 the rescue was only needed in patient
with previous abdominal surgery, 22.2% vs 0% without surgery. The bromage
scale at the end of the surgery is seen at table 1.

Motor block

<table>
<thead>
<tr>
<th>Group</th>
<th>LB-3,75</th>
<th>LB-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromage 0</td>
<td>84.3%</td>
<td>52.9%</td>
</tr>
<tr>
<td>Bromage 3</td>
<td>5.9%</td>
<td>9.8%</td>
</tr>
</tbody>
</table>

Bromage scale at the end of surgery, *p<0.05.

Conclusion(s): The use of doses below ED50 in CSE techniques guarantee
the safety of the patients, and our global maternal hypotension incidence is
lower than publicized in literature. LB-5 was effective to realize CS with lower
hypotension incidence and better neonatal wellbeing in women who were never
operated for abdominal surgery. We haven’t found benefits lowering to 0.75 mg.
The early motor block recovery allows prompt discharge from PACU and neu-
rological evaluation sooner.

Pneumocephalus as a neurological complication from labor
epidural analgesia

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Douro, Vila Real, Portugal

Background and Goal of Study: The lumbar epidural is one safe anesthetic’s
technique used frequently for labor analgesia. The neurological complications
that are associated to, are rare and result, among others, from the accidental
breaching of the dura mater’s integrity.

Materials and Methods: Primigesta of 19 years old, observed for syndrome of
isolated intracranial hypertension beginning one day after a dystocic labour from
the suction cup application, carried out under epidural analgesia. This was re-
alized with the pregnant woman sitted and with resource to the technique of
the loss of resistance with air for research of the epidural space, have been men-
tioned an accidental puncture of the dura mater during the procedure. The eti-
ological investigation done with cerebral CT, allowed to identify pneumocephalus,
with gas embolism in the frontal recession of both lateral ventricles and in the
right temporal recession.

Results and Discussion: Haven’t been identified other problems or complica-
tions, we observed a favorable evolution, translated as a clinical remission and
partial resorption of pneumocephalus, throughout one week under conserva-
tive treatment who included rest in bed, analgesia, oxygen treatment with high
debit and fluid therapy.

Conclusion(s): Warn for the risk of pneumocephalus associated to the use
of air for identification of the epidural space in labor anesthesia, dissuading the
application of this technique, assigned by the seated position, in favor of other
alternatives used for the same effect.

References:
1. Sabrowski LA, et al; Identification of the epidural space: is loss of resistance to air a safe
 technique? A review of the complications related to the use of air; Reg Anesth 1997; 22(1):
3-15.
2. Koskowksi, Grzegorz et al; Lumbar Puncture Associated with Pneumocephalus; Report
3. Lavida, Silvia et al; Pneumocephalus With Intense Headache and Unilateral Pupillary Di-
latation: After Accidental Dural Puncture During Epidural Anesthesia for Cesarean Sectio;
4. Figueiredo, E.; Techniques for identifying the epidural space; Rev Esp Anestesiol Reanim
2005; 52 (7): 401-12.
5. Bleeker CP, et al; Postpartum post-dural puncture headache: is your differential diagnosis
Materials and Methods: 20 ASA class I-II women scheduled for Cesarean section were studied. Abdominal circumference (AC) and trunk length (TL) were recorded preoperatively. All the patients were given 10mg 0.5% heavy bupivacaine intrathecally. The level of spinal anesthesia was checked by cold sensation every 1–5 minutes within 20 minutes after injection. The relationships of AC, TL, AC/TL, AC2/TL and AC2 × TL with the maximal level of spinal anesthesia were analyzed with Spearman rank correlation coefficient. The resulted r value was compared with r=0.

Results and Discussion: The AC were 83–109 cm, the TL were 49–66 cm and the maximal spinal level were C7 to T11. The correlation coefficient between the maximal spinal level and AC, TL, AC/TL, AC2/TL and AC2 × TL were -0.052, 0.221, -0.342, -0.421, 0.174, respectively. None of these were significantly different from r=0. The AC solely had very low correlation with maximal spinal level. However, the correlation between maximal spinal level and AC/TL and AC2/TL were much higher with marginal p value (0.1 < p < 0.05). AC/TL was regarded as the ratio of long and short axis of the body, and AC2/TL simulated the body volume. Our preliminary result suggested that the ratio might have more influence on the spinal level than AC or TL alone. This is reasonable because lumbar lordosis and intrabdominal pressure are three dimensional features.

Conclusion(s): Abdominal circumference and trunk length were not correlated with spinal level in obstetric patients. Although there was no statistical significance, the ratio of long and short axis had higher correlation with spinal level, especially AC/TL.

References:
3. The Lumbar Spine and Subarachnoid Block; Anesthesiology, 1968, 29: 60-64.

11AP2-2

Effect of caffeine, magnesium and aminophylline in prevention of post dural puncture headache in obstetrics patients. Is there any sense in pharmacological prophylaxis?

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Background and Goal of Study: Frequency of post dural puncture headache (PDPH) decreased in recent years due to innovations in needles used for spinal anesthesia, however it remains a vexing problem for obstetric patients. A range (PDPH) decreased in recent years due to innovations in needles used for spinal anesthesia, however it remains a vexing problem for obstetric patients.

Materials and Methods: The study was carried out on the group of 142 patients undergoing cesarean section under spinal anesthesia. Exclusion criteria concerned obstetric emergencies and cardiovascular diseases. The studied women were divided into 4 groups regarding the pharmacological prophylaxis: 1 - control group receiving standard postsurgical treatment (n=37), 2 - group receiving additionally 3x2 tbl. a 300 mg of caffeine p.o (n=38), 3 - group receiving caffeine and magnesium and aminophylline in prophylaxis of PDPH in obstetric patients after spinal blockade.

Materials and Methods: The study was carried out on the group of 142 patients undergoing cesarean section under spinal anesthesia. Exclusion criteria concerned obstetric emergencies and cardiovascular diseases. The studied women were divided into 4 groups regarding the pharmacological prophylaxis:

Results and Discussion: The lowest ratio was observed in group 3 (3%) whereas the highest was in group 2 (8.3%). In groups 1 and 4 similar PDPH percentages were noted (5.4 and 5.7%). Statistical analysis didn’t reveal significant differences in frequency of PDPH among the compared groups.

Conclusions: Our study showed that none of the applied pharmacological management, based on reported in literature (1,2,3) influenced statistically PDPH frequency in obstetric patients undergoing spinal blockade.

References:

11AP2-3

Major obstetric haemorrhage management. A 28 months prospective study in 21726 deliveries

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Background and Goal of Study: Obstetric haemorrhage is a major cause of maternal morbidity and mortality in the world (1). Our goal is to describe major obstetric haemorrhage care in all women who needed high dependence unit care and its incidence in a tertiary reference hospital with more than 10000 births/year.

Materials and Methods: Observational prospective study from 1st July 2005 to 1st November 2007. All data (prevalence, morritmality, risk factors, monitoring, transfusion, etc) were coded in a database and analyzed with SPSS 13.0.

Results and Discussion: There were 21726 deliveries and 0.57 % (124 patients) with severe haemorrhage.

Table 1

<table>
<thead>
<tr>
<th>Types of Delivery</th>
<th>Spontaneous</th>
<th>Instrumental</th>
<th>C. section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twins</td>
<td>2619</td>
<td>1459</td>
<td>573</td>
</tr>
<tr>
<td>Triplets</td>
<td>397</td>
<td>25</td>
<td>115</td>
</tr>
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<table>
<thead>
<tr>
<th>Total of births</th>
<th>(n=21726)</th>
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<th>(n=21726)</th>
</tr>
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<tbody>
<tr>
<td>(68.6%)</td>
<td>(56.2%)</td>
<td>(23.8%)</td>
<td></td>
</tr>
<tr>
<td>(1.4%)</td>
<td>(0.6%)</td>
<td>(1.4%)</td>
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Haemorrhages appeared after placental delivery in 83.8 %. Main causes were uterine atony (45.2%), vaginal tears (26.6%) and retained placental membranes (18.5%). Median haemoglobin loss from basal values was 5.06±1.89 g/dl, and was replaced with blood products: packed red cells (96.8%), fresh frozen plasma (48.4%), fibrinogen (49.2%), platelets (26.6%), prothrombin complex (7.25%), and recombinant factor VIIa (3.2%). Median haemoglobin increase after transfusion from postbleeding values was 3.13±1.79g/dl. Interventional radiology was used in 10.5 % (success = 84.6% in 1 attempt) and 1 uterine artery pseudoaneurism as a complication. Hysterectomy was performed in 13.7% (84.7% of them puerperal). The type of anasthesia was epidural in 51.6%, and general in 48.3%. Invasive monitoring was used in 37.9% of cases. Main post-operative events were: postoperative mechanical ventilation (11.33%), myocardial ischemia (4%), TRALI (4.8%), acute renal failure (8.9%), fibrilar ventriculization (0.8%) and eutoc (0.8%). This patient died due to pre-delivery fetal demise with disseminated intravascular coagulation (DIC). Our global mortality incidence is 0.4/10000 deliveries.

Conclusion(s): Severe haemorrhage incidence is low, but a leading cause of maternal morbidity. Our mortality incidence is low. Our protocolized practice shows a frequent administration of fibrinogen and low mortality due to DIC. Angiographic embolisation is highly effective but hysterectomy is still necessary. Special caution should be taken in multiple pregnancies and fetal demise.

References:

11AP2-4

A comparison study of the hemodynamic effect and extent of spinal anesthesia between hyperbaric and isobaric bupivacaine for cesarean section (CS) delivery

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Background and Goal of Study: Spinal anesthesia is increasing in popularity as the method of choice in parturients undergoing Cesarean section (CS) delivery. It was therefore deemed useful to study the effectiveness of sensory block produced by isobaric and hyperbaric bupivacaine and hopefully determine the safer and more effective agent.

Materials and Methods: In this double-blind controlled study 60 parturients, category ASA I-II, were randomly assigned to one two groups. Group A (n=34)
received spinal anesthesia administered by 12-15mg of isobaric bupivacaine (S.G.0, 999-1, 0059, sol.0.5%); while group B (n=33) received 12-15mg of hyperbaric bupivacaine (B.G. 1, 0227-1, 0278,sol. 0.5% in 8.25% DSW) ad-
ministered subarachnoidly without barbotage, through a Sprotte 24G spinal
needle, at a rate of 0.14-0.25 ml/sec. Ringer/Lactate solution 100ml i.v. and
anti-vomiting agents were administered to all parturients prior to anesthesia in-
duction. The anesthesia was conducted in sitting position and all women were
placed in left lateral position 15° with spontaneous ventilation. Effectiveness of
sympathetic nerve block was then using evaluated using the hot-cold method and
pin-prick test. Bromage scale was used to evaluate the motor block. The
An egg score of the reonate at 1st and 5th minute, the max height of the sen-
sory block, the incidence of hypotension and the amount of ephedrine needed for
maintaining blood pressure within 20% of baseline was also recorded.
Results and Discussion: 60 women were included for further statistical analy-
sis, while 6 were excluded due to protocol violation and 1 due to surgical com-
ercurrence of PDPH in our population might be attributable to the conjunction
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11AP2-8
Comparison of measured and estimated angles of operating table tilt among operating department practitioners with different levels of experience
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Department of Anaesthesia, Leicester Royal Infirmary, University Hospitals of Leicester, Leicester, Leics, United Kingdom

Background and Goal of Study: Operating Department Practitioners (ODPs) are often asked to tilt the operating table during Caesarean Sections. We wanted to establish whether their experience would influence their ability to estimate the tilt of an operating table to 15°. The common recommendation of tilting the operating table to 15° lateral tilt was described by Crawford and colleagues in 1972 who showed significant improvement in foetal well-being. Morgan and colleagues found that estimating angles by eye was grossly inaccurate. We are often asked to tilt the operating table during Caesarean Sections. We wanted to establish whether their experience would influence their ability to estimate the tilt of an operating table to 15°. The common recommendation of tilting the operating table to 15° lateral tilt was described by Crawford and colleagues in 1972 who showed significant improvement in foetal well-being. Morgan and colleagues found that estimating angles by eye was grossly inaccurate.

Methods: We assessed two groups of ODPs. In group A were ODPs who had more than 5 years work experience and in group B were ODPs with less than 5 years experience. The same non-pregnant volunteer was lying on the table for every assessment. Everyone was asked to tilt the table to what he/she thought was "adequate" 15° lateral tilt, both with the volunteer on it and also without anyone lying on the table. The table was electronically controlled and at the other end of the table, unseen by the ODP, the angle was measured with a protractor and a hanging weight. A split level was used as standard to identify the neutral position of the table before commencing and also to ensure that the hanging weight corresponded to 0° on the protractor before commencement of the manoeuvre.

Results and Discussion: Out of 16 ODPs, nobody correctly estimated 15° left lateral tilt. The measured angle of tilt was always lower than 15°. There was no statistically significant difference between the two groups but all the ODPs who had more than 5 years experience tilted the table close to 10°. The range of tilt varied between 7° and 13°. Almost all ODPs tilted the table less with the volunteer on it than without. All ODPs involved in our study had serious concerns about patient safety when they were shown the recommended 15° left lateral tilt.

Conclusion(s): 1. Nobody estimated 15° correctly and therefore operating tables should have a simple device to easily show the angle of tilt. 2. The experience of the ODPs probably made the ODPs in group A tilt the table more than their less experienced colleagues but the tilt achieved was still less than the recommended 15° tilt. 3. The safety of the patient is important while attempting to achieve the recommended 15° tilt.

References:

11AP2-9
The lumbar L2-3 epidural space depth in parturients scheduled for caesarean section is related to maternal height and weight
D. Valsamidis, H. Basiakou, A. Loukeri, A. Diakaki
Anaesthesiology, University Hospital of Athens, Athens, Greece

Background and Goal of Study: Identifying the lumbar epidural space in par-turients was a challenge even among experienced anaesthetists. The aim of this study was to investigate the relationship between lumbar L2-3 epidural space depth and body weight of the parturient, maternal age and gestational age respectively, in parturients scheduled for elective caesarean section.

Materials and Methods: This retrospective study consisted of 219 parturients from 26 to 41 weeks of gestation, all scheduled for caesarean section. The parturients were placed in the lateral decubitus position. After aseptic preparation of the skin and local infiltration with 3 to 4 mL of lidocaine 2% the L3-L4 epidural space (LES) was identified with a 20G Tuohy needle and loss of resistance technique. We estimated centimeter depth of the LES to the nearest half-centimeter. Maternal age, body weight, height and gestational age were also recorded. Data is expressed as mean ± standard deviation (SD). The Pearson’s correlation coefficient was measured. All analyses were conducted using the SPSS software, version 10.0.0 (SPSS Inc, Chicago, IL).

Results and Discussion: LES depth at L2-3 level was found at 5.6±2.1 cm (mean±SD). Mean maternal weight was 80.0±16.6 kg, mean maternal age was 31.2±5.4 years while mean gestational age was 37.7±2.3 weeks. A positive correlation was identified between LES depth and maternal weight of the parturient (r=0.63, p<0.001) and a weak correlation between LES depth and maternal age (r=0.18, p<0.007). No correlation was identified between LES depth and gestational age or maternal age.

Conclusion(s): A positive correlation between LES depth and both body weight and height of the parturients scheduled for caesarean section was observed. Further studies are needed in order to consider maternal body weight and height as significant predictors of LES depth in parturients scheduled for caesarean section.

11AP2-10
Is bilateral ilioinguinal block as effective as epidural morphine for analgesia after caesarean section? M. Pereira, H. Viela, A. Miranda, I. Bonifácio, L. Ormonde Anaesthesiology, Hospital Fernando Fonseca, Lisboa, Estremadura, Portugal

Background and Goal of Study: There is a significant degree of pain after caesarean section (CS) which can be easily controlled with systemic or neural opioids. However there is a high incidence of related adverse effects. The objective of this study was to examine if bilateral ilioinguinal nerve block provides analgesia as effectively as epidural morphine after CS.

Materials and Methods: This was a randomised prospective study in which were included women both primiparous and multiparous undergoing non-emergent CS under neuroaxial anaesthesia. Parturients were excluded if they exhibited one of the following: pre eclampsia, ec demia, psychiatric disease, history of substance abuse, allergy to local anesthetics or non-steroidal anti-inflammatory drugs, peptic ulcer, renal disease, progressive neurological disease, infection at the site of the nerve block and body mass index > 30. Of the 120 women studied only 60 were included and subsequently divided into two groups (I and II). In group I (n=30) patients underwent ilioinguinal block with 10 ml of ropivacaine 0.75% administered bilaterally. In group II (n=30) patients received epidural morphine 4 mg (3 mg at the end of the surgery and 1 mg 4 hours later). All the patients received cefotetan and paracetamol (EV. Tramadol (100 mg EV) was given as rescue analgesia whenever VNS > 4. VNS scores (0-10) were evaluated at 2nd, 4th, 12th and 24th hour after CS. The total tramadol consumption (mg) in the 24 hours was calculated. Statistical significance for between-group differences was assessed by Fisher’s exact test and Chi-square test. The differences were considered as statistically significant when p < 0.05.

Results and Discussion: VNS scores and tramadol consumption were similar for both groups (I and II). VNS median scores were as follows: at 2nd hour 0 in both groups (p=1); at 4th hour 1.5 in group I vs 1.0 in group II (p=0.49); at 12th hour 2.5 in group I vs 2.0 in group II (p=0.32); at 24th hour 2.0 in both groups (p=0.12). The total tramadol consumption in the 24 hours was 147.1±129.0 mg in group I vs 146.2±140.0 mg in group II (p=0.649). The variable VNS < 4 was accepted as to define an acceptable level of analgesia and the incidence was of 43% in group I and 57% in group II (p=0.33).

Conclusion(s): Based upon the results we demonstrated that bilateral ilioinguinal nerve block might be as effective as epidural morphine for post caesarean section multimodal analgesia.

Intensive Care Medicine

12AP1-1
Beta defensin 2 gene copy variations influence mRNA expression and protein release in whole blood cultures from healthy individuals
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Background and Goal of Study: Defensins are part of the innate immune system. They show antimicrobial activities against bacteria, fungi and coated viruses. Inducible beta defensin 2 (hBD2) gene expression was detected in epithelial cells and peripheral white blood cells [1]. In addition to antimicrobial properties immunomodulating activities have been detected [2]. Copy number variations in the human beta defensin 2 gene have been reported. However, their functional relevance for leukocytic hBD2 inducibility is unknown. This investigation assessed the question whether the number of gene copies influence inducible mRNA expression and protein release in an in vivo setting with cultured periph-eral blood cells.

Materials and Methods: Whole blood from 49 healthy individuals with two to six gene copies was cultured ex vivo and stimulated with 100ng/ml endotoxin for 6 hours. mRNA inducibility was quantified relatively by real time PCR by using
a housekeeping gene, HB2 protein levels in the supernatant were quantified by using ELISA technique.

Results and Discussion: HB2 mRNA inducibility is associated with gene copy number. Individuals with higher copy numbers HB2 mRNA expression is higher (Pearson test p<0.05). Protein release to cell culture supernatant is as well associated in the same fashion to gene copy number. High copy numbers resulted in high protein levels (Pearson test, p<0.05). These results indicate the functional relevance of gene copy number variations in the HB2 gene. Copy number variations in innate immune genes may modulate immune function and, in part, may be responsible for interindividual differences in coping with invading pathogens.

Conclusion(s): HB2 Copy number variants influence quantity of mRNA expression and protein release by leucocytes in this ex vivo setting.

References:

12AP1-2
Volume resuscitation in a two hit model of sepsis: Influence on microcirculation
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Background and Goal of Study: Using a porcine two hit model combining a haemorrhagic and septic shock we tested the effects of 6%HES 130/0.42 (HES130), Gelatine4% (Gela) and 10%HES 200/0.5 (HES200) compared to Ringer Acetate (RAc) on systemic haemodynamics, mesenterial flow and microcirculation.

Materials and Methods: Projective randomised, controlled animal study, 23 anaesthetised, ventilated pigs (28±1.7 kg) were randomised (5 in each shock, 3 in control group) to volume replacement with colloids, RAc or a non-septic control group (control) receiving RAc. Animals were bled in the shock groups untiil reaching half of their baseline mean arterial pressure (MAP) or cardiac output (CO) for 45 minutes. Volume resuscitation was completed when baseline MAP was accomplished. As second hit sepsis was induced using an E. Coli bacterial clot into abdominal cavity 6 h after hemorrhagic shock. Systemic haemodynamics and microcirculation were obtained before (t0) and every 4 hours after the shocks. Therefore transonic, tonometry in the ileum and laser Doppler flow measurements were obtained. Statistics were performed using ANOVA.

Results and Discussion: After sepsis induction MAP was lower in RAc group (59±8) compared to all other groups (HES200 70±21; HES130: 86±11, Gela: 71±26; Control: 96±7). CO [ml/kg] increased in all groups but was higher in colloid groups at study end (HES200 157±61; HES130: 171±47; Gela: 163±42; RAc: 137±92; Control: 150±58). Percentage of mesenterial flow of CO [%] was significantly lower in the HES200 group (7.3±3.8) compared to HES130 and control at study end (HES130: 14.6±4.8; Gela: 13.6±3.6; Control 17.8±1.3). The microcirculatory flow of the ileum [% of bl] was significantly lower in the HES 200 and Gela group (HES200: 45.1±16.3; Gela: 44.4±13.9) compared to control group (117±15.0). 8h after sepsis. The COG Cap 12 h after sepsis induction in the ileum was significantly higher in the HES 200 group (35±15) compared to HES130 (17±6), RAc (16±9) and Control (8±9). The SO2 of the mucosal was significantly lower in colloid groups (HES200: 9.8±3.9; HES130: 17.4±4.9; Gela: 27.8±17.18) than in control (65±23.3; RAc: 45.2±13.41) after 12h of sepsis.

Conclusion(s): In this two hit model the coloids HES200 and Gela could not maintain microcirculatory flow in the ileum associated with reduced mucosal oxygenation. A more marked endothelial damage may be a potential mechanism explaining the difference between the used volume replacement solutions.

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sions (OL) have been shown to occur after the infusion of HES. In an isolated renal perfusion model we compared the effects of three different infusion solutions: 10% HES 200/0.5 (HES200) vs. 6% HES 130/0.42 (HES130) vs. Ringers Lactate (RL).

**Materials and Methods:** After approval of the local animal protection committee, 24 porcine kidneys in an isolated renal perfusion model of 6 hours duration were studied. Infusion was supplied to achieve a stable hematocrit of 0.2. Blood and urine samples were analyzed for the calculation of creatinine clearance (CleAcrea). For the assessment of tubular damage, beta-NAG was determined. After staining, histological assessment of osmotic nephrosis like lesions (OL) were quantified using a scoring system (0 = not observed, 1 = 0–25% of visual fields, 2 = 25–50%, 3 = 50–75%, 4 = 75%). Effects of infusion solution and time were statistically analyzed by ANOVA for repeated measurements. The histological changes were analyzed using ANOVA.

**Results and Discussion:** Urine output was significantly different between RL and the two HES groups (p < 0.001). CleAcrea was significantly different between HES 200 and the two other groups (p < 0.001). However, there was no difference between HES130 and RL. Beta-NAG was significantly different between groups (p < 0.001). There were significant differences between HES groups (HES200 1.9 ± 0.2, HES130 1.97 ± 0.2) and RL (1.1 ± 0.1) in the assessment of OL, however there were no OL in the RL group.

**Conclusion(s):** For the first time we found that infusion of RL causes OL in the kidney. Thus our results suggest that OL may not be the only pathomechanism of renal injury when using HES.

**12AP1-7**

**Effect of parenteral glutamine on plasma cytokines and HSP-70 in healthy persons during endotoxemia**

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**Background and Goal of Study:** Glutamine levels have shown to decrease substantially with severe sepsis and it is suggested to be related with increased mortality. Therefore, in the present we have infused either saline or glutamine during an endotoxin challenge and measured parameters related to an immune response, i.e. plasma cytokines and HSP-70.

**Materials and Methods:** This was a double-blind, randomized, placebo-controlled crossover trial. Eight healthy young men were enrolled following approval from the Ethical Board, informed consent and a thorough physical examination. Studies were performed in random order on two separate days, which were spaced four weeks apart. Subjects received an infusion of glutamine or saline. Glutamine (Alanin-Glutamine (®Dipeptiven)) was infused at a rate of 0.025 μmol/kg BW/h for 10 hrs; saline was infused at identical volume rates. After two hours, subjects were given an intravenous bolus injection of E. coli endotoxin (0.3 ng/kg). Blood samples were collected hourly for the following eight hours. HSP-70 protein was isolated from PBMCs at 0, 2 and 4 hours and the content measured by western blotting.

**Results and Discussion:** Plasma glutamine was significantly increased during infusion with glutamine. Endotoxin induced a reduction in plasma-glutamine, both at control conditions and when plasma-glutamine levels were increased due to glutamine administration prior to and following endotoxin administration (Figure 1). A significant effect of endotoxin was found on all parameters. No differences were found between treatments with regard to the effect of endotoxin on white blood cell count, WBC subsets, TNF, IL-6 (Figure 2) or the expression of HSP-70 in PBMCs.

**Conclusion(s):** Endotoxemia reduces plasma glutamine independent of parenteral administration of glutamine. Glutamine does not alter the response of probiotics plus G-CSF improves survival in septic rats

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**Background and Goal of Study:** In perioperative routine (e.g. abdominal

**Results and Discussion:** Septic patients were distinct from critically ill controls in terms of a high SAPS II score (57 vs. 23), serum interleukin 6 (260 vs. 18 pg/ml), high serum concentrations of procalcitonin (14.6 vs. 0.17 ng/ml) and decreased lymphocyte counts. Apoptosis was found to be accelerated in T- and B-cells as indicated by increased activation of caspase-3 (p < 0.01) and externalisation of phosphatidylserine (p < 0.05) in sepsis but not in critically ill patients. Clear downregulation of the bcl2 protein (p < 0.05 in T-cells and p < 0.01 in B-cells) indicated possible involvement of the mitochondrion. Analysis of relative mRNA-expression (table) showed mRNA-downregulation of anti-apoptotic (bcl2, bcl-xl) and upregulation of proapoptotic genes (bak, bim, bcl-x). The mobile B kes-only proteins bim and bcl-x are two potent inducers of apoptosis [2].

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mRNA expression in %, healthy controls = 100%.

**Conclusion(s):** The massive shift of gene expression in severe sepsis towards pro-apoptotic genes is likely to render lymphocytes susceptible to apoptosis in severe sepsis. Therapeutic approaches to limit apoptosis should target the mitochondrial pathway.

**References:**

**12AP1-9**

**Prophylaxis with heparin plus G-CSF improves survival in septic rats**

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**Background and Goal of Study:** In perioperative routine (e.g. abdominal
Background and Goal of Study:

Materials and Methods: After approval we used 60 male Wistar rats. All underwent laparotomy with peritoneal contamination and infection (PCI) using standardized stool. Feasibility of Heparin prophylaxis (800 IU/kg Liqueuremine™ administered s.c. 12 h before and 12 h after surgery) was tested in six animals. Then after 54 rats were randomised to one of the following treatments: 1) PCI only, or 2) PCI plus Heparin prophylaxis, or 3) PCI plus Heparin plus G-CSF prophylaxis (20 mg/kg s.c., 12 h before, 12 h and 36 h after infection). The primary endpoint was survival rate after 120 h. Survival rates were analysed using y2-Test and Log Rank-Test was applied to analyse Kaplan Meier survival curves.

Results and Discussion: The pilot study was successful, specifically no bleeding complications occurred. Rats of similar weight (250±30 g) and data of all animals in the main study were included in the analysis. 39% (7/18 rats) of controls survived PCI only, after Heparin prophylaxis it were 56% (10/18 rats), however only Heparin plus G-CSF prophylaxis improved survival significantly to 83% (15/18 rats), p = 0.023, d = 2.1

These results suggest positive interactions of both substances, which is in line with recent findings by electrophoresis and mass spectrometry (1).

Conclusion(s): In this model of intraabdominal sepsis the combination of Heparin plus G-CSF prophylaxis significantly improved outcome. However detailed mechanisms including potential anti-inflammatory effects of sub-coagulatary doses of Heparin have to be further evaluated before entering a clinical trial.

References:

12AP1-11

Analysis of cardiac proteome expression during sepsis indicates compromised energy production

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Background and Goal of Study: Sepsis and septic shock have still a high mortality rate. The heart is one of the mostly affected organs during the course sepsis and may result in septic cardiomyopathy. Molecular causes and changes in protein expression are still unclear. The aim of the present study was to explore sepsis-induced alterations of cardiac protein expression at 12, 24, and 48 hours after sepsis induction in a common septic rat model.

Materials and Methods: After approval of the local committee for animal research, 62 male Wistar rats were investigated and assigned to a sham group (n=16) and three sepsis groups (n=46; surviving and analyzed at 12h: n=6 vs. 24h: n=9 vs. 48h: n=4). Sepsis was induced by cecal ligation and puncture (CLP). Heart was removed after decapitation and prepared for further analysis as previously described (1). Two-dimensional gel electrophoresis and mass spectrometry (MS) were used to identify changes in the protein expression between septic and non-septic samples. Gels were digitized and images analyzed using the Phoretix 2D Expression software.

Results and Discussion: N=27 rats of the sepsis group died (mortality 44%); no rat of the sham group died. More than 1,100 proteins could be discriminated with the proteomic method, of which 12 were significantly up- or downregulated. These proteins belong to the following groups: energy production (n=9), protein transport (n=2), and metabolism (n=1). At all 12 and 24 hours after sepsis induction 3 proteins (3↑) were differentially regulated and 6 proteins (5↓, 1↑) at 48 hours.

Conclusion(s): Severe sepsis with a mortality of 44% induced significant alterations in the cardiac proteome 12, 24, and 48 hours after sepsis induction. Mainly proteins related to energy production were differentially regulated. Whereas proteins were always upregulated in the early sepsis phase, nearly all proteins were downregulated in the late phase at 48 hours. This may indicate that cardiac energy production is severely compromised and may account for septic cardiomyopathy.

References:

12AP2-1

Noninvasive vs invasive mechanical ventilation in intensive care patients

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Background and Goal of Study: To compare two methods of mechanical ventilation, Invasive (IMV) and Non-invasive (NIMV), for patients with acute respiratory failure.

Materials and Methods: A prospective randomized trial was conducted at the medical-surgical Intensive Care Unit (ICU) during 24 months. Inclusion criteria were acute respiratory failure with mechanical ventilation duration longer than 24h, patients not mechanically ventilated on admission to the ICU, absence of cardiac arrest within 5 days, patients not scheduled for organ donation, patients who were not comatose, those without central nerve system disorders unrelated to hypercapnic encephalopathy or hypoxyemia and patients who were not in shock. After that, 140 patients remained and they present the research sample. The patients were randomized for either NIMV (88 patients) or IMV (72 patients) using closed, non-transparent envelops. The two methods were compared based on the statistically determined difference in objective parameters and mechanical ventilation treatment outcome. Parameters compared were mechanical ventilation duration, time spent in ICU, need for tracheostomy, incidence of ventilator associated pneumonia and ICU mortality.
Results and Discussion: NIMV vs IMV: mechanical ventilation duration was 81 hours vs 126 hours (p<0.001), time spent in ICU 112 hours vs 168 hours (p<0.001). 344% patients in NIMV group opposite to 16% (22%) in IMV group required tracheostomy (p<0.001). Incidence of ventilator associated pneumonia was 48% vs 18% (25%) patients (p<0.001).

Conclusion(s): Both NIMV and IMV confirmed to be suitable methods for patients with acute respiratory failure. NIMV has proven superior when compared to IMV in parameters of treatment outcome and can be successfully applied in carefully selected patients.

References:

12AP2-2
Interleukin-1β causes acute lung injury via integrin-dependent mechanisms
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Background and Goal of Study: IL-1β has previously been shown to be one of the most biologically active cytokines in the lungs of patients with acute lung injury (ALI). Furthermore, there is experimental evidence that lung vascular permeability increases after short-term exposure to IL-1α protein, although the exact mechanism is unknown. Therefore, the objective of these studies was to determine the mechanisms of IL-1β mediated increase in lung vascular permeability and pulmonary edema following transient overexpression of this cytokine in the lungs by adenoviral gene transfer.

Materials and Methods: An adenovirus expressing human IL1β (Ad-IL1β) or a control adenovirus (Ad-Empty) was instilled intratracheally in male, C57 mice. The endothelial permeability, excess lung water and the BAL fluid of the lungs were studied at defined time points (up to 28 days). To determine the molecular mechanisms of the observed increase in lung vascular permeability and pulmonary edema following transient overexpression of IL-1β, a series of experiments on signaling pathways were performed on lung epithelial and endothelial cells.

Results and Discussion: Lung vascular permeability increased with intrapulmonary IL-1β production with a maximal effect 7 days after instillation of the adenovirus. Furthermore, inhibition of the αvβ6 integrin and/or TGF-β attenuated the IL-1β-induced ALI. The results of in vitro studies indicated that IL-1β caused the activation of TGF-β via RhoA/αvβ6 integrin-dependent mechanisms and the inhibition of the αvβ6 integrin and TGF-β signaling completely blocked the IL-1β mediated protein permeability across alveolar epithelial cell monolayers. In addition, IL-1β increased protein permeability across lung endothelial cell monolayers via RhoA- and αvβ5 integrin-dependent mechanisms. The final series of in vivo experiments demonstrated that pretreatment with blocking antibodies to both the αvβ5 and αvβ6 integrins had an additive protective effect against IL-1β-induced ALI.

Conclusion(s): In summary, these results demonstrate a critical role for the αvβ5/6 integrins in mediating the IL-1β induced acute lung injury and indicate that these integrins could be a potentially attractive therapeutic target in ALI.

12AP2-3
Oxygen-powered mechanical ventilator to meet a pandemic surge: A volumetric NO delivery modification
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Background and Goal of Study: UK influenza pandemic planning predicts up to 750,000 additional deaths, hospital capacity meeting 25% of demand, and the need to prioritise patients. This could cause huge ITU demand, requisition of ward beds, erratic oxygen supplies, and increased nitric oxide (NO) requirement for treatment of ARDS. From studying early ITU history (manual ventilation during 1952 polio epidemic, Copenhagen) and the gas economy of the “Tri-Service” apparatus we evaluated i) the possibility of sustaining a patient using a pneumatic ventilator incorporating a self-inflating bag, ii) a volumetric NO delivery modification, iii) the effect of different lung compliances (different workloads) on inspired NO fraction.

Materials and Methods: We used CO2 as a cheap measurable marker gas to simulate NO. A pneumatic piston compressed a single-use self-inflating bag. “Waste” oxygen from the mechanism was directed into the reservoir, enriching the air within. A smaller piston, linked to the main one, additionally pumped CO2 into this reservoir - in proportion to the minute volume, theoretically providing a fixed FICO2. This device, constructed from readily available industrial components, ventilated a test lung over a range of rates, I:E ratios, tidal volumes and compliance settings representative of both normal and diseased lungs. Data collected included oxygen consumption and delivered FICO2.

Results and Discussion: The FICO2 decreased marginally as the lung compliance and tidal volume were increased and during inverse ratio ventilation (I:E ratio 2:1). In all conditions, the FICO2 was maintained within a narrow range (3–3.8%), suggesting that a stable FNO within acceptable safe limits could be delivered automatically by a design of this type.

Conclusion(s): The low cost oxygen powered ventilator may potentially be modified to deliver a fixed NO concentration, without need for continuous NO monitoring. This could be useful in situations where there is an overwhelming demand for mechanical ventilation and management of patients with ARDS.

References:
1 Pandemic flu: A national framework. UK DOH 22.11.07.

12AP2-4
Urinary trypsin inhibitor attenuates lipopolysaccharide-induced neutrophil activation and acute lung injury
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Background and Goal of Study: This study was performed to clarify the effects of urinary trypsin inhibitor (UTI) on neutrophil activation and lipopolysaccharide (LPS)-induced acute lung injury.

Materials and Methods: To assess possible interactions between UTI and LPS on neutrophil activation, neutrophils from human blood were incubated with various concentrations of UTI (0, 1, 10, 100, 1000 and 10,000 U/ml) and LPS (100 ng/ml) in 24-well plates (5 x 10^6 cells/well) with RPMI medium 1640 containing 5% of serum. We measured protein levels for interleukin (IL)-6, and tumor necrosis factor (TNF)-α using ELISA after 4 hr incubation period. To evaluate the intracellular signaling pathway, we also measured the levels of phosphorylation of p38, ERK and JNK with western blot analysis and nuclear levels of the transcription factor NF-κB with electrophoretic mobility shift assays (EMSA). We determined the effect of UTI on acute lung injury (development of pulmonary edema, lung injury score, the concentration of IL-8 in bronchoalveolar lavage fluid (BALF)) of rabbits treated with LPS.

Results and Discussion: UTI attenuated activation of neutrophils induced by LPS. UTI decreased expression of proinflammatory cytokine, including TNF-α and IL-6, and activation of intracellular signaling pathways, such as JNK, but not p38, ERK and nuclear translocation of the transcriptional regulatory factor NF-κB. Rabbits treated by UTI were protected from LPS-induced lung injury determined by development of lung edema, lung injury score and IL-8 in BALF levels.

Conclusion(s): UTI can attenuate LPS-induced ALI via the attenuation of neutrophil activation caused by LPS.

12AP2-5
The effects of prone position on intraabdominal pressure, hemodynamics, and alveolar oxygenation in patients with ALI/ARDS
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Background and Goal of Study: Prone position is one of the treatment protocols in ARDS. We investigated its effects on intrapulmonary pressure (IAP), abdominal oxygenation and hemodynamics in this group of patients.

Materials and Methods: 15 patients between the ages of 16-60 within the 24 hour after the diagnosis of ALI/ARDS were included. APACHE II and Lung Injury scores were calculated. All patients were mechanically ventilated under sedation and muscle relaxation. They were randomized into two groups. Maneuvers were performed when the patients were supine with no head elevation (baseline), one hour and two hours after the prone position with no abdominal support. Ventilator parameters were not changed during the study. Kholmogorov Smirnov, paired sample t, and Pearson correlation analysis were used for statistical analysis.

Results and Discussion: IAP increased and oxygenation were improved after 1 and 2 hours in prone position (p<0.01). The slight decrease in MAP and in HR after 1 and 2 hours were not clinically significant (p>0.05).

12AP2-7
Repercussion in gasometric values and ventilatory mechanics of alveolar recruitment maneuvers in an experimental model of ARDS
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Background and Goal of Study: To demonstrate the gasometric and ventilatory changes to the different maneuvers of alveolar recruitment in 17 pigs with ARDS caused experimentally.

Materials and Methods: Study was carried out in 17 (Landrace) pigs with ARDS evoked through multiple broncho-alveolar lavages with saline solution. Three groups of study were established, according to the maneuvers of alveolar recruitment (AR) made after the development of the ARDS: A Group: total AR, realizing maneuvers of recruitment to obtain PaO2 >90% of the basal value with various maneuvers of rapid AR and one maneuver of sustained inspiration. B Group: simple maneuver of rapid AR without objective of oxygenation. C Group: control group. The hemodynamic study was made at basal time and at 15, 60, 180 and 360 minutes after the provocation of ARDS. The statistical analysis was made using ANOVA study, T-student, χ^2 and exact test of Fisher.

Results and Discussion: The maneuvers of Alveolar Recruitment (AR) produce a significant PaO2 increase in A and B groups, from minute 15th until the end of the study. C group has a different behavior, but those differences are not statistically significant. Conclusions: (a) A significant increase in PaO2 and PCO2 reduction in minute 15th until the end of the study. Into the group without AR it was observed the worsening of the ventilatory parameters and the decreases of Ph values from minute 15th until the end of the study. Peak inspiratory pressure and mean anay pressure behavior is equivalent in the three groups (from ANOVA perspective), but there are statistically significant differences between ARDS and minute 15th using T Student (p<0.05). The PEEP values are similar among the three groups. The values of LIP (Low Inflexion Point) from basal to ARDS are similar into the three groups using ANOVA. There are statistically significant differences between basal and ARDS, using T Student (p<0.05).

Volume minute decreased in every group in ARDS and stayed unchanged after AR. Pulmonary extravascular water increased significantly from basal to ARDS, later the tendency in the three groups is to diminish without statistically significant difference.

Conclusion(s): A. The association of pulmonary Protection to maneuvers of Total or Simple AR and a value of PEEP inferior to the LIP is an effective method to improve oxygenation and ventilation in experimental ARDS. B. There is an increase in the values of PaCO2 and a reduction of Ph in the group without recruitment maneuvers. In that group a value of PEEP lower than the LIP was used.

12AP3-1
Augmented pro-inflammatory response after trauma with and without secondary sepsis: Beneficial or detrimental?
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Background and Goal of Study: The cytokine cascade activated in response to injury consists of a complex biochemical network with diverse effects on the injured host. In two-hit hypothesis, sepsis represents a second insult to a previously injured and primed host, converting a low-grade or regulated host response, triggering new or progressive organ dysfunction (1). Aim of this study was to assess pro-inflammatory response to trauma with or without sepsis as a second insult.

Materials and Methods: Twenty five patients with severe trauma who developed sepsis and 10 patients with same kind of severe trauma without sepsis were enrolled in this study. In the trauma-sepsis group 21 patients developed multiple organ dysfunction syndrome (MODS) and 14 died. In trauma group 4 developed MODS and 2 died. Blood was drawn on the first, third and fifth day after trauma. Concentrations of IL-8, IL-12, tumor necrosis factor (TNF)-α, interferon (IFN) gamma were determined in plasma using ELISA assays.

Results and Discussion: When compared trauma-sepsis group with trauma group we found that mean values of IL-8 were 230-fold higher (p<0.01), IFN-γ, gamma 260-fold higher (p<0.01) and TNF-α alpha 17-fold higher (p<0.05 in patients with trauma + sepsis; IL-12 was not statistically different (p<0.05) between two groups. When compared MODS group with group without MODS, we found that mean values of IL-8 were 60-fold higher (p<0.01) and TNF-α alpha 43.5-fold higher (p<0.01) in patients with MODS; IL-12, tumor necrosis factor (TNF)-α and interferon (IFN)-γ gamma were not statistically different (p<0.05) between two groups. When compared non-survivors with survivors, we found that mean values of IL-8 were 2.3-fold higher in non-survivors (p<0.01), mean values of TNF-α alpha were 2.2-fold higher in survivors (p<0.01), IL-12 was also higher in survivors (p<0.05). IFN-γ gamma was not statistically different (p<0.05) between two groups.
Conclusion(s): There is augmented pro-inflammatory response after trauma with secondary sepsis. High concentrations of IL-8 and TNF-alpha indicated higher severity (MODS). But, fatal outcome was predicted with high concentrations of TNF-alpha and IL-12. Therefore, pro-inflammatory response was partly beneficial and partly detrimental to the host.

References:

12AP3-2
New risk factor for catheter related bacteraemia: Total or partial detached dressing
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Background and Goal of Study: Numerous risk factors have been studied for catheter related bacteraemia (CRB), specially in central venous catheters (CVC). It is known that cutaneous catheter entry site and catheter hubs are the main cause of CRB. Nevertheless, it is not known if the relatively frequent partial or total dressing detachment of the CVC is a risk factor for CRB. The aim of the study was to investigate this possible risk factor together with others already known.

Materials and Methods: In a University hospital of 400 beds, there was realized a prospective study of all patients with a CVC placed by surgery department. From February 1, 2004, in the moment of placement of the CVC, a record was opened by all the information of the patient including the possible risk factors: a) Patient related: age, sex, responsible department, diagnosis, concomitant infection, diabetes, neoplasia, immunodeficiency, immunosuppressant treatment, albinunemia and glycaemia- 120; b) CVC related: urgent placement, insertion in operating room, vein of insertion, and lumens; c) Use and manipulation related: total parenteral nutrition (TPN), infusion of antimicrobials, days of duration, number of three-way stopcocks used, use of Segur-Lockká protector for hubs (SL), number of manipulations, and another specific observing about total or partial dressing detachment (TPDD). The researchers in charge of the follow-up of the factors, registered them every 48-72 hours, until the end of use of the CVC, or its withdrawal for suspicion of CRB.

Results and Discussion: We followed 181 CVC, placed in 161 patients. The Results and Discussion: of the CVC, or its withdrawal for suspicion of CRB. The average insertion in operating room, vein of insertion, and lumens; c) Use and manipulation duration of 17,8 days (SD ±0.19; IC95%: 0,04-0,93; p=0,04). In multivariate analysis, reached statistical significance: TPN-infusion (OR: 3,6; IC95%: 1,6-8.1; p <0.01), the TPDD (OR: 2,6; IC95%:1,1-6.7, p<0.04) and the SL (OR: 0,19; IC95%: 0.04-0.93; p=0.04).

Conclusion(s): Total parenteral nutrition and the total or partial dressing detachment, increase the risk of central venous catheter related bacteraemia. Segur-Lock’s utilization protecting the hubs is a factor that diminishes this risk.

Disclosure: One of the co-researchers is the inventor of Segur-Lock.

12AP3-3
Decrease of the central venous catheter nosocomial related infection by intervention on the own risk factors
Anesthesia, H. del Mar- Esperança. IMAS, Barcelona, Spain

Background and Goal of Study: In a previous study in our institution, we have detected, that the principal risk factors for central venous catheter (CVC) related bacteraemia (CRB), has been to observe that the dressing of the CVC entry site was detached, and total parenteral nutrition (TPN) administration. Likewise, it was demonstrated as protective factor, Segur-Lock’s use as antiseptic hubs. The aim of the study has been to diminish these infections through the intervention in these concrete risk factors.

Materials and Methods: 1) During the study period (SP) all CVC placed by surgery department were followed prospectively for 11 months. The well-established measures were: a) the control of the dressing for a nurse dedicated to the follow-up every 48-72h. When any partial or total detachment was observed, the dressing was changed and the importance of this was remembered. b) Likewise, we carried out meetings of punctual and specific formation showing the previous results and this three risk factors, to all the units of nursing and monitoring until remotion. With regard to the TPN it was included training in these concrete risk factors. 2) As control period (CP) has been used the study about the risk factors, which take place the 11 previous months.

Results and Discussion: During 11 months of the SP we consecutively followed 231 CVC vs 181 CVC in the CP. In the SP, CVC have had an average duration of 17,8 days (SD ±33,7), between 0 and 314 days vs 16,7 days (SD ±15,3), between 0 and 90 days in the CP (p: N.S.). They were withdrawn by CRB suspicion in 36/231 (15,7%) vs 43/181 (24,1%) (p <0,04) and there was 13/231 BRC (5,6%) vs 22/181 (12%) respectively (p <0,02). The BRC for 1000 days of CVC were reduced from 7,2 to 3,2 (p<0,02).

Conclusion(s): Directly intervention on the CRB risk factors detected previously in our center has been decisive to diminish this infection more than 50%.

12AP3-4
Sepsis in patients with peptic ulcer perforation – An identification of risk factors in patients surgically treated for peptic ulcer perforation
M. Hylander Møller
Department of Anaesthesiology and Intensive Care Medicine, Copenhagen University Hospital Herlev, Herlev, Denmark

Background and Goal of Study: The overall mortality rate for patients undergoing surgery for perforated peptic ulcer has increased despite improvements in perioperative monitoring and treatment 1. The goal of this study was to identify perioperative risk factors in patients with perforated peptic ulcer.

Materials and Methods: Three hundred and ninety-eight patients undergoing emergency surgery in four university hospitals in Denmark were included. Variables regarding the pre-, intra- and postoperative phase were recorded retrospectively by extracting information from medical records. Data were analysed using multiple logistic regression analysis. The primary endpoint was 30-day mortality rate.

Results and Discussion: Mean age (SD) was 68.4 years (± 14.8). The 30-day mortality rate was 27%. The results of multiple logistic regression are presented in table 1. Table 1. Variables associated independently with 30-day mortality by multiple logistic regression analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>P-value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA class ≥ II</td>
<td>0.000</td>
<td>3.630</td>
<td>1.872-7.038</td>
</tr>
<tr>
<td>Age &gt; 65 years</td>
<td>0.004</td>
<td>2.535</td>
<td>1.338-4.803</td>
</tr>
<tr>
<td>Prooperative metabolic acidosis</td>
<td>0.015</td>
<td>2.402</td>
<td>1.182-4.881</td>
</tr>
<tr>
<td>Creatinin concentration &gt; 110 (W/130) (μM)</td>
<td>0.024</td>
<td>1.921</td>
<td>1.089-3.300</td>
</tr>
<tr>
<td>upon admission</td>
<td>0.035</td>
<td>2.791</td>
<td>1.164-6.581</td>
</tr>
<tr>
<td>Insufficient nutrition postoperatively</td>
<td>0.026</td>
<td>2.031</td>
<td>1.048-3.936</td>
</tr>
<tr>
<td>Albumin concentration &lt; 350 μM upon admission</td>
<td>0.039</td>
<td>1.986</td>
<td>1.037-3.804</td>
</tr>
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</table>

Total parenteral nutrition and the total or partial dressing detachment, increased the risk of central venous catheter related bacteraemia. But, fatal outcome was predicted with high concentrations of TNF-alpha and IL-12.

Conclusion(s): In the present study, we identified two factors that have not previously been described as significant risk factors for death within 30 days of surgery in patients with perforated peptic ulcer: 1) incipient sepsis upon admission, reflected by shock, elevated concentration of creatinine, metabolic acidosis and subnormal concentration of albumin and 2) insufficient nutrition after the operation. In order to improve the outcome for patients with perforated peptic ulcer, a clinical controlled trial is needed, where interventions aimed at modifying these risk factors should be carried out.

Acknowledgements: Co-authors: Shah K, Bendix J, Jensen AG, Zimmermann-Nielsen E, Adamsen S and Møller AM.

References:

12AP3-5
Descriptive study about complications of venous central catheters in a project to decrease related bacteraemias
N. Baldoma, J. Alvarez, L. Molto, R. Terradas, G. Segura
Anesthesia, H. del Mar, Barcelona, Spain

Background and Goal of Study: Detection risk factors is important to reduce incidence of catheter related bacteraemia (CRB). Registering evolution an risk factors of inserted central venous catheters (CVC) was decided to establish interventions oriented in decreasing CRB.

Materials and Methods: It was performed prospective following of CVC inserted at the hospital from 2006 February to December registering dates about insertion and monitoring until remotion.

Results and Discussion: 801 CVC were inserted: 232 (29%) surgery and 569 (71%) anaesthesia with 17.9 and 5 average days of duration respectively. CRB was 3.2/1000 days per surgery and 2.3/1000 days per anaesthesia. Anaesthesia CVC were divided in: 51 (9%) at recovery room and 517 (81%) at operating theatre; 69.4% were jugular, 23% subclavia 6.8% forearm and 0.7% femoral. During insertion minor complications were reported in 6% cases (basically arte...
nal puncture, no pneumothorax). It was a unique puncture in 67% cases. During the following: 18.3% of the dressings were unstuck once at least; 5.2% were accidentally withdrawn. Of the 8 anasthesia CRB: 6 (75%) had CVC inserted for 6 days at least, 3 were inserted at recovery room. 5.8% of CVC inserted at recovery room presented CRB vs a 1% of the inserted at operating theatre, p < 0.05. 1 was femoral. 25% of femoral CVCs presented CRB vs a 1% of jugular ones, p < 0.05.

**Conclusion:** 1.- BRC of CVC inserted by anesthesiology department is a 30% less than the ones inserted at surgery department. 2.- Insertion at the recovery room and in the femoral vein was correlated with CRB presentation. 3.- CVCs poor fixation is revealed as a problem because of high CRB and accidental withdrawal.

### 12AP3-6

**A four year review of Clostridium difficile rates in critical care:**

**Antibiotic control works**

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**Background and Goal of Study:** Surveillance of Clostridium difficile associated disease (CDAD) has been included in the mandatory healthcare associated infection surveillance system for acute Trusts in England since January 2004. Cases are defined as all diarrhoeal specimens that test positive for the toxin (where the patient has not been diagnosed with CDAD in the preceding four weeks). Nationally, there has been a year on year increase in the rate of CDAD per 1000 bed days across all trust categories from 2004 – 2006 [1]. We sought to identify the trend in the rate of CDAD over the past four years in our intensive care population.

**Materials and Methods:** All the patients who had confirmed cases of CDAD from January 2004 – October 2007 were identified from the microbiology database. The number of admissions and the bed occupancy rate for each year during this period was calculated from the critical care database in order to determine the rate per 1000 bed days of CDAD. Pharmacy data of antibiotic usage by means of the defined daily doses (DDD) per 1000 occupied bed days was also studied.

**Results and Discussion:**

<table>
<thead>
<tr>
<th>Table 1. Results</th>
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<tbody>
<tr>
<td><strong>Year</strong></td>
</tr>
<tr>
<td>No of Admissions</td>
</tr>
<tr>
<td>Bed occupancy days</td>
</tr>
<tr>
<td>No of CDT +ve patients</td>
</tr>
<tr>
<td>CDAD rate/1000 bed days</td>
</tr>
<tr>
<td>Antibiotic DDD/1000 bed days</td>
</tr>
</tbody>
</table>

We found a significant reduction in the rate of CDAD/1000 bed days between 2004 and 2006/7 (p < 0.05 Chi square). There was no significant change in antibiotic usage over the four year period.

**Conclusion(s):** Contrary to the national picture of a continuing rise in the rate of Clostridium difficile associated disease, we have observed a significant reduction over the last four years. The critical care unit at University Hospital Aintree has a strict antibiotic and infection control policy. The unit receives considerable referrals from the local community, but the majority of the patients are transfers from other hospitals. The HPA report provides overall Trust data for England and Wales. However specific data for critical care units is lacking. Our retrospective review is novel and should be repeated in other critical care units.

**References:**


### 12AP3-7

**Prognostic value of microalbuminurea values at day 1 and day 5 in the intensive care unit**

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Haydarpasa Numune Teaching and Research Hospital, Anesthesiology and Intensive Care Unit, Istanbul, Turkey

**Background and Goal of Study:** We investigated the relationship of the MACR changes from day 1 to day 5 with the septic complications and mortality rates in medical and surgical patients in ICU.

**Materials and Methods:** We studied on 60 patients with the approval of the Ethical Board. The patients, who had a history of arterial hypertension, related use of medicine, endocardial disease, malignity, nephropaty, renal, urological, gynecological, endocrinal disease, malignity, nephropaty, renal, urinary trauma, creatinine > 1.2 mg/ml, those whose cause of admission required immediate surgery, and who underwent long-term CPRI, were excluded. APACHE II, SOFA scores recorded, CRP, lactate levels, the degree of fittening degree of malnutrition (1 to 4) and PaO<sub>2</sub>/FiO<sub>2</sub> ratios were measured as well as MACR ratio at day 1 and day 5. Patients were divided into two groups according to the level of MACR compared to day 1. All/ARDS, sepsis and mortality rates were compared between ‘MACR high’ and ‘MACR low’ group. The cut-off value for MACR was accepted as 2.5 mg/mmol. SPSS was used for statistical analysis.

**Results and Discussion:** 10 patients were excluded from the study. 46 patients were alive at day 5.31 patients were in the ‘MACR high’ group in which 90% had sepsis with the mortality rate of 71%. The sepsis and the mortality rates of the 15 patients in the ‘MACR low’ group were 80% and 26.7%.

**MACR Change from Day 1 to Day 5**

<table>
<thead>
<tr>
<th>Age</th>
<th>Increase (n=31)</th>
<th>Decrease (n=15)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>55.2±20.9</td>
<td>57.6±16.8</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>11 (35%)F</td>
<td>3 (20%)F</td>
<td>0.285</td>
</tr>
<tr>
<td>APACHE II at 15 min</td>
<td>20.8±9.8</td>
<td>12.8±4.8</td>
<td>0.809</td>
</tr>
<tr>
<td>SOFA at 15 min</td>
<td>5.5±2.1</td>
<td>5.3±2.1</td>
<td>0.903</td>
</tr>
<tr>
<td>Mortality n</td>
<td>22 (71%)</td>
<td>4 (26.7%)</td>
<td>0.004</td>
</tr>
<tr>
<td>Sepsis</td>
<td>7 (22.6%)</td>
<td>7 (21.3%)</td>
<td>0.459</td>
</tr>
<tr>
<td>ARDS</td>
<td>9 (29%)</td>
<td>7 (20%)</td>
<td>0.513</td>
</tr>
<tr>
<td>CRP</td>
<td>Day 1</td>
<td>1.9±1.7</td>
<td>1.8±1.3</td>
</tr>
<tr>
<td>Day 5</td>
<td>16.8±10.6</td>
<td>13.8±12.3</td>
<td></td>
</tr>
<tr>
<td>Lactate</td>
<td>Day 1</td>
<td>2.5±2.8</td>
<td>1.9±1.3</td>
</tr>
<tr>
<td>Day 5</td>
<td>2.2±1.8</td>
<td>1.5±0.5</td>
<td></td>
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<tr>
<td>1.5</td>
<td>0.5</td>
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**Conclusion(s):** When the result of the present study and similar studies are taken into consideration generally in terms of the presence of a correlation between the MACR and the mortality and development of sepsis, we believe that routine use of MACR, which is an easy-to-use, laboratory parameter, in addition to the scoring systems as a supportive tool in the near future in the heterogenous group of critically ill patients, can be achieved if supported by further studies, which will be carried out with specific and larger patient groups.

### 12AP3-8

**Cholinesterase modulations in patients with pneumococcal meningitis**

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CM, Department of Infectious Diseases, University Hospital Righospitalet, Copenhagen, Denmark

**Background and Goal of Study:** Acetyl- and butyrylcholinesterase (ACHE and BChE) are stress-induced enzymes which may modulate neuroinflammation and neuronal apoptosis in various neuropathologies. Altered cholinesterase (CHE) activities have previously been shown in the cerebrospinal fluid of patients with bacterial meningitis, but the pathophysiological significance of these remains to be elucidated. It is possible that CHEs are released from the brain and contribute to the systemic inflammatory response in patients with bacterial meningitis, and/or that CHE modulations contribute to the neuropathology of this disease.

**Materials and Methods:** Following ethical approval and informed consent, arterial and jugular venous samples were obtained from seven patients with pneumococcal meningitis, and from eight healthy volunteers who served as controls. Specific ACHE and BChE activities were determined using Elman’s method, and the concentration of active ACHE was measured by means of Karnovsky’s assay. Cerebral blood flow was determined with the Kety-Schmidt technique, and the net cerebral flux of active ACHE was calculated according to the Fick principle.

**Results and Discussion:** An immense suppression of the total circulating CHE activity occurred in patients when compared to healthy controls (median 816 [range 138 to 1102] vs. 1335 [range 1053 to 1450] ng/ml/mn, p < 0.004; Mann-Whitney). This primarily involved decreases in the BChE (median 650 [range 83 to 920] vs. median 136 [range 874 to 1239] ng/ml/mn, p = 0.0006; Mann-Whitney), but not the ACHE activity (median 166 [range 56 to 205] vs. median 198 [range 168 to 257] ng/ml/mn, p = 0.4; Mann-Whitney). There was no difference in the net cerebral flux of active ACHE between patients and controls (median –2 [range –4 to 0] vs. 29 [range –38 to 4]) (U = 0.4, Mann-Whitney).

**Conclusion(s):** The net cerebral transfer of active ACHE is not affected in patients with pneumococcal meningitis. However, the total circulating CHE activity is suppressed, mainly due to a decreased BChE activity. CHEs are rapidly de-
naturated by pneumococcal hydrogen peroxide in vitro, which may contribute to this suppression. Further studies are needed to investigate pathophysiological mechanisms and consequences of CHE modulations in pneumococcal meningitis.

12AP3-9
Is early goal-directed therapy for sepsis practised in UK A & E departments? A postal survey
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Anaesthesia & Intensive Care, Mid Staffordshire General Hospital, Stafford, Staffordshire, United Kingdom

Background and Goal of Study: Early goal-directed therapy (EGDT) has been shown in a randomised clinical trial to improve outcome in sepsis about six years ago. Although the paractice has been largely accepted as good evidence for better outcome in the management of severe sepsis, its adoption by acute care units has not been universal worldwide for various reasons. We conducted a postal survey on the use of EGDT in the United Kingdom National Health Service Trusts (UK NHS) accident and emergency (A&E) departments.

Materials and Methods: A total of 240 NHS Trusts throughout the UK were randomly selected for the EGDT survey. Questionnaires addressed to the Lead Clinician or head of Department were sent to the A&E department of the selected hospitals. A stamped self-addressed envelope was enclosed with the questionnaire. Questionnaires not returned after two weeks were followed up by telephone calls.

Results and Discussion: A total of 143 (59.6%) responses were obtained (Table 1). Ninety seven departments declined participation. From the hospitals that responded 64.7% of respondents were A&E consultants; 19.6% were associate specialists; 11.8% specialist registrars, and 3.9% senior house officers. Out of the 84.3% of respondents who have heard or read about EGDT, 90.9% associate specialists, 11.8% specialist registrars, and 3.9% senior house officers.

Conclusions: The sensitivity, specificity, PPV, NPV, LR+ and LR- of the blinded procedures with the corresponding 95% confidence intervals were: 77% (54-99), 66% (15-103), PPV 91% (73-100), NPV 40% (0-80), LR+ 2.3 (0.3-13) and LR- 0.3 (0.2-4) respectively. PTP was 0.8 (0.4-0.9) from expected pre-test probability of 0.6. One patient had a major bronchoscopic complication (bronchoaspiration). Prior antibiotic therapy was present in 50% of the included patients.

| Table 1
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<td>5</td>
<td>3</td>
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Conclusions: Microbiological culture obtained through blinded procedure is accurate diagnostic test for pneumonia in postoperative patients. However, when pneumonia is suspected clinically and blinded culture is negative, a bronchoscopic method should be taken under consideration.

12AP3-10
Diagnostic accuracy of blinded procedures for the diagnosis of pneumonia in postoperative patients
L. Valencia, S. Siermejo, A. Sánchez-Ford, E. Soler, E. Samso
Servei d’Anestesiologia, Hospital del Mar-Esperança (IMAS). Universitat Autònoma de Barcelona, Barcelona, Spain

Background and Goal of Study: Postoperative pneumonia is associated with high mortality and morbidity. Diagnosis is based on clinical findings and on microbiological procedures. The aim of this study was to evaluate the diagnostic accuracy of blinded cultures in the setting of suspected postoperative pneumonia.

Materials and Methods: We retrospectively studied 77 postoperative patients with suspicion of pneumonia (January/06-November/07). Twenty-five of them had respiratory tract cultures obtained through both nonbronchoscopic (blinded) and bronchoscopic procedures. Nine patients with low quality samples were excluded. Finally 16 patients were included in the analysis. Twenty-five of them were intubated. Complications of the bronchoscopic technique and antibiotic therapy prior to the diagnostic of pneumonia were also assessed. We designed a 2x2 table (Table 1) to calculate: sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), likelihood ratios (LR+ and LR-) and post-test probability (PTP). We assumed bronchoscopic samples as gold-standard.

Results and Discussion: The sensitivity, specificity, PPV, NPV, LR+ and LR- of the blinded procedures with the corresponding 95% confidence intervals were: 77% (54-99), 66% (15-103), PPV 91% (73-100), NPV 40% (0-80), LR+ 2.3 (0.3-13) and LR- 0.3 (0.2-4) respectively. PTP was 0.8 (0.4-0.9) from expected pre-test probability of 0.6. One patient had a major bronchoscopic complication (bronchoaspiration). Prior antibiotic therapy was present in 50% of the included patients.

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<tr>
<td>11</td>
<td>10</td>
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<td>5</td>
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</table>

Conclusions: Microbiological culture obtained through blinded procedure is accurate diagnostic test for pneumonia in postoperative patients. However, when pneumonia is suspected clinically and blinded culture is negative, a bronchoscopic method should be taken under consideration.

References:

12AP3-11
8-hour meropenem infusion induces fast PCT decrease in cancer patients with severe intraabdominal infections – Early report
A. Lukaszewska, P. Sozinski, E. Hagmajer, M. Symonides
Anaesthesiology and Intensive Care, The Maria Sklodowska-Curie Memorial Cancer Center, Institute of Oncology, Warsaw, Poland

Background and Goal of Study: To examine the efficacy of antibacterial chemotherapy for severe infections, we investigated the outcome after a prolonged infusion regimen of meropenem based on a pharmacokinetics/pharmacodynamics (PK/PD) theory. The aim of study was to assess the impact of the change in meropenem administration on the rate of the disappearance of infection markers of severe abdominal infections in cancer patients.

Materials and Methods: 14 cancer patients (age 54-72) admitted postoperatively to the ICU with severe intraabdominal infection. They all received meropenem 3 x 1 g, but were randomized into two groups. G I – received antibiotic in 20 min. infusion. G II – received antibiotic in 8-hour infusion. All patients received also 0.4g. of fluconazole per die. During the ICU stay clinical evaluation (APACHE II) and PCT (VIDAS BRAHMS) level were performed once daily, WBC, all symptoms and complications were noted. The efficacy of eradication was assessed microbiologically. Patient observation terminated on discharge from ICU.

Results and Discussion: PCT seems to be a good parameter to estimate severity, prognosis or further course of the infection disease. In our study PCT levels was high in both groups before start of the therapy (18,7 – 29.1 ng/ml). In G II early normalization of PCT level was observed (mean 4 days), in G I normalization was after 7 days.

Conclusions: Some studies demonstrate positive impact of prolonged infusion of beta-lactam antibiotics. These results may suggest that prolongation of infusion time of meropenem can be useful for improvement of the clinical efficacy against severe intraabdominal infection in cancer patients, but of course it need further studies.

12AP4-1
Different effects of epinephrine and norepinephrine on microcirculatory gastric mucosal oxygenation during anesthesia with sevoflurane or propofol
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Department of Anesthesiology, University Hospitals ULM/UKD, Ammersham/ Dusseldorf, Netherlands/Germany

Background and Goal of Study: Adequate gastrointestinal mucosal oxygenation is regarded crucial in prevention and therapy of critical illness [1]. Both epinephrine (EPI) and norepinephrine (NOR) are commonly used for perioperative hemodynamic support, however, their effects on gastrointestinal mucosal hemoglobin oxygenation are unclear. Moreover, the respective effects of EPI and NOR may be affected by the type of underlying anesthesia. Thus we studied the effects of EPI and NOR during anesthesia with sevoflurane (SEVO) or propofol (PROPO) on regional gastric mucosal and systemic oxygenation.

Materials and Methods: Study design: Double randomized, cross over, large animal study. Chronically instrumented dogs (24 experiments; 27-35 kg) were repeatedly anesthetized (randomly with SEVO or PROPO), ventilated, and randomly received NOR or EPI (0.05, 0.1 and 0.2 µg kg⁻¹ min⁻¹). We measured...
microvascular gastric mucosal oxygenation (\(\mu HbO_2\), reflectance spectrophotometry) and systemic \(O_2\)-transport (\(DO_2\)) [2]. Statistics: Data are presented as means±SEM, ANOVA, Fisher PLSD, p<0.05.

Results and Discussion:} During SEVO anesthesia, NOR markedly increased \(\mu HbO_2\) from 55±1 to 67±2%, and also increased \(DO_2\) (from 12±1 to 20±2 mL kg\(^{-1}\) min\(^{-1}\)). In contrast, EPI failed to increase \(\mu HbO_2\) (57±1 vs. 57±2%), despite markedly increasing \(DO_2\) (from 12±1 vs. 27±3 mL kg\(^{-1}\) min\(^{-1}\)). This observation is in line with the findings of other studies [1-4], showing that SEVO anesthesia, when compared to EPI, improves gastric mucosal oxygenation more effectively. These findings are in agreement with previous studies showing that SEVO anesthesia is more effective in improving gastric mucosal oxygenation than EPI [1-4].

Conclusion(s):} The effects of NOR and EPI depended on the underlying type of anesthesia, i.e., SEVO or PROPO. Herein NOR, but not EPI, increased \(\mu HbO_2\) during SEVO anesthesia, whereas both catecholamines failed to increase \(\mu HbO_2\) during PROPO anesthesia. Moreover, the regional mucosal effects (\(\mu HbO_2\)) were non-significant. In conclusion, SEVO anesthesia is more effective in improving gastric mucosal oxygenation than EPI.


References:

12AP4-2

Monitoring of endexpiratory propofol concentrations during TIVA – Chance and limitations of a new clinical tool

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Dept. of Anaesthesiology and Intensive Care Medicine, University of Rostock, Rostock, Germany

Background and Goal of Study:} Monitoring of drug effects onto consciousness is an important issue in intensive care medicine and in anesthesia when sedation is to be tailored to patients’ real needs. Conventional determination of propofol concentrations still requires sophisticated and time consuming techniques. Physicochemical properties of propofol allow the detection in expired air. In order to evaluate clinical applicability of propofol breath monitoring, correlations between propofol breath and blood concentrations were investigated.

Materials and Methods:} After approval by the institutional board and after having obtained written consent 21 mechanically ventilated patients during total intravenous anesthesia or sedation with propofol were enrolled into this observational study. 5 patients underwent lung resection. Blood and breath samples were taken after at least one hour of continuous i.v. propofol application. Propofol concentrations in breath, peripheral, central venous and arterial blood were determined by means of headspace solid phase micro-extraction (SPME) and gas chromatography/mass spectrometry (GC-MS). Correlations between propofol breath and blood concentrations were assessed by means of Pearson correlation coefficients and linear regression analysis.

Results and Discussion:} Correlation coefficient between arterial blood concentrations and breath concentrations was 0.91 (p<0.001) for the 16 mechanically ventilated patients under steady state conditions. No correlation was found between breath and peripheral or central venous concentrations. All 5 patients after lung resection consistently showed lower breath propofol concentrations when compared to corresponding values of the other 16 patients. Under steady state conditions regression analysis yielded an R\(^2\) of 0.822 (\(r_{\text{arterial}} = 0.62\pm0.43, \; t^* \text{mean} = 0.001\)).

Conclusion(s):} Propofol concentrations in human blood and breath can be measured precisely by means of SPME-GC/MS. Assessment of propofol blood concentrations by propofol breath monitoring may be influenced by physiological parameters such as ventilation-perfusion ratio of the lung. Good correlations between propofol breath and arterial blood concentrations indicates that monitoring of exhaled propofol in steady state conditions may act as a promising tool for assessing blood propofol concentration and depth of anesthesia.

References:
12AP4-5
Direct cardiac effects of s(+)-ketamine and propofol in isolated septic rat heart
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Background and Goal of Study: Sedatives show different haemodynamic characteristics, and some might influence cardiac performance negatively especially in patients with septic depressed heart function. S(+)-ketamine combines sedative and analgetic effects, and additionally has positive haemodynamic properties (1). At this time there is no recommended sedative for patients in severe septic or septic shock. (2). The aim of our study was to compare the direct cardiac effects of S(+)-ketamine and propofol in the isolated septic rat heart.

Materials and Methods: Polymicrobial sepsis was induced in male Wistar rats (220-250 gr) via cecal ligation and single puncture (CLP, n=20). After 24 hours of incubation hearts were isolated and retrograde perfused at constant pressure in Langendorff apparatus. Hearts received S(+)-ketamine or propofol at concentrations of 10-5 to 10-4 M with one of these drugs. Mechanical performance (LVP: left ventricular pressure, +dp/dt: contractility, lusitropie), heart rate (HR), oxygen delivery (DO2), percentage oxygen extraction (O2 Ext), and myocardial oxygen consumption (MVO2) were recorded. Raw data from each functional and metabolic variable were compared after a wash in of repeated measures. P<0.01 was considered to be statistically significant.

Results and Discussion: Propofol and S(+)-Ketamine showed over a range from 10-5 to 10-4 M concentration dependent no significant effect on LVP, +dp/dt and HR. But propofol showed at 10-4 M significant reduction in contractility (LVP: -30%; +dp/dt: -38%) and chronotropic (-29%) effects. This was accompanied by a reduction in MVO2 of 16% at 10-4 M. S(+)-Ketamine only showed a slight but significant reduction in HR (14%) at 10-4 M compared to control values. Evenhough this reduction was to a lesser extent compared to propofol at equimolar concentration (10-4 M).

Conclusion(s): Propofol, but not S(+)-Ketamine showed significant dose dependent negative inotropic and chronotropic effects at concentrations > 10-5 M in the isolated septic heart. Septic depressed heart function might deteriorate with these high plasma concentrations of propofol achieved by bolus administration or long-term infusion in septic patients in severe sepsis or septic shock, especially with multiple organ failure accompanied by a decreased hepatic and renal metabolism. S(+)-Ketamine showed at concentration from 10-5 to 10-4 M a safe administration regarding influence on inotropic performance in septic rat heart.

References:

12AP4-6
Haemodynamic effects of levosimendan in patients with pulmonary hypertension after cardiac surgical procedures under extracorporeal circulation
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Background and Goal of Study: Levosimendan is an inotropic agent (calcium sensitizing agent) that is frequently used for the treatment of low cardiac output syndrome. It is a minimally invasive method to assess the volemia. This volume is calculated with a pharmacokinetic one compartment model. We also collected the changes in usual hemodynamic variables: heart rate, arterial pressure, central venous pressure, pulmonary arterial pressure, and the interstitial fluids of highly perfused organs. It is correlated to volemia assessed by different methods. Few data are available concerning the changes of IDVG after a fluid challenge, especially in ICU patients.

Materials and Methods: With ethic approval and appropriate consent, ICU patients needing a fluid challenge were recruited prospectively. The fluid challenge consisted in an infusion of 500 ml of normal saline, hydroxyethylstarch or gelatin over 30 minutes. For IDVG measurement 5 g of glucose were infused with a calibrated dosing pump. We used a paired Student’s t test to compare the groups according to the type of fluid.

Results and Discussion: Thirty five patients were included. After a fluid challenge, especially in ICU patients, IDVG seems to show the same changes as standard hemodynamic variables after a fluid challenge. These results have to be confirmed on a larger population and compared to other means of volemia evaluation.

12AP4-7
Evaluation of the initial distribution volume of glucose after a fluid challenge in ICU patients
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Background and Goal of Study: Estimation of the volemia is a major concern in Intensive Care. The initial distribution volume of glucose (IDVG) is a simple and minimal invasive method to assess the volemia. This volume is calculated with a pharmacokinetic model after infusion of glucose. IDVG consists in the plasma and the interstitial fluids of highly perfused organs. It is correlated to volemia assessed by different methods. Few data are available concerning the changes of IDVG after a fluid challenge, especially in ICU patients.

Materials and Methods: With ethic approval and appropriate consent, ICU patients needing a fluid challenge were recruited prospectively. The fluid challenge consisted in an infusion of 500 ml of normal saline, hydroxyethylstarch or gelatin over 30 minutes. For IDVG measurement 5 g of glucose were injected through a central line and arterial samples were collected before and 3, 4, 5 and 6 minutes after injection. IDVG was calculated using pharmacokinetic one compartment model. We also collected the changes in usual hemodynamic variables: heart rate, arterial pressure, central venous pressure, variation of pulse pressure and urine output. We used a paired Student’s t test to compare the changes after the fluid challenge and a Kruskall Wallis test to compare the groups according to the type of fluid.

Results and Discussion: Thirty five patients were included. After a fluid challenge, IDVG increased significantly compared with baseline values for the same group, <p<0.05 compared with respect to comparison between the two groups.

Day 21 9.16
Day 14 8.45
132 patients were enrolled (54pts – NT, 78pts – ET).
Hb value during ICU stay, transfusion status. Statistical analysis was conducted
and ever transfused (ET). Collected data: demographic data, severity scores,
ICU of a tertiary care university hospital with a longer ICU length of stay (LOS)
Materials and Methods:
mation of IDVG is simple and minimally invasive. The aim of this preliminary work
volume consists in plasma and interstitial fluid of highly perfused organs. Esti-
method estimating circulating blood volume using the dilution of glucose. This
ing peri-operative period. The initial distribution volume of glucose (IDVG) is a
assess the trend of hemoglobin (Hb) value during long ICU stay (>7 days).
Despite the fact that Hb value at ICU admission may vary
down to NT and 8.5±2.8g% in ET group.
In our group Hb transfusion trigger was 7.8±2.3g%. During ICU stay (day 0-day
21) mean Hb decreases with 0.94g% in NT group and with 0.89g% in ET group
(non-significant difference).

Conclusion(s): Despite the fact that Hb value at ICU admission may vary
widely, after 14 days of ICU stay the Hb values tends to converge, disregarding if the
patient received or not blood transfusion. The dispersion of Hb values within
NT group shows a mean of 3g% (2.8g%) to 1.02g% (1.04g%).

During the same period standard deviation (SD) decreases in NT (and ET group
respectively) from 3g% (2.8g%) to 1.02g% (1.04g%).

Conclusion(s): Despite the fact that Hb value at ICU admission may vary
widely, after 14 days of ICU stay the Hb values tends to converge, disregarding if the
patient received or not blood transfusion. The dispersion of Hb values within
NT group shows a mean of 3g% (2.8g%) to 1.02g% (1.04g%).

Hemoglobin trend

<table>
<thead>
<tr>
<th>Day</th>
<th>NT (mean±SD)</th>
<th>ET (mean±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission</td>
<td>10.1±3.3</td>
<td>8.5±2.8</td>
</tr>
<tr>
<td>Day 7</td>
<td>9.3±1.8</td>
<td>9.02±1.73</td>
</tr>
<tr>
<td>Day 14</td>
<td>8.45±1.06</td>
<td>7.82±1.33</td>
</tr>
<tr>
<td>Day 21</td>
<td>9.16±0.02</td>
<td>7.61±1.04</td>
</tr>
</tbody>
</table>

NS - not significant; NT - not transfused group; ET - ever transfused group.

Hb value at ICU admission was 10.1±3.3g% in NT and 8.5±2.8g% in ET group.
In our group Hb transfusion trigger was 7.8±2.3g%. During ICU stay (day 0-day
21) mean Hb decreases with 0.94g% in NT group and with 0.89g% in ET group
(non-significant difference).

Conclusion(s): IDVG can predict the occurrence of hypovolemic hypotension
after aortic surgery for aneurysm. This method could be a useful tool to optimize
the fluid infusion peri-operatively. This method need to be validated on a greater
population and other types of surgery.

12AP4-10
Liberal versus restrictive fluid administration in a
goal-directed strategy: Toward a logic of optimisation of the patient circulatory status?
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Background and Goal of Study: Despite several studies concerning the in-
fluence of intraoperative fluid administration (liberal or restrictive) in high-risk
surgery, the impact of such strategies has never been evaluated in a goal-
directed strategy of optimisation the patient circulatory status. Taking into ac-
count the risk of altered tissue perfusion during hypovolemia, this prospective
and randomised study was designed to evaluate the influence of two strategies
(liberal and restrictive) integrated in a goal-directed therapy in terms of hypov-
olemia and postoperative organs dysfunctions.

Materials and Methods: In this prospective study, 40 patients, ASA III-II,
undergoing major abdominal surgery were randomised to 12 ml/kg/h (group Lib-
eral, n=20) or 6 ml/kg/h (group Restrictive, n=20). Intraoperative administration of
cristalloids (NaCl 0.9% or Ringer lactate). In both groups, hemodynamic moni-
toring including oesophageal doppler, arterial pulse pressure variations (deltaPP)
and oxygen delivery index (DO2). Hypovolemia were corrected by bolus of col-
loids (HES 130/0,4).

Results and Discussion: Pre-operatively, group L and R were comparable
in terms of demographic data, ASA, P-Possum, types and duration of surgery.
The amount of cristalloid perfused was significantly lower in group R (median
3025 ml (2000-4300) vs 5570 ml (4000-8000), p<0,01). Compared with group
L, hypovolemia as well as the amount of colloid necessary (125 ml (0-750) vs
625 ml (0-2000)) were significantly increased in group R (p<0,01). At the
end of surgery, DO2 was comparable in both groups (450±108 ml/min/m² vs
491±161 ml/min/m², p<0,51). Post-operative complications were not signifi-
cantly different in both group, except for the incidence of renal insufficiency
(p<0,01) and a tendency to an increase incidence of sepsis (p=0,07) in group
R. Post-operative recovery was not different according to groups.

Conclusion(s): Although promoted by recent work (1), according to the risk
of hypovolemia, frequent and readily insidious, restrictive fluid administration
expose to the risk of altered tissue perfusion and post-operative organ dys-
function. Early detection and correction of hypovolemia are fundamental.
The application, in routine, of restrictive strategies of vascular filling does not seem
to be able to be recommended within the framework of a more global strategy of
optimization and monitoring of the hemodynamic profile of patients.

References:
1. Neanevich V et coll. Effect of intraoperative fluid management on outcome after intraab-

12AP4-9
Initial distribution volume of glucose predicts hypovolemic
hypotension after aortic surgery
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Background and Goal of Study: Assessing volemia is a major concern dur-
ing peri-operative period. The initial distribution volume of glucose (IDVG) is a
method estimating circulating blood volume using the dilution of glucose. This
volume consists in plasma and interstitial fluid of highly perfused organs. Esti-
mation of IDVG is simple and minimally invasive. The aim of this preliminary work
is to evaluate IDVG in predicting post operative hypovolemic hypotension after
aortic surgery for aneurysm.

Materials and Methods: After approval of our ethic committee and collection
of appropriate consent, we prospectively included 22 patients after scheduled
aortic surgery for aneurysm. The amount of per operative fluid infusion was de-
cided by the attending anaesthetist aiming to maintain appropriate volemia.
Post operatively, IDVG was estimated after injection of 5 grams of glucose and
measurement of glycemia on arterial blood before injection and after 3, 4, 5,
12APS-1
Implementation of blood sugar standard operating procedure on an intensive care unit
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Background and Goal of Study: Mortality on an intensive care unit can be reduced by a consequent blood sugar adjustment. Blood sugar (BS) management based on individual care may be suboptimal. A Standard Operating Procedure (SOP) for BS monitoring and treatment was implemented and outcome of patients was compared to individual care.

Materials and Methods: The study was performed in three steps: RECORDING: daily BS profile was monitored in 439 patients care days treated individually. TRAINING: A SOP for BS monitoring and treatment was implemented and ICU nurses were trained in physician-independent practice. INTERVENTION: daily BS profile was monitored in 398 patients care days. Every day the following parameters were recorded: maximal and minimal BS values, range of fluctuation, incidence of hypoglycaemia (BS < 60mg/dl), and achievement of target glucose range (80-120mg/dl).

Results and Discussion: The mean maximal BS value decreased from 172±63mg/dl (p < 0.05, RECORDING vs. INTERVENTION). The mean range of fluctuation decreased from 63±36mg/dl to 50±27mg/dl (p < 0.05, RECORDING vs. INTERVENTION). The target area was achieved in 27.8% (RECORDING) and 35.8% (INTERVENTION). The incidence of hypoglycaemia decreased from 2.7% to 2.0% (p < 0.05, RECORDING vs. INTERVENTION). The mean minimal value increased from 110mg/dl to 113mg/dl (p > 0.05, RECORDING vs. INTERVENTION). The incidence of hypoglycaemia decreased from 2.7% to 2.0% (p < 0.05, RECORDING vs. INTERVENTION). The range of fluctuation decreased from 63mg/dl to 50mg/dl (p < 0.05, RECORDING vs. INTERVENTION).

Conclusion(s): Implementation of BS SOP on an intensive care unit improved BS monitoring and treatment resulting in a decrease of the incidence of potentially harmful BS values.

12APS-2
The protective effect of tight glucose control for acute hepatic impairment after hepatectomy
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Background and Goal of Study: Intensive insulin therapy has been reported to reduce the mortality in critically ill patients. Tight glycemic control in diabetic CABG patients improves perioperative outcomes, enhances survival, and decreases the incidence of ischemic events and wound complications (1). How-ever, tight glucose control remains difficulties in management to keep appropriate blood glucose level. We have already reported that the STG-22, an artificial pancreas, is a reliable device for continuous monitoring of blood glucose. In addition, the STG-22 can control blood glucose level by automatic insulin infusion. In the current study, therefore, we investigated the protective effect of automatic insulin infusion by the STG-22 on acute hepatic impairment after hepatectomy in comparison with conventional insulin protocol with a sliding scale.

Materials and Methods: 58 patients undergoing hepatectomy were enrolled in this study and divided into two groups. In both groups, blood glucose concentration was monitored by the STG-22. In group A (n=29), the targeted blood glucose level of the STG-22 was set at 90-120 mg/dl. In group B (n=29), the patient’s blood glu-cose level was controlled with automatic infusion of insulin or glucose by the original algorithm of STG-22 during surgery and ICU stay. After discharging the ICU, the control of blood glucose level was followed by conventional insulin protocol with a sliding scale. In group B (n=29), blood glucose level was controlled using a sliding scale during whole perioperative period. C-reactive protein (CRP), alanine aminotransferase (ALT) and aspartate aminotransferase (AST) was measured on post-operative days (POD) 1, 2, 4 and 6. Data were analyzed by repeated measures of analysis with Wilcoxon test as a post hoc test. A P < 0.05 was considered to be statistically significant.

Results and Discussion: There were no significant differences in patient’s background, operation time and blood loss between the two groups. For the first 24 hours, average blood glucose level was significantly lower in group A than in group B. 129.2±2.4mg/dl and 205.8±8.4mg/dl, respectively. AST was significantly lower in group A (42.9±8.4 U/l) on PODs 6 than in group B (55.8±8.4 U/l). No hypoglycemic event was observed in either group. Our date suggested intensive insulin therapy using the STG-22 may provide early recovery of liver damage.

Conclusion(s): Perioperative tight glucose control by the STG-22 may have protective effect for acute hepatic impairment after hepatectomy.

References:

12APS-3
Intestinal tissue glycemic level in critically ill patients during tight glycemia control: Comparison of different methods
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Background and Goal of Study: Tight glycemic control in critically ill patients significantly decreases their mortality and morbidity. The aim of our study was to investigate whether the glucose values from the Guardian real time (RT) system that measures concentrations of glucose in interstitial fluid using a subcutaneous micro-sensor, differ substantially from microdialysis interstitial glucose readings.

Materials and Methods: Ten critically ill patients with tight glycemic control based on arterial blood glucose measurements, admitted to 6-bed multidisciplinary ICU of tertiary care hospital, with no clinical and laboratory signs of inadequate tissue perfusion, were included in this single-center study. Intestinal glucose concentrations were measured by the Guardian Real Time monitoring system and by the microdialysis of subcutaneous adipose tissue. The microdialysis catheter was constantly perfused at a flow rate of 0.3 μL/min. Dialysate was collected in hourly fractions and analyzed for glucose using a microdialysis analyzer. The Guardian RT’s data were downloaded and paired with dialysate glucose concentrations. Data were analyzed using the Bland-Altman method and the correlation coefficient was calculated.

Results and Discussion: One hundred and thirty six paired results were obtained and analyzed. Correlation between both methods was reasonable, but not perfect. (Correlation coefficient r = 0.7118 P <0.0001). This was confirmed by Bland-Altman analysis (figure 1), demonstrating broad limits of agreement: +4.2 and +0.6 mmol/L.

Conclusion(s): There is statistically significant correlation between both methods. Due to broad range of variability the Guardian RT monitoring system could not be considered equivalent to microdialysis interstitial glucose level monitoring.

Acknowledgements: The study was supported by MZO 00179906.

12APS-4
The total energy expenditure’s comparison between predicted using Harrison-Benedict’s equation and the measured using the Datex M-COVX metabolic monitor in hemodynamically stable, ventilated ICU patients
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Background and Goal of Study: Nutritional support according to accuracy determination of caloric needs is one of the most essential management aspect in critically ill adult patients. Routinely the daily energy expenditure calculated by using Harrison-Benedict’s equation might be inappropriate. Indirect calorimetry using Datex-Ohmeda metabolic monitor can enable to assess adequacy energy expenditure and use appropriate nutritional support. This clinical study was designed to determine the variation between the measured and calculated total energy expenditure (TEE) in hemodynamically stable, ventilated ICU patients.

Materials and Methods: Serial measurement of total energy expenditure (TEE), respiratory quotient (RQ), oxygen consumption (VO2) and carbon dioxide production (VCO2) were performed by indirect calorimetry using Datex-Ohmeda M-COVX metabolic monitor and resting energy expenditure (REE) predicted us-
Conclusion(s):
Routinely, standard total energy expenditure calculated according to the equation is appropriate to predict the energy in critically ill patients. Indirect calorimetry might be more useful to adequate determination of the energy and caloric requirements and allows to show remaining parameters as well as respiratory quotient (RQ), oxygen consumption (VO2) and carbon dioxide production (VCO2).

Acknowledgements: The Physician Assistant Cardiopulmonary Clinical Research Project.

References:

Intensive insulin therapy on polytrauma patients: A clinical audit
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Background and Goal of Study: Intensive insulin therapy (IIT), as a promising new method was started in 2005 at our Intensive Care Unit in the Trauma and Neurotrauma Intensive Center of University of Szeged. After an implementation period trauma patients with Injury Severity Score (ISS) ≤15 were included into this regime from 2006 onward, according to the original protocol. Recently a clinical audit was carried out to assess the results and to modify our tactics of application, if necessary. Results of this clinical audit are presented here.

Materials and Methods: An internal critical audit, a retrospective data analysis of polytrauma patients treated from January 2006 to December 2006 with IIT at our eight-bed tertiary Intensive Care Unit were carried out. Age, gender, predicted death rate on admission from Trauma Injury Severity Score (TRISS) calculation, length of stay (LOS) on the ICU, diabetes in the previous medical history, triggers blood sugar for the intensive insulin treatment, daily total insulin consumption in unit, calory and carbohydrate intake/day, frequency of blood sugar measurements/day, blood sugar on admission and on discharge, number of hypoglycaemic episodes (blood glucose (BG) less than 4.1 mmol/l), patient-nurse ratio and ICU mortality rate were recorded.

Results and Discussion: During study period altogether 54 patients with an ISS of 15 or more were admitted to our ICU, 29 male (M) and 25 female (F), respectively, 12 patients of them: 8 male and 6 female were - involved into the intensive insulin treatment group (22%). The mean age was 28.5 years for male (M) and 58.5 years for the female (F) patients. The mean ISS was 44 (M) vs.39.9 (F) and the mean TRISS was 52±14.7 (M) vs. 53.8±25.08. All 12 patients survived. The average LOS on the ICU was 16.6±5.6 (F) vs. 21.5±2.5 days. The nurse-patient ratio was 1:2, 1:3 respectively, and the BG was measured four hourly. The trigger BG level was found to be 8.5 mmol/l and mean daily insulin consumption proved to be 38.9±3.9 (M) vs. 45.6±13.95 (F) in the IT group. Hypoglycaemia was observed 22 times at 7 patients. The lowest recorded BG was 2.3 mmol/l. The daily calory intake was 1000 kcal/day on the day 7. The enteral route was used in 9 cases (75%). No diabetes mellitus was found in the PMH in this group.

Conclusion(s): The compliance rate to intensive insulin therapy proved too low on the unit than anticipated. Our clinical audit showed that the current trigger BG rate has to be reassessed for the future, in order to extend the safe use of this treatment.
Changes of liver proteome expression during sepsis indicate compromised energy production and altered metabolism

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Background and Goal of Study: Sepsis and septic shock have still a high mortality rate. The liver is one of the mostly affected organs during the course of a sepsis-induced multiple organ dysfunction syndrome (MODS). A recent study highlighted mitochondria as targets of injury during sepsis [1]. The aim of the present study was to explore sepsis-induced alterations of protein expression 12, 24, and 48 hours after sepsis induction in a common septic rat model.

Materials and Methods: After approval of the local committee for animal research, 62 male Wistar rats were investigated and assigned to a sham group (n=16) and three sepsis groups (cecal ligation and puncture model; n=46; surviving and analyzed at 12h: n=6 vs. 24h: n=9 vs. 48h: n=4). Liver was removed after decapitation and prepared for further analysis as previously described [2].

Results and Discussion: N=23 (17 male, 6 female) critically ill and ventilated patients (mean: 59.9±17.3 years, body mass index 28.0±6.3 kg·m⁻²) were investigated. Underlying diseases were: sepsis with multi-organ failure, multiple trauma, subarachnoid and intracerebral bleeding. A mean bias of ΔEE=−135.0±417.2 kcal, (range, -1,124 to +531; n=12) cal per 24 hours was calculated. Bland Altman analysis revealed that SW overestimates IC energy expenditure in the hypercaloric range (i.e. >2,400 kcal per 24 hours; ΔEE=−178.3±267.7 kcal; n=12) cal per 24 hours; ΔEE=1,791.3±393.5 kcal; P<0.0098).

Conclusion(s): Although the SenseWear armband is non-invasive, convenient and easy to handle, it may be inaccurate in critically ill and ventilated patients. The exact reason of inaccuracy remains unclear, hence further research in this field is required.

References:

12AP5-9

Tissue Doppler Imaging of the Heart in Critically Ill Patients

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Background and Goal of Study: Intravascular Doppler at the lateral mitral annulus and preload variation (preliminary results)

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Preload is a major factor in improving oxygen delivery. Since the introduction of the PAC a number of new cardiac output measurement devices have become available. The latest one in the FloTrac™/Vigileo system by Edwards Lifesciences. It continuously measures cardiac output by using a conventional arterial line and does not require external calibration. The aim of the study was to evaluate the accuracy of cardiac output measurements in the resuscitation period of patients suffering from severe sepsis and septic shock using the FloTrac™ compared to PAC derived cardiac output in the three different FloTrac™ software versions.

Materials and Methods: Twenty consecutive patients suffering from severe sepsis or septic shock who received a PAC to guide the resuscitation were connected to the FloTrac™. Patients had to be sedated, intubated and on mechanical ventilation. The aim of the present study was to evaluate accuracy (measurement bias) of the SenseWear measurement in critically ill and ventilated patients.

Materials and Methods: After approval of the local ethics committee and written informed consent, critically ill and ventilated patients were enrolled. During a 24 hours study period with the SW (standardized position at right upper arm), additionally an IC was performed. Measurement bias (ΔEE) was calculated as ΔEE=SW-IC. Daily energy expenditure of both techniques (IC vs. SW) was compared using regression analysis and the Bland Altman method [2]. T-Test was used for statistical analysis, P<0.05 was considered statistically significant.

Results and Discussion: N=23 (17 male, 6 female) critically ill and ventilated patients were included. Underlying diseases were: sepsis with multi-organ failure, multiple trauma, subarachnoid and intracerebral bleeding. A mean bias of ΔEE=−135.0±417.2 kcal, (range, -1,124 to +531; n=12) cal per 24 hours was calculated. Bland Altman analysis revealed that SW overestimates IC energy expenditure in the hypercaloric range (i.e. >2,400 kcal per 24 hours; ΔEE=−178.3±267.7 kcal; n=12) cal per 24 hours; ΔEE=1,791.3±393.5 kcal; P<0.0098).

Conclusion(s): Although the SenseWear armband is non-invasive, convenient and easy to handle, it may be inaccurate in critically ill and ventilated patients. The exact reason of inaccuracy remains unclear, hence further research in this field is required.

References:

12AP6-2

Comparing two methods of cardiac output measurement during severe sepsis and septic shock: pulmonary artery catheter (PAC) vs. FloTrac™ (three consecutive software versions)

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Background and Goal of Study: One of the goals in septic shock therapy is to optimize hemodynamic parameters to improve oxygen delivery to the tissues. Cardiac output is a major factor in improving oxygen delivery. Since the introduction of the PAC a number of new cardiac output measurement devices have become available. The latest one in the FloTrac™/Vigileo system by Edwards Lifesciences. It continuously measures cardiac output by using a conventional arterial line and does not require external calibration. The aim of the study was to evaluate the accuracy of cardiac output measurements in the resuscitation period of patients suffering from severe sepsis and septic shock using the FloTrac™ compared to PAC derived cardiac output in the three different FloTrac™ software versions.

Materials and Methods: Twenty consecutive patients suffering from severe sepsis or septic shock who received a PAC to guide the resuscitation were connected to the FloTrac™. Patients had to be sedated, intubated and on mechanical ventilation. The aim of the present study was to evaluate accuracy (measurement bias) of the SenseWear measurement in critically ill and ventilated patients.

Materials and Methods: After approval of the local ethics committee and written informed consent, critically ill and ventilated patients were enrolled. During a 24 hours study period with the SW (standardized position at right upper arm), additionally an IC was performed. Measurement bias (ΔEE) was calculated as ΔEE=SW-IC. Daily energy expenditure of both techniques (IC vs. SW) was compared using regression analysis and the Bland Altman method [2]. T-Test was used for statistical analysis, P<0.05 was considered statistically significant.

Results and Discussion: N=23 (17 male, 6 female) critically ill and ventilated patients were included. Underlying diseases were: sepsis with multi-organ failure, multiple trauma, subarachnoid and intracerebral bleeding. A mean bias of ΔEE=−135.0±417.2 kcal, (range, -1,124 to +531; n=12) cal per 24 hours was calculated. Bland Altman analysis revealed that SW overestimates IC energy expenditure in the hypercaloric range (i.e. >2,400 kcal per 24 hours; ΔEE=−178.3±267.7 kcal; n=12) cal per 24 hours; ΔEE=1,791.3±393.5 kcal; P<0.0098).

Conclusion(s): Although the SenseWear armband is non-invasive, convenient and easy to handle, it may be inaccurate in critically ill and ventilated patients. The exact reason of inaccuracy remains unclear, hence further research in this field is required.

References:
charnel ventilation, in sinus rhythm. Vasocative therapy should at least consist of dopamine > 15μg/kg/min or on any dose of noradrenaline. Data from FloTrac™ were evaluated and compared with intermittently cardiac output measurement of all three software versions.

Results and Discussion: 283 paired measurements were obtained in 13 patients using the first software version. Mean bias 1,8 L/min, precision 2,2 L/min, limits of agreement -2,5 - 6,2 L/min and % of error 60%. 84 paired measurements were obtained in 4 patients using the 1.07 software version: Mean bias 1,6 L/min, precision 1,6 L/min, limits of agreement -1,6 - 4,8 L/min and % of error 48%. 41 paired measurements were obtained in 3 patients using the latest version of the FloTrac™ software version. Mean bias 0,9 L/min, precision 1,0 L/min, limits of agreement -1,2 - 3 L/min with a % error 35%. Improvements between first and third software package (p < 0.01) and between second and third software package (p < 0.028) are significant improvements.

Conclusion(s): The accuracy of cardiac output measurements during the respiratory phase in mechanically ventilated patients regarding mechanical ventilation when the patient is unable to make by himself an inspiratory effort. The patients were given fluid loading with 250 mL, 500 mL of hydroxyethyl starch or 500 mL of saline 0,9% randomly. We measured the values of CI, CVP, SVV and GEDVI by the transpulmonary thermodilution technique (PICCO), before and after bolus in both groups. The change in haemodynamic parameters in relation to fluid loading was determined using paired t-test and the relation between IC and the rest of the parameters was tested using Pearson correlation.

Results and Discussion: After fluid loading SVV decreased, whereas CVP, GEDVI and IC increased in both groups. In the group with mechanical ventilation the relation between IC and the rest of the parameters was tested using Pearson correlation. In the group with no mechanical ventilation the relation between IC and the rest of the parameters was tested using Pearson correlation. In the group with no mechanical ventilation the relation between IC and the rest of the parameters was tested using Pearson correlation.

Conclusion(s): Changes of SVV and CVP could estimate changes of CI after fluid loading in mechanically ventilated patients, therefore may be a useful tool for management of fluids in these patients. In no ventilated patients, changes of GEDVI are moderately correlated to changes in CI (without achieving statistical significance), so it could be useful in this subgroup of patients.

References:
2. R. Navarro-Perez, A. Gomez, F. Ramasco, A. Ruiz, H. Garcia. Anaesthesiology, La Princesa Hospital, Madrid, Spain.
4. K. Singh, K. Krishnan, P. Dhillon, A. Mallick. Anaesthesia Department, Scunthorpe General Hospital, Scunthorpe, North Lincolnshire, United Kingdom.
5. C. Slagt has received lecture fees from Edwards Lifesciences in the past. C. Slagt is a lecturer of the Edwards Essense course: Educational course for Anaesthetists and has attended European advisory board meetings on hemodynamics of Edwards Lifesciences.

12AP6-3
Comparison of different preload parameters in the assessment of volume responsiveness in mechanically ventilated versus non mechanically ventilated patients
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Background and Goal of Study: A patient is considered to respond favourably to fluid administration when cardiac index increases after fluid administration. Our goal is to determine whether the increase in cardiac index (CI) obtained after volume administration relates to the increase obtained in stroke volume variation (SVV), global end-diastolic volume index (GEDVI) and pressure central venous (CVP) in mechanically ventilated and no ventilated patients.

Materials and Methods: This was a prospective clinical study in a university hospital with thirty-eight patients with septic shock and suspicion of hypovolemia. Twenty of whom were receiving controlled mechanical ventilation, considering mechanical ventilation when the patient is unable to make by himself an inspiratory effort. The patients were given fluid loading with 250 mL, 500 mL of hydroxyethyl starch or 500 mL of saline 0,9% randomly. We measured the values of CI, CVP, SVV and GEDVI by the transpulmonary thermodilution technique (PICCO), before and after bolus in both groups. The change in haemodynamic parameters in relation to fluid loading was determined using paired t-test and the relation between IC and the rest of the parameters was tested using Pearson correlation.

Results and Discussion: After fluid loading SVV decreased, whereas CVP, GEDVI and IC increased in both groups. In the group with mechanical ventilation the relation between IC and the rest of the parameters was tested using Pearson correlation. In the group with no mechanical ventilation the relation between IC and the rest of the parameters was tested using Pearson correlation. In the group with no mechanical ventilation the relation between IC and the rest of the parameters was tested using Pearson correlation.

Conclusion(s): Changes of SVV and CVP could estimate changes of CI after fluid loading in mechanically ventilated patients, therefore may be a useful tool for management of fluids in these patients. In no ventilated patients, changes of GEDVI are moderately correlated to changes in CI (without achieving statistical significance), so it could be useful in this subgroup of patients.

References:
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12AP6-4
Current trends in cardiac output monitoring in the UK intensive care units
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Background and Goal of Study: There are many techniques, invasive and less invasive, available to measure cardiac output (CO) in intensive care units.

Which CO monitor provides reliable haemodynamic informations during resuscitation of critically ill patients to guide fluid and inotrope/vasopressor therapy, is not known. The objective of this survey was to find out commonly used methods in the UK, to view any changes in practice and what the clinician thought about the impact of CO monitoring on the patient outcome.

Materials and Methods: Two hundred and twenty-six adult ICUs in the UK were surveyed by using postal questionnaire. The questions were aimed at finding out the common methods used for CO monitoring, any change in practice to less invasive techniques and impact of CO monitoring and ScvO2 saturation monitoring on outcome.

Results and Discussion: A total of 156 units of 226 (85%) replied the questions of interest. Amongst those who responded 96% used CO monitoring and 80% have access to more than one CO monitor. Majority of the consultants (77%) suggested that continuous measurements are superior and 61% feel that CO monitoring alters the patient outcome. Many units (90%) no longer use PA catheter. Most of the units (61%) have access to PA Catheter technique but only 20% of them are keen to continue the practice. A fifth of the units those not using PA catheter consider revisiting the technique. More than half (57%) of the units have already moved to less invasive methods and another quarter (25%) are planning to move. Oesophageal Doppler (55%) is the first choice of technique with LiDCO (28%) and PICCO (26%) being the second and third. Many (61%) have access to Trans-oesophageal (TOE) or trans-thoracic echo (TTE) while only 40% of the units are planning to get intensivists trained. Only in 6% of the units Intensivists perform TOE/TTE to guide fluid/inotrope therapy and in the remainder performed by either the cardiologists or cardiac technicians. Nearly half (47%) of the responders feel that ScvO2 monitoring may improve the patient outcome in critically ill patients.

Conclusion(s): Oesophageal Doppler remains as method of choice for CO monitoring by the majority of the units. The pulse contour methods including PICCO and LiDCO have shown increased use. PA catheter use has been reduced to a large extent. The results of this survey have shown an increasing trend of using bedside TOE or TTE for fluid/inotrope therapy. A number of clinicians are planning to undertake training for TOE or TTE.

12AP6-5
Systolic pressure variation and pulse pressure variation during modifications of arterial pressure
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Background and Goal of Study: Functional preload parameters, such as systolic pressure variation (SPV) and pulse pressure variation (PPV) are useful to assess volume responsiveness in critically ill patients. During hemodynamic instability, vasopressors are frequently used to stabilize the patient. This study was performed to investigate the effect of vasopressor therapy on systolic pressure variation (SPV) and pulse pressure variation (PPV) compared to experimentally measured left ventricular stroke volume variation (SVV).

Materials and Methods: In twelve anaesthetized and mechanically ventilated pigs, SPV and PPV were calculated and compared to SVV derived from blood flow measurements on the ascending aorta. The comparison was performed during baseline conditions, during increased mean arterial pressure (increase by 100%, continuous infusion of phenylephrine) and during decreased mean arterial pressure (decrease by 30%, continuous infusion of sodium nitroprusside). During baseline conditions and decreased afterload, correlation with SVV was good for both SPV (R=0.892 and R=0.859, respectively) and PPV (R=0.870 and R=0.871, respectively) (all p<0.001). Correlation with SVV was only moderate during increased arterial pressure (R=0.683 for SPV and R=0.732 for PPV, p<0.05).

Changes in SPV and PPV

<table>
<thead>
<tr>
<th>Increased arterial pressure</th>
<th>Baseline conditions</th>
<th>Decreased arterial pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean value (SD)</td>
<td>Correlation with SVV</td>
<td>Mean value (SD)</td>
</tr>
<tr>
<td>SPV</td>
<td>4.6 (1.9)</td>
<td>0.689</td>
</tr>
<tr>
<td>PPV</td>
<td>11.6 (8.7)</td>
<td>0.732</td>
</tr>
</tbody>
</table>

*venous increased arterial pressure, P<0.05.

Conclusion(s): For guiding fluid therapy in patients under vasopressor support, PPV seems superior to SPV. PPV was unaffected by changes in mean arterial pressure and has a good correlation with experimentally measured SVV.

References:

179
Intensive care medicine
The venous oxygen saturation is firmly established as an overall index of cardiac output [1] with lower values indicating low output states. Recently, interest has been renewed in the difference between venous and arterial CO2 partial pressures (CO2 gradient) as an alternative to CVP. Whether measurement of peripheral venous pressure (PVP) is a reliable alternative to CVP.

### Materials and Methods
A prospective observational study was performed on 19 adult patients undergoing elective major surgery with an expected recovery time greater than 24 hours. Patients with acute cardiovascular disease, on mechanical ventilation or taking vasodilatory drugs were excluded. Correct central catheter placement was confirmed by chest radiography, and the peripheral catheter (20–18 gauge) was placed in the antebrachial fossa. The catheters were flushed (2 minutes) and the transducers calibrated and zeroed to atmospheric pressure at right atrium level with the patient supine. A total of 159 mean CVP and PVP pressure values were recorded simultaneously. Statistical analysis was performed with Student’s t test, Pearson’s correlation and Bland-Altman analysis.

### Results and Discussion
Mean CVP was 5.3 mmHg (95% CI 1.9-8.7) and mean PVP was 3.6 mmHg (95% CI 4.7-12.6). The mean difference was 3.3 mmHg (SD ± 4.06). The Pearson correlation coefficient was 0.41 (p<0.01). The Bland-Altman analysis used to determine the accuracy of PVP in comparison to CVP yielded a bias of 8.3 mmHg (SD ± 23.9; 95% CI 38.7-55.2%).

### Conclusion(s)
Our data indicate that PVP and CVP values measure the same variable but at different points with a mean difference of 3.3 mmHg. PVP measurement may be a non-invasive alternative that allows estimation of CVP to avoid the risk of central venous catheter-related complications, although PVP overestimates CVP between 40-50%.

### References
of the studied variables were frequently omitted by the anesthesiologist and
Conclusion(s):
Results and Discussion: A MEWS score of 5 or above at admission was associated with an increased risk of ICU death, odds ratio (OR) 3.4 (95% CI 1.3-8.8). MEWSin and MEWSmax were also independent predictors of 90 days mortality (OR 3.0 95% CI 1.5-9.0 and OR 2.3 95% CI 1.1-5.0 respectively). A comparison between the four scoring systems was made, using ROC curves. The Area Under the Curve (AUC) for the predictive value of ICU mortality was 0.67 (CI 0.58-0.76) for MEWSin and 0.71 (CI 0.63-0.79) for MEWSmax. The corresponding values for APACHE II were 0.81 (CI 0.76-0.87) and SAPS II were 0.78 (CI 0.70-0.85).
Conclusion(s): This study shows that MEWS predicts outcome in critically ill patients and can be used as a risk tool in the ICU. MEWS is based on physiological variables only and has a range from 0-15. Therefore it should not be seen as an alternative to the more advanced and established risk scores APACHE II and SAPS II, but as a complement for rapid clinical assessment. This study was limited by its small size and a larger prospective study would be required to confirm our findings.

12AP7-3
Degree of completeness of admitting instructions in a postoperative intensive care unit
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Background and Goal of Study: Treatment omission in intensive care units (ICU) is a major reason for malpractice suits and has a direct influence on quality of care. The aim of our study was to assess the degree of completeness of care instructions by the anesthesiologist at patient admission to our postoperative ICU.

Materials and Methods: This prospective, blinded, observational study included all patients who stayed at least one night in our unit over a period of 7 months (June-December 2007). The level of instruction completeness was assessed in terms of the following variables: name of anesthesiologist, time of admission, frequency of hemodynamic monitoring, visual analogical scale (VAS) score in awake patients, sedation-agitation-scale (SAS) score in intubated patients, head position, oxygen/ventilation, fluid therapy, nutrition, stress ulcer prophylaxis, thrombosis prophylaxis, antibiotic therapy, analgesia and glucose monitoring. All data were analyzed by the same investigator and are presented as percentage of completeness.

Results and Discussion: Three hundred and six patients were included. The levels of completeness for each variable were as follows: fluid therapy (86.7%), hemodynamic monitoring frequency (97.4%), stress ulcer prophylaxis (94.7%), analgesia (94.1%), antibiotic therapy (88.9%), oxygen/ventilation (86.6%), name of anesthesiologist (85.5%), oxygen/ventilation (82.0%), thrombosis prophylaxis (79.7%), head position (73.5%), nutrition (59.6%), time of admission (41.8%), VAS score (99%) and SAS score (99%). Intubated patients: 73. Levels of completeness lower than 75% were considered to be insufficient.

Conclusion(s): In the daily admitting instructions in our postoperative ICU, five of the studied variables were frequently omitted by the anesthesiologist and these deficient levels of completeness should be improved. This is a preliminary study leading to the construction of a mnemonic device or checklist for preventing treatment omissions, encourage teamwork and improve the quality of critical care.


12AP7-5
The prognostic value of point-of-care testing during medical emergency team calls: A preliminary report
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Background and Goal of Study: Rapid and accurate prognostic evaluation of patients receiving Medical Emergency Team (MET) may assist in their management. A point-of-care (POC) diagnostic panel may have prognostic value.

Objectives: To evaluate the prognostic value of a multimarker POC diagnostic panel (Biostrat Triage Profiler® SBD) for myocardial ischemia, pulmonary embolism and pulmonary oedema, capable of measuring B-type Natriuretic Peptide (BNP), cardiac Troponin-I (cTn-I), D-dimer, CK-MB and Myoglobin.

Materials and Methods: Prospective data collection during daytime MET calls. Analysis of sensitivity, specificity, positive and negative predictive value for in hospital mortality.

Results and Discussion: We evaluated 100 episodes from 96 patients (mean age 70.5±15 years; range 23-96). Of these patients, 36% were surgical, 41% had a history of cardiac dysfunction and 70% had renal impairment (following the RIFLE criteria) and 44% were dyspnoeic. Main MET call triggers were tachycardia (14%), hypotension (20%), respiratory distress (36%) and a decrease in conscious state (25%). The diagnostic panel was positive for at least one marker in 50% of episodes. There were 34 deaths. The cardiac panel had limited specificity and specificity for the prediction of in hospital mortality. However, BNP levels had a sensitivity of 85.7% for mortality but a low specificity (35%). Stress ulcer prophylaxis (96.7%), D-dimer levels had a sensitivity of 94% and a specificity of 21.5%. In keeping with these observations, BNP had a negative predictive value for mortality of 0.82 and D-dimer of 0.87. Furthermore, the only two patients who died despite a negative D-dimer had an elevated positive BNP value (490 and 157 pg/ml respectively). Accordingly, none of the patients who died had both a normal BNP and D-dimer level (negative predictive value of 100%).

Conclusion(s): A multimarker POC diagnostic panel has prognostic value in patients receiving a MET call. In particular, in a cohort from our hospital, the absence of an elevated D-dimer and of an elevated BNP level predicted survival with 100% accuracy.

12AP7-6
PAR scores do not predict readmission to a mixed intensive care unit of a district general hospital – A retrospective audit
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Background and Goal of Study: Previous studies have used different severity of illness scores to analyse patients readmitted to intensive care units (ICU) including the Simplified Acute Physiology Score II (SAPS II) and the Logistic Organ Dysfunction system (LOD). The Modified Patient at Risk (PAR) score is easy to perform and is used by general ward nursing staff to assess patients. It provides a reproducible measure of how ‘at risk’ the patient is and permits early identification of deteriorating patients. This study aimed to evaluate the PAR score in predicting the likelihood of patients being readmitted to a mixed ICU of a district general hospital.

Materials and Methods: A retrospective audit of all unexpected readmissions over a 6 month period to the ICU was conducted. 18 patients were identified. 10 patients were included in the study as they had documented PAR scores prior to first ICU admission, prior to discharge from first ICU admission and prior to first ICU readmission.

Results and Discussion: Patients readmitted to ICU ranged from 20 - 80 years of age. 9 out of 10 patients were over the age of 60. 6 out of 10 patients were male. 7 out of 10 patients were discharged outside of normal working hours (Mon - Fri 9-1800). Par scores prior to first ICU admission, prior to first ICU discharge and prior to first ICU readmission ranged from 0 - 7, from 0 - 3 and from 1 - 10 with mean values of 2.8, 0.5 and 5.4 respectively. Wilcoxon rank sum tests were performed on the data. There was no statistically significant difference between ICU admission and first readmission PAR scores (p=0.1074). There was a statistically significant difference between PAR scores prior to discharge and prior to first readmission (p<0.01). Mean ICU Length of Stay (LOS) of all the patients to the ICU was 5.6 days. In our audit population, mean LOS following first admission and following first readmission was 6.1 and 9.4 days respectively. There was no significant difference between LOS following first admission and LOS following first readmission (p=0.0036). Respiratory complications were the commonest precipitating cause of readmission (50%), in keeping with the findings of other studies.

Conclusion(s): PAR scores on discharge from ICU do not predict readmission to the ICU. Being male and elderly and being discharged outside of normal working hours are good independent predictors of readmission. We propose the use of increased monitoring of respiratory function on general wards post ICU discharge to prevent respiratory deterioration and reduce readmission rates to the ICU.

12AP7-7
Outcome after aorto-bifemoral bypass surgery
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Background and Goal of Study: Aorto-bifemoral bypass (ABF) is commonly performed to treat aorto iliac occlusive or aneurysmatic disease and durable long-term outcome is achieved. Few studies examined the dependency of pa-
Results and Discussion:
After applying exclusion criteria, a total of 1780 cardiac surgeries were eligible for this 12-month follow-up study. Patients were contacted 6 months after discharge to complete the Short Form-36 questionnaires (SF-36) and to have their dependency in Activities of Daily Living (ADL) evaluated. Assessment of the relationship between each variable with outcome dependent variables was made by univariate analysis through simple logistic regression with odds ratio (OR) and 95% confidence interval (95% CI).

Results and Discussion: At 6 months patients had worse scores in all SF-36 domains but bodily pain, when compared to respective urban population. Sixty-nine percent reported that their general level of health was better on the day they answered the questionnaire. The Lawton Instrumental ADL Scale and the Katz Index of ADL demonstrated higher dependency (6.5±1.8 versus 4.9±2.1 and 1.0±0.4 versus 0.7±1.4, p<0.001 and p=0.006). Sixty-nine percent percent and 29% were dependent in at least one activity in instrumental and personal ADL, independent risk factors for mortality were emergency surgery (OR 13.5, 95%CI 2.7-67.0, p=0.001), age (OR 1.03, 95% CI 1.0-3.10, p=0.013), ischemic heart disease (OR 9.5, 95%CI 1.1-80.7, p=0.039), congestive heart failure (OR 11.1, 95%CI 2.9-52.7, p=0.002), total RCRI (OR 4.2, 95%CI 1.8-10.0, p=0.001), SAPS (OR 1.08, 95%CI 1.02-1.14, p=0.013), longer PACU length of stay (OR 7.8, 95%CI 1.6-32.2, p=0.01). Determinants for staying longer in the PACU were emergency surgery (OR 5.2, 95%CI 1.37-21.1, p=0.002) and congestive heart disease (OR 4.4, 95% CI 1.5-14.7, p=0.017). Six months after PACU discharge only age (OR 1.02, 95% CI 1.2-2.0, p=0.019) was a determinant for dependency on at least one ADL task.

Conclusion(s): Patients undergoing AFB perceive improved quality of life although they are more dependent in ADL tasks and have worse scores in all SF-36 domains compared with the population they belong. Age, comorbidities and emergency surgery appears to predicts of mortality, longer stay in the PACU or dependency in ADL.

12AP7-9
Early post-operative delirium: Are surgery and anesthesia themselves independent risk factors?
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Background and Goal of Study: Aims of the study are to assess the incidence of early post-operative delirium in patients without predisposing factors and the eventual role played by subjects’ age and gender, the kind of surgery they underwent and the anaesthetic treatment they received in increasing their risk.

Materials and Methods: Following ethics committee approval, an epidemiologic, prospective study was conducted on a consecutive cohort of patients admitted within 24 hours after major surgery to our ICU. Exclusion criteria were known predisposing factors for delirium, according to literature. Patients have been assessed daily, using the CAM-ICU, for 72 hours after surgery or until discharge or death. Data are given as means ± standard deviation and relative risk (RR); comparisons between groups of values were performed by unpaired Student’s t-test for numeric variables and by χ²-test for univariates variables; a p value <0.05 (95% confidence interval) was considered statistically significant.

Results and Discussion: 100 patients were examined, 52 of which were recruited (mean age 64±11.4 years). Incidence of post-operative delirium during the first 3 days was 28%; 86% of cases occurred in the first 24 hours; 67% of patients with delirium manifested the hypoactive form. Risk in patients >64 years old was not significantly different from younger subjects (RR=1.273, χ²=0.284, p>0.05); gender was not a risk factor (RR=1.406, χ²=0.466, 0.5<p<0.10). Cardiac surgery was not associated to an increased risk compared to other surgeries (RR=1.413, χ²=1.887, 0.5<p<0.10). Concerning the induction agent, thiopental was associated to an eight-fold higher risk compared to propofol (RR=8.0, χ²=2.456, 0.05<p<0.02); this increase was not dose-related (p=0.463). Neither the use of muscle relaxants nor the drug administered (pamcuronium vs rocuronium) seem to determine a risk difference (χ²=2.33, 0.5<p<0.10), as well as the doses of midazolam (p=0.467) and fentanyl (p=0.484) and the halogenated compound used (isoflurane vs sevoflurane, χ²=3.201, 0.10<p<0.05).

Conclusion(s): Early post-operative delirium occurs in more than 1 patient out of 4 without predisposing factors. The incidence peak is in the first 24 hours and the most common form is the hypoactive one. Age and gender do not seem to play a role in the development of this dysfunction. Cardiac surgery itself does not represent a risk factor. With regard to anesthesia, the only factor statistically associated to a strong increase in the RR is the use of thiopental, regardless of its dose.

12AP7-10
POSSUM and Portsmouth-POSSUM scoring system for predicting mortality
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Background and Goal of Study: Physiologic and operative severity score for the enumeration of mortality and morbidity (POSSUM) and Portsmouth-POSSUM (P-POSSUM) are two related scoring systems used to predict post-operative mortality [1,2]. The aim of the study was to evaluate the accuracy of the POSSUM and P-POSSUM for mortality prediction in patients undergoing surgery.

Materials and Methods: Data from patients admitted in the Postoperative Care Unit (March 2006-August 2007) were collected prospectively. Predicted mortality was calculated using both POSSUM and P-POSSUM scoring systems. In-hospital mortality was also recorded. The relationship between observed and predicted mortality rates was analyzed in overall population and into subgroups of elective and emergency surgery. Statistical analysis was per-
formed with $x^2$-test, Bivariate Logistic Regression and Hosmer-Lemeshow Test of goodness of fit.

**Results and Discussion:** From 666 patients, 518 underwent elective surgery and 148 emergency surgery. Among overall, POSSUM and P-POSSUM showed a statistically significant relationship with the observed mortality ($p<0.001$). However, both scoring systems are prone to over-predict mortality in high-risk groups. A), P-POSSUM predicted mortality more accurately than POSSUM.

**References:**

**12AP7-11**

The importance of urinary excretion of cortisol and insulin-like growth factor I (IGF–I) in determining the severity of sepsis

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**Background and Goal of Study:** The severity of sepsis is correlated with functioning of adrenal gland, so the exact measurement of the total daily cortisol is essential in the follow-up of the patients with sepsis. We investigated the importance of urinary cortisol excretion in patients with sepsis as a prognostic marker of severity of sepsis. Insulin-like growth factor I (IGF–I), as a marker of hepatic function, was also measured.

**Materials and Methods:** The prospective randomised study involves 30 patients with sepsis who are separated into two groups. Group I (n=18 average age 65), Group II (n= 12 average age 43). Diagnosis and follow up of sepsis were performed using standard clinical and biochemical parameters. Urine was collected daily for 24 hour for measurement of all day excretion of cortisol (mmol/24h) and IGF–I (mmol/l) using method of radio immuno assay (RIA). Measurements were made 24h after diagnosis of sepsis (T1) and 48h after initiation of therapy (T2).

**Results and Discussion:** Group I consists of 17 patients with postoperative sepsis and 1 patient who has undergone surgery. The carrier of sepsis in this group was periurinal puerperal (15/18), Fistula bronchopneumonitis (1/18), Peritonitis bilharia (1/18), Ventilator asuad pneumonitis (1/18). In the 2nd group postoperative sepsis was diagnosed with 9/12, bronchopneumonia with 2/12, urorospsis with 1/12 patients. Bacteriological confirmation of sepsis was obtained in 10/18 in the Group I and in 10/12 patients in the Group II. The significant decrease in IGF–I concentration in serum and its increase in urine were found in both groups of patients with sepsis, $p<0.05$. Urinary excretion of cortisol in group I was higher $3933\pm159,6$ than in group II $1794\pm6,60$ and the mean number of comorbidities was $2.13\pm1.35$. 38.3% presented some kind of malignance. Statistical significance was found between social functioning scores APACHE II and the number of comorbidities.

**Conclusion(s):** a) POSSUM and P-POSSUM scoring systems predicted mortality in postoperative patients. b) Both scores over-predicted mortality in high-risk groups. c) P-POSSUM predicted mortality more accurately than POSSUM.

**References:**

**12AP8-2**

Epidemiology of the severe trauma patient. A prospective assessment of clinical management

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**Background and Goal of Study:** Trauma injuries are the first cause of mortality in population younger than 40 years. Worldwide they cause more than 5 million deaths each year and most of them occur in the prehospital setting. Our endpoint was to describe and analyze the characteristics of patients with trauma injuries that required admission to the trauma intensive care unit of our hospital.

**Materials and Methods:** Epidemiologic retrospective study based on 250 patients who met the study criteria admitted to the trauma intensive care unit during a one-year period (2005). Data collected included patient demographics, admitting diagnostic category, premorbid conditions, admission ISS, primary or secondary attendance, initial GCS, ventilator days, ICU length of stay, need for surgery, transfusion or drugs in the first 48 hours and mortality.

**Results and Discussion:** 76.5% were men with mean age of 40 years. 56% were attended in the first instance in our hospital and 32% had to have an operation in the first 48 hours (69% in our hospital). Mean admission ISS was 18.52. Most of our patients presented blunt trauma and the two main causes of injury were motor vehicle crashes (43%) and falls (25%). 60.6% required mechanical ventilation with a mean length of 7.2 days. Central nervous system injuries were the most frequent admitting diagnostic (44%) and initial GCS = 8 was the first cause of death in the ICU (55%). 32.4% required administration of vasopressive drugs and 31.8% received blood transfusion in the first 48 hours after injury. There was a significant correlation between the mortality rate, GCS and ISS. The media of initial GCS in the exitus group was 6.9 versus 12 in the non exitus group ($p<0.001$) and admission ISS 35 in the exitus group versus 15 in the non exitus group ($p<0.001$). The mean length of stay in the ICU was 12 days and mortality rate 11.15%.

**Conclusion(s):** Patients that survived septic shock and severe sepsis had good adaptation to their normal social life. Previous state of health and severity of the sepsis correlates well with social adaptation after discharge from the Unit.

**References:**

**Figure 1. Relation by number of comorbidities.**
12AP8-3

Hypothesis and the postoperative intensive care patient – An audit of 5051 patients

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Background and Goal of Study: To determine the overall incidence of postoperative hypothermia in patients admitted to the intensive care unit (ICU) in the immediate postoperative period and to assess whether perioperative hypothermia is associated with adverse outcomes. We tested the hypothesis that many postoperative patients admitted to the ICU are hypothermic in the first 24 hours and that this may correlate with negative outcomes.

Materials and Methods: We undertook an observational study of postoperative temperatures in patients from the operating suite during the first 24 hours of admission to the ICU measured via either a pulmonary artery catheter thermistor or tympanic infrared thermometer. We defined hypothermia as core temperature below 36 degrees Celsius. We compared the temperatures and incidence of hypothermia patients after cardiac and non-cardiac surgery. We performed tests of significance for continuous measures and X2 tests for categorical data. We used and withdrawal (WD) decisions, and also registering cause of death, and the reason number of deaths in which an EOLD was taken, differentiating withholding (WH) and withdrawal (WD) decisions. We undertook a retrospective study of postoperative patients admitted to our ICU and may be associated with harm as indicated by indirect measures. We suggest careful attention to intra-operative maintenance of normothermia and that staff in ICU should actively re-warm hypothermic postoperative patients and have sufficient equipment to do so.

Results and Discussion: 35% of 5051 postoperative patients fulfilled our criteria for postoperative hypothermia. There was no significant difference in the proportion of patients who were hypothermic after cardiac versus non cardiac surgery. In all the patients there was significant difference between the two groups (hi and low temperature) in glucose levels and mortality (p<0.001). In the subgroup cardiac surgery patients the two groups were different in glucose levels (p<0.05), hemoglobin and bicarbonate. Pre-specified outcomes were mortality at hospital discharge and hospital/ICU length of stay.

Main reasons for EOLD were therapeutic failure (39%), illness irreversibility (25%) and poor expected quality of life (12%). Factors significantly and independently associated to a EOLD making (OR; CI 95%) were: age (1.07; 1.03-1.12); and previous renal disease (6.06; 1.17-31.44).

Conclusion(s): EOLD are used in most patients dying in our POCU. Age and renal disease were the only factors related to these decisions. Mixed decisions (WH + WD) were the most frequently used. The main reason for EOLD was therapeutic failure. Multorganic failure was the main cause of death in patients under EOLD.

References:

12AP8-4

End of life decisions in a postoperative intensive care unit

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Anesthesiology and Perioperative Medicine, Hospital Juan Canalejo, A Coruña, Spain

Background and Goal of Study: Most of the deaths occurring in intensive care units are related to end of life decisions (EOLD). However this situation in postoperative care units (POCU) is not properly studied. The aim of this study was to evaluate the use of EOLD in a POCU.

Materials and Methods: All consecutive adult patients admitted to our POCU who died between May 2006 and October 2007 were retrospectively studied. We registered age, gender, ASA physical status and comorbidities. We analyzed the number of deaths in which an EOLD was taken, differentiating withholding (WH) and withdrawal (WD) decisions, and also registering cause of death, and the reason number of deaths in which an EOLD was taken. Descriptive data are shown in table 1.

Table 1. Descriptive data

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>no EOLD (28)</th>
<th>EOLD (99)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>59 (54-70)</td>
<td>75 (67-80)*</td>
</tr>
<tr>
<td>Gender (Male)</td>
<td>78%</td>
<td>78%</td>
</tr>
<tr>
<td>ASA</td>
<td>3 (3-4)</td>
<td>4 (3-4)</td>
</tr>
<tr>
<td>Comorbidities (p)</td>
<td>2 (1-3)</td>
<td>3 (2-4)*</td>
</tr>
<tr>
<td>Length of stay (d)</td>
<td>5.5 (1-19)</td>
<td>6 (2-19)</td>
</tr>
<tr>
<td>Time to EOLD (d)</td>
<td>0</td>
<td>5 (1-19)</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td>35%</td>
<td>70%*</td>
</tr>
<tr>
<td>Cardiac comorbidities</td>
<td>35%</td>
<td>65%*</td>
</tr>
<tr>
<td>Pulmonary comorbidities</td>
<td>71%</td>
<td>37%*</td>
</tr>
<tr>
<td>Renal comorbidities</td>
<td>7%</td>
<td>30%*</td>
</tr>
</tbody>
</table>

Values as median (IQR) or percentages. *p<0.05.

Causes of death are described in table 2.

Table 2. Causes of death

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>no EOLD (28)</th>
<th>EOLD (99)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurological</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Cardiac</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Haemorrhagic</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Multiple organ failure</td>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>11</td>
</tr>
</tbody>
</table>

Reference:

12AP8-5

Safety walk around in intensive care unit: A survey by the Italian Society of Anaesthesia and Intensive Care (SIAARTI)

F. Petrini, E. Acriano, C. Delia, S. Milesi, A. Levati
Anestesia e Rianimazione, P.O. ClinicaZo SS. Anunnziata, Chieti, Italy

Background and Goal of Study: In the last years patient safety is an important objective of health care system in Intensive Care Unit (ICU). Too. Recently, Safety Walk Around (SWA), a structured interview according to Joint Commission proposal (1), was introduced as a tool to increase awareness of safety culture by all healthcare providers, to make safety a priority for the leadership, to educate staff to no blame culture and to obtain informations and suggestions about safety from the staff.

Materials and Methods: In 2007 we performed a SWA in 4 General ICU in four Italian regions. Before interviews the aims and methods of the study were shown and explained to ICU healthcare providers. Interviews were scheduled in advance and usually performed at the end of daily duty, individually or in small groups, according to staff choice. All questions were the same for everyone. On the basis of argument five group of questions were defined: error (a), prevention of error (b), communication teamwork and leadership (c), error discussion (d) and relationship with patient/family (e). Interviews were performed by a group of the hospital (a component of Study Group, the Risk Manager, a physician and a nurse of the ICU).

Results and Discussion: In the 4 ICUs were 36 beds. 27/36 physicians and 69/84 nurses were interviewed. The interviews (individual in 10%) lasted between 30 and 150 min. Group a: 37% of interviewed persons were not able to care their patient as safely as possible in the last week and 32% intercepted an error potentially severe. Group b: almost all agree that there is something to do to prevent the next adverse event (AE) and 93% developed a personal practice to prevent making errors. Group c: the unit’s ability to work as a team was sufficient only for the 32%. Group d: 78% discussed with staff about errors and near misses and 77% were concerned about personal consequences when make or report an error. Group e: 55% discussed patient safety issues with patients/family and 43% of patients/family were concerned about safety problems.

Conclusion(s): In our study, non technical skills (communication and teamwork) were evaluated as the most critical items. SWA may be an useful and not expensive tool to detect latent failures and actions to prevent AE. Front line staff are very perceptive to SWA and eager to provide items for the discussion. SWA might be an integral part of the quality and safety patient management.

References:

12AP8-6

Financing ICU care: Correlations of different variables with the total costs

G. Schuepeler, S. Hunziker, A. Konovalczuk
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Background and Goal of Study: Hospital financing systems are changing from a cost reimbursement to a pricing system such as diagnostic related groups (DRG’s). It is therefore important to identify relevant cost drivers.

Materials and Methods: The following variables were assessed: Length of stay (LOS) in hospital, LOS in the ICU, age, gender, SAPSII-score, DRG cate-
therapeutic hypothermia in group of comatose patients after cardiac arrest. The
Materials and Methods: implemented in Polish intensive care units (ICUs).
the guidelines 2005 recommendations regarding therapeutic hypothermia are
Results and Discussion: 926 consecutive surgical ICU patients were included in
this study. Data of 900 patients were categorised grouped using an AP-DRG
grouper software (Fa. 3M) (drop out rate of 2.6%). 65.9% were male, and 43.1%
fee patients. Average cost per ICU day were 3117,- CHF and the case mix
was 4.11, reflecting resource intensive patients with high costs. For de-
scriptive statistics of the variables see table. Only the nursing manpower usage
score (NMUS) correlated statistically significant with the total ICU cost and the
total hospital cost ($r <0.98, p<0.05$), but not the SAPS II score, age, LOS ICU
or the cost weight (CW) of the applied DRG grouper (see figures).

Different variables (n=900)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>± standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>60.6 (64)</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>SAPSII Score</td>
<td>27.5 (25)</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>NMUS (minutes)</td>
<td>3636 (1569)</td>
<td>6313</td>
<td></td>
</tr>
<tr>
<td>LOS ICU (days)</td>
<td>3.1 (1)</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>LOS Hospital (days)</td>
<td>18.9 (14)</td>
<td>18.7</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion(s): A strong correlation of cost with the NMUS was found, but the
cost wight of the DRG did not reflect ICU cost in this cohort suggesting that DRG
grouping is not a realistic pricing system for surgical ICU patients. In this study
the TSS score was not available. It is important for hospital reimbursement
systems such as DRG’s to build in adequately cost representing variables. The in
Switzerland used NMUS (see reference) has to potential to reflect on a realistic
cost base ICU cost.

References:

12AP8-7
Therapeutic hypothermia after cardiac arrest – Do we follow the
guidelines? The Polish experience

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Chair and Department of Anaesthesiology and Intensive Care Medicine,
Jagiellonian University Medical College, Cracow, Poland

Background and Goal of Study: The aim of the study was to assess how
the guidelines 2005 recommendations regarding therapeutic hypothermia are implemented in Polish intensive care units (ICUs).

Materials and Methods: A telephone survey was carried out on the use of mild
therapeutic hypothermia in group of comatose patients after cardiac arrest. The following questions have been asked during the survey: Do you use hypothermia after cardiac arrest? How many patients have been cooled? What kind of the method of cooling do you apply? What is the target temperature? How long do you keep the patient in hypothermia? Do you apply hypothermia to every patient after cardiac arrest or concerning the cardiac arrest mechanism VF/VT, non-VF/VT? Do you start the hypothermia management before admission to hospital/ICU?

Results and Discussion: From all 290 ICUs in Poland 237 (82%) gave the feedback. Only 18 (7.6%) of them are using hypothermia after cardiac arrest. The majority of these ICUs have cooled fewer than 10 patients. Regarding the methods used to induce and maintain hypothermia 11 ICUs do this procedure without any equipment (cold fluids, ice), 2 ICUs use additionally cold air blankets, 3 ICUs use cold gel cover of the patient’s head only and 2 ICUs use special devices designed for hypothermia management. 9 ICUs apply hypothermia for 24 hours however the longest cooling time was 72h. The target temperature within 32-34°C was achieved only in 8 ICUs. 15 ICUs cool the patients after cardiac arrest regardless the rhythm. No ICU is involved in prehospital cooling.

Conclusion(s): There is still big discrepancy between the published evidence and recommendations for therapeutic hypothermia after cardiac arrest and clinical practice in Polish ICUs. The potential barriers need to be identified and overcome in order to provide the best currently available way of managing the comatose patients after cardiac arrest.

References:
2 Induced hypothermia is underused after resuscitation from cardiac arrest: a current prac-
3 Therapeutic hypothermia utilization among physicians after resuscitation from cardiac ar-
4 Therapeutic hypothermia after cardiac arrest: a survey of practice in intensive care units in
5 Implementing the ILCOR guidelines on hypothermia after cardiac arrest. The German ex-

12AP8-8
Effect of music intervention on patients after cardiac surgery

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Department of Anaesthesiology, University of Luebeck, Luebeck, Germany

Background and Goal of Study: Positive effects of music on the state of mind as well as on anxiety, pain and physiological measures were described for the postoperative setting on the ICU [1]. Aim of this study was to examine the influence of a music intervention in the early postoperative period on patients undergoing open heart surgery.

Materials and Methods: We examined 126 patients undergoing open cardiac surgery, randomly assigned to one of five groups: 1) Music intervention transmitted by a closed headphone for 60 minutes immediately after arrival on the ICU, 2) Like (1) but only headphone without music, 3) Music intervention transmitted by a closed headphone for 60 minutes immediately after discontinuation of sedation, 4) Like (3) but only headphone without music 5) Control without head-
phone or music. Music intervention was provided by a conventional CD player. For the self assessment of postoperative complaints and patient satisfaction we used the Anaesthesiological Questionnaire (ANP) [2]. Furthermore blood pressure, heart rate and infused catecholamines, peripheral saturation and consumption on opioid analgetics were recorded.

Results and Discussion: We found no difference between the five groups. In the analysis of variance for the factor “music” there was a significant increase in pain in the operated area, thirst, nausea and remembrance of the postoperative period in the ANP (p<0.05 respectively). For the factor “early versus late” intervention we found a significant improvement of pain in the operated area, discomfort and satisfaction with the perioperative course (p<0.05 respectively). There was neither a combined effect of both factors nor differences between further recorded data.

Conclusion(s): Music intervention seems to pronounce typical perioperative complaints in this setting. This might be explained by a intensified awareness of the situation on the ICU. The difference between early and late intervention may indicate the importance of a sufficient noise protection even during continuous sedation of the patient.

References:
2 Huppi M, Zilhauer M, Alms A, Bremach D, Dietrich W, Luth JU, et al. The Anaesthesiologi-
cal Questionnaire for patients in cardiac anesthesiology. Results of a multicenter survey by the scientific working group for cardiac anesthesia of the German Society for Anaesthesiology and Intensive Care Medicine. Anaesthesist 2005; 54(7): 655-66.

12AP8-9
The key points of the communication with brain-death donors’ relatives in Hungary

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Department of Transplantation and Surgery, Semmelweis University,
Budapest, Hungary

Background and Goal of Study: Long-term traumatic memories of brain-
death donors’ relatives were influenced by the perceived quality of interaction with professionals on intensive care unit. How could the communication in intensive care unit influence the depressive symptoms and especially the grief reaction after donation?

Materials and Methods: The communication in intensiv care unit was studied according to knowledge, opinions regarding solid organ donation and late psychologic consequences of organ retrieval. Every relative who agreed to organ
Results and Discussion: 27.5% of patients underwent AFB surgery, admitted to the Post Anesthesia Care Unit (PACU) between Mars 2006 and Mars 2007. The following patient characteristics were recorded: age, gender, body mass index, ASA physical status, duration and type of anesthesia, temperature at admission, intravenous fluid administration during surgery, length of stay (LOS) in Post Anesthesia Care Unit (PACU) and in the hospital, co-morbidities and the Revised Cardiac Risk Index (RCRI), Simplified Acute Physiology Score II (SAPS II) and troponin I at admission. The clinical predictors of cardiac complications included in the RCRI were recorded as well as the occurrence of major cardiac complications (MCC) namely: acute myocardial infarction (AMI), pulmonary edema (PE), ventricular fibrillation (VF) or primary cardiac arrest (CPA). Assessment of the relationship between each variable and the occurrence of a major cardiac event was made by univariate analysis performed by simple logistic regression with an odds ratio (OR) and its 95% confidence interval (95%CI). For outcome evaluation patients with MCE were compared with those without MCE for PACU LOS and mortality at 6 months follow-up.

Results and Discussion: We recorded 9 MCC (13.2%): 5 AMI (7.4%), 1 VF (1.5%) with CPA in one patient and 3 episodes of PE (4.4%). Significant risk factors for the occurrence of MCE were cerebralvascular disease (OR 8.40, 95%CI 1.45-48.60, p<0.017), score of RCRI (OR 2.02, 95%CI 1.01-1.12, p<0.029) and SAPS score (OR 1.064, 95%CI 1.01-1.12, p<0.029). Patients with MCC stayed longer in PACU (5.45±3.67 against 2.58±2.41 days) (OR 1.30, 95%CI 1.04-1.63, p<0.023) and had higher mortality rates at 6 months follow-up (38% against 10%) (OR 5.40, 95%CI 1.03-28.44, p=0.047).

Conclusion(s): The RCRI score, one RCRI item individually and severity of illness appears to be determinants of the occurrence of postoperative MCC. These patients stayed longer and had higher mortality rates at 6 months follow-up.


186 Resuscitation and emergency medicine

13AP1-1 Hypertonic-hyperoncotic solution improves microcirculation in brain after hypovolemic cardiac arrest E. Semenas, L. Wiklund Department of Surgical Sciences/Anaesthesiology and Intensive Care Medicine, Uppsala University Hospital, Uppsala, Sweden

Background and Goal of Study: Resuscitation from hemorrhagic shock and subsequent cardiac arrest (CA) is a major clinical challenge in the care of trauma patients [1]. Hypertonic saline dextan solution (HSD) has been used during CPR not only as a resuscitative fluid, but also as an anti-inflammatory agent. The aim of this study was to evaluate survival and possible organprotective effects of HSD in hypovolemic CA and subsequent cardiopulmonary resuscitation.

Materials and Methods: An experimental porcine model of hypovolemic (exsanguination of 27.5 ± 5.4% of calculated total blood volume to a mean arterial blood pressure of 35 mm Hg during 15.3 ± 3.4 min) cardiac arrest (2 min CA and 8 min open chest CPR) was employed. At 3 min of CA 26 anesthetized pigs (26.0 ± 2.3 kg) of both genders were randomized to one of two fluid regimens: HSD group: hypertonic-hyperoncotic solution (HSD, 7.5% saline, 6% dextran 70) 3 ml/kg or B group: hypertonic-hyperoncotic solution 3 ml/kg and methylene blue infusion 7.5 mg/kg during 20 min. Internal defibrillation was attempted from 4 min of CA to achieve restoration of spontaneous circulation (ROSC). Hemodynamic variables, cerebral cortical blood flow and blood gas parameters were measured up to 180 min after ROSC. Blood samples for 186 Resuscitation and emergency medicine

12AP-10 Major cardiac complications after aorto-bifemoral bypass surgery S. Quevedo, F. Abela, S. Massada, C. Santos Anesthesiology, Hospital de Sao Joao, Porto, Portugal

Background and Goal of Study: Cardiovascular complications are important causes of mortality and morbidity after Aorto-bifemoral bypass (AFB). The aim of this study was to identify predictors of major cardiac complications after AFB surgery.

Materials and Methods: All 68 patients who underwent AFB surgery, admitted to the Post Anesthesia Care Unit (PACU) between Mars 2006 and Mars 2007. The following patient characteristics were recorded: age, gender, body mass index, ASA physical status, duration and type of anesthesia, temperature at admission, intravenous fluid administration during surgery, length of stay (LOS) in Post Anesthesia Care Unit (PACU) and in the hospital, co-morbidities and the Revised Cardiac Risk Index (RCRI), Simplified Acute Physiology Score II (SAPS II) and troponin I at admission. The clinical predictors of cardiac complications included in the RCRI were recorded as well as the occurrence of major cardiac complications (MCC) namely: acute myocardial infarction (AMI), pulmonary edema (PE), ventricular fibrillation (VF) or primary cardiac arrest (CPA). Assessment of the relationship between each variable and the occurrence of a major cardiac event was made by univariate analysis performed by simple logistic regression with an odds ratio (OR) and its 95% confidence interval (95%CI). For outcome evaluation patients with MCE were compared with those without MCE for PACU LOS and mortality at 6 months follow-up.

Results and Discussion: We recorded 9 MCC (13.2%): 5 AMI (7.4%), 1 VF (1.5%) with CPA in one patient and 3 episodes of PE (4.4%). Significant risk factors for the occurrence of MCE were cerebralvascular disease (OR 8.40, 95%CI 1.45-48.60, p<0.017), score of RCRI (OR 2.02, 95%CI 1.01-1.12, p<0.029) and SAPS score (OR 1.064, 95%CI 1.01-1.12, p<0.029). Patients with MCC stayed longer in PACU (5.45±3.67 against 2.58±2.41 days) (OR 1.30, 95%CI 1.04-1.63, p<0.023) and had higher mortality rates at 6 months follow-up (38% against 10%) (OR 5.40, 95%CI 1.03-28.44, p=0.047).

Conclusion(s): The RCRI score, one RCRI item individually and severity of illness appears to be determinants of the occurrence of postoperative MCC. These patients stayed longer and had higher mortality rates at 6 months follow-up.


13AP1-2 Hypertonic saline dextan versus ringer lactate in the resuscitation of haemorrhagic shock in polytraumatized patients P. Pomic, Z. Djunic, M. Jevric, N. Filipovic, M. Surbatic Clinic of Anaesthesiology and Intensive Therapy, Military Medical Academy, Belgrade, Serbia, Yugoslavia

Background and Goal of Study: The crystalloid-colloid debate regarding the most effective intravenous fluid for resuscitation from haemorrhagic shock has been raging over the past 60 years, and still continues without a satisfactory resolution [1]. The authors report their own experience in application of Ringer lactate (RL) and hypertonic saline dextan (HSD).

Materials and Methods: In 40 polytraumatized patients who developed haemorrhagic shock, prevailed thoracic (19) and abdominal (12) trauma. Replacement of lost circulatory volume with RL, Dextran 70 or Haemaccel began at 120 and 180 min after ROSC compared with the B group (p<0.015 and p=0.001, respectively). In addition, oxygen extraction in jugular bulb samples was greater in the B group compared with the HSD group at the same time-points (p<0.017 and p<0.001, respectively).

Conclusion(s): HSD improved cerebral perfusion reflected by higher jugular bulb pH, base excess and lower oxygen extraction ratio though no significant changes were observed in cerebral cortical blood flow with Laser Doppler tech- nique.


13AP1-2 Hypertonic saline dextan versus ringer lactate in the resuscitation of haemorrhagic shock in polytraumatized patients P. Pomic, Z. Djunic, M. Jevric, N. Filipovic, M. Surbatic

Background and Goal of Study: The crystalloid-colloid debate regarding the most effective intravenous fluid for resuscitation from haemorrhagic shock has been raging over the past 60 years, and still continues without a satisfactory resolution [1]. The authors report their own experience in application of Ringer lactate (RL) and hypertonic saline dextan (HSD).

Materials and Methods: In 40 polytraumatized patients who developed haemorrhagic shock, prevailed thoracic (19) and abdominal (12) trauma. Replacement of lost circulatory volume with RL, Dextran 70 or Haemaccel began at 120 and 180 min after ROSC compared with the B group (p<0.015 and p=0.001, respectively). In addition, oxygen extraction in jugular bulb samples was greater in the B group compared with the HSD group at the same time-points (p<0.017 and p<0.001, respectively).

Conclusion(s): HSD improved cerebral perfusion reflected by higher jugular bulb pH, base excess and lower oxygen extraction ratio though no significant changes were observed in cerebral cortical blood flow with Laser Doppler technique.

groups: one received only HSD for volume replacement (n=20) and the other received different solutions other than HSD (n=20).

Results and Discussion: Average quantity of the administered solutions, prior to admission, in both groups was 2375±175 mL. HSD group was resuscitated with 4-5 mL/kg until the final surgical treatment and had statistically higher MAP (increase of 58% compared to admission), CVP (average increase of 8.25 cmH2O), diuresis (average 350 mL after 30 min.), better blood gas analyses and acid-base status compared to non-HSD group. Non-HSD group had MAP increase of 18%, CVP 2.5 cmH2O and diuresis 200 mL after 30 min. Total quantity of administered solutions was significantly smaller in HSD group (2800 mL vs. 4862 mL). The only observed complications in HSD group were hypokalemia and moderate plasma hyperosmolarity which disappeared within 32 hours. The quantity of blood transfusions was considerably smaller in HSD group (1000 mL vs. 2000 mL). Pulmonary edema occurred only in non-HSD group (two patients - 10%). Coagulation disorder and hypotension were not recorded in HSD group because of the fast rate of infusion which lasted 5 min.

Conclusion(s): The results show the efficacy of resuscuation with HSD. Administered volume of HSD was smaller than all other solutions.

References:

13AP1-3
Look again! Delayed traumatic rupture of the diaphragm radiologically simulating a tension pneumothorax
A. Arora, K. Kadia, A. Ferguson
Department of Anaesthetics and Intensive Care, Craigavon Area Hospital, Portadown, Northern Ireland, United Kingdom

Background and Goal of Study: Diaphragmatic injury with herniation is a well-documented complication of both penetrating and blunt trauma. It occurs in approximately 3% of abdominal and 1.5% of thoracic injuries with a 2:1 ratio of penetrating to blunt trauma. It is left-sided in 70-80% of cases. Diagnosis requires a high index of suspicion as many cases are missed at first presentation. We describe a case of delayed traumatic diaphragmatic hernia radiologically simulating tension pneumothorax.

Materials and Methods: 6 months prior to presentation a 52 year old bricklayer had fallen from a ladder. Chest X-ray at that time demonstrated undisplaced rib fractures with no pneumothorax and follow-up was not thought necessary. He came to hospital on this occasion with a one month history of dull upper abdominal pain. Repeat chest X-ray showed unilateral radiolucent herniation on the left with a few broken ribs on that side and mediastinal shift to the right; a scaphoid abdomen was noted on examination.

After review of the film, needle thoracocentesis was deferred and a CT scan performed. This showed a diaphragmatic hernia containing transverse colon. He underwent thoraco-abdominal repair of diaphragmatic hernia.

Results and Discussion: In trauma patients presenting with delayed symptoms and abnormal chest x-ray, traumatic diaphragmatic hernia should be suspected and confirmed by further imaging.

Conclusion(s): The diagnosis of diaphragmatic injury is difficult to establish in the immediate post-traumatic period. Patients with delayed diaphragmatic herniation frequently present months to years after the initial injury with manifestations of visceral incarceration, obstruction, ischemia from strangulation, or perforation.

13AP1-4
Hemorrhagic shock-resuscitation does not exacerbate associated lung injury in pigs
H. Wang, M. Bodenstein, B. Duerges, S. Ghanadi, K. Markstaller
Dept. of Anaesthesiology and Pathology, Johannes Gutenberg-University, Mainz, Germany

Background and Goal of Study: To explore whether hemorrhage shock-resuscitation exacerbate lung injury caused by large tidal volume ventilation.

Materials and Methods: With IRB approval, pigs (20-25 kg) were anesthetized and ventilated by pressure controlled ventilation (FIO2 1.0, RR 8/min, V̇e 20 mL/kg/J). After catheterization, pigs were randomized to CTR (n=7), SHAM (n=10) and hemorrhagic shock/resuscitation (HS/R, n=10) groups. HS/R was performed by blood withdrawal and reduction of mean arterial pressure to 40 mmHg for 40 min; the pigs were then resuscitated by transfusion of the shed blood. Pigs were exanguinated immediately after catheterization (CTR group) or after 5 h of ventilation (SHAM and HS/R groups). Wet-to-dry weight ratio (W/D) and total protein content in bronchoalveolar lavage fluid (BALF) was measured from the mid lobe and the lower lobe of the right lung, respectively. Histopathology scoring was done on eleven tissue sectors sampled out from the left lower lobe.

Results and Discussion: W/D in the SHAM group increased slightly versus CTR group. No difference was found in the BALF total protein content between the three groups (Table 1, mean ± SD, *p<0.05 vs. CTR).

<table>
<thead>
<tr>
<th>Group</th>
<th>W/D (n)</th>
<th>Total protein in BALF (n) (μg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR</td>
<td>5.7±0.28 (5)</td>
<td>521.9±238.0 (8)</td>
</tr>
<tr>
<td>SHAM</td>
<td>6.4±0.43 (9)</td>
<td>502.2±249.5 (5)</td>
</tr>
<tr>
<td>HS/R</td>
<td>6.2±0.36 (6)</td>
<td>521.4±232.9 (5)</td>
</tr>
</tbody>
</table>

Only sporadic overdistension, atelectasis and congestion were found in the CTR group. The SHAM and HS/R groups showed almost the same pattern of lung lesions, with mild to moderate atelectasis and overdistension, neutrophil accumulation in the interstitial vascularity and septa, interstitial edema, and congestion, being the prominent alterations. The histopathology scores were shown in Figure 1. Differences between the three groups were found in some injury categories. However, the total lung injury score showed no difference.

Figure 1. Global lung injury scores for 9 injury categories (A) and global total injury score (B), sum of the scores for 9 injury categories. "p<0.05, *p<0.01 versus CTR by Mann-Whitney U test, n = 7, 10 for CTR SHAM and HS/R, respectively.

Conclusion(s): A brief hemorrhagic shock-resuscitation does not exacerbate ventilator associated lung injury.

13AP1-5
Changes of intracranial pressure during different therapy regimens in severe haemorrhagic shock after penetrating liver trauma
E. Cavus, P. Meybohm, V. Duerges, J. Scholz, B. Bein
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Changes of intracranial pressure during different therapy regimens in severe haemorrhagic shock after penetrating liver trauma
Background and Goal of Study: The optimal therapy for patients with uncontrollable hemorrhagic shock is still unclear [1]; conventional fluid resuscitation, small volume resuscitation (2), and vasopressors (3) may be strategies to control hypotension until surgical intervention. The effect of the therapy used on intracranial pressure (ICP) is important, since multiple trauma may be associated with brain injury. The purpose of this study was to evaluate the changes of ICP during therapy with fluids, hypertonic-hyperoncotic starch solution (HHS), and AVP in patients admitted to our trauma room who were ventilated with a laryngeal mask airway (LMA).

Methods and Materials: Following approval of the Animal Investigation Committee, anaesthetised pigs (12 to 16 weeks, 40 to 45 kg) underwent a simulated penetrating liver trauma. The animals were bled until hemodynamic decompensation, indicated by a mean arterial pressure less than 25 mm Hg, or a heart rate of less than 20% of its peak value. At this point, either fluid resuscitation (0.9% saline/4.5% gelofusine) or an LMA was inserted. Thirty minutes after drug administration, bleeding was controlled manually. All surviving animals received fluids (hydroxyethylstarch 10 ml/kg, and Ringer’s solution 10 ml/kg), and were observed for 30 minutes. Systemic haemodynamic variables, ICP, and cerebral perfusion pressure (CPP; calculated mean arterial blood pressure minus ICP) were continuously recorded.

Results and Discussion: MAP and CPP increased in all treatment groups after initiation of therapy (Intervention vs. 30 min of therapy: MAP: FR: 25.2 ± 5.4 vs. 54.6 ± 5.5 mm Hg; HHS: 19.1 ± 4.8 vs. 52.1 ± 4.8 mm Hg; CPP: FR: 17.3 ± 3.8 vs. 13.5 ± 3.9 mm Hg; CPP: HHS: 9.1 ± 3.9 vs. 13.5 ± 3.9 mm Hg). Combined with HHS and AVP/HHS group, ICP in the FR group showed a higher increase during therapy, and was significantly higher after manual stop of bleeding (12.4 ± 2.1 vs. 12.6 ± 1.1 mm Hg vs. 17.3 ± 3.9 mm Hg, respectively; p<0.05).

Conclusion(s): Compared to hypertonic-hyperoncotic starch solution alone or combined with vasopressin in this porcine model of uncontrollable hemorrhagic shock, fluid resuscitation resulted in an increase of ICP. This may be important if shock is accompanied with traumatic brain injury.

References:
Conclusion(s): Fasciotomy is as important as revascularisation, making it more effective. 2. Time, complexity and anatomic region of arterial trauma, are important factors in the decision of performing or not fasciotomy. 3. When compartment syndrome is installed long incision to perform fasciotomy is always necessary.

References:

13AP2-1
Comparison of conventional and powered air-purifying respirators during resuscitation of CBRN victims
J. Schumacher, L. Weidelt, S. Gray, A. Brinker, W. Stratling
St Thomas Campus, Dpt of Anaesthetics, GKT School of Medicine, King’s College, London, United Kingdom

Background and Goal of Study: Advanced life support of patients who are contaminated with chemical, biological, radiological or nuclear (CBRN) substances requires adequate respiratory protection for medical first responders [1,2]. The aim of our study was to compare the specific influence of conventional air-purifying respirators (APR) and powered air-purifying-respirators (PAPR) on the simulated first response emergency treatment of CBRN victims. This will help to improve major incident planning and measures for protecting medical staff.

Materials and Methods: The study was approved by the institutional Review Board of the London Ambulance Service NHS Trust. We investigated the influence of conventional (Promask 40 and Filter CFS2, Scott Health and Safety) and powered air-purifying-respirators (Proflow SC weight 2.1 kg, connected to a Promask 40, Scott Health and Safety) on the resuscitation of simulated CBRN victims. A PAPR unit consists of a powered fan which forces incoming air continuously through a filter for delivery to the user for breathing. Fifteen UK paramedics carried out a standardised resuscitation algorithm inside an LDV ambulance vehicle, either unprotected or wearing a APR or a PAPR in a randomized crossover design. All three groups carried out the resuscitation scenario wearing a semipermeable CBRN protective overgarment (Saratoga BMI-Suit, Bluecher) and CBRN protective gloves of medium thickness (butyl rubber, 0.35mm, Bluecher). Treatment times and wearer comfort were determined and compared.

Results and Discussion: We did not find any difference in treatment times between the groups wearing respiratory protection and the controls (243±19 seconds for the controls, 248±17 seconds for the APR and 251±13 seconds for the PAPR [Means±SD]). In the questionnaire, volunteers expressed that communication and mobility comfort was similar in both respirator groups whilst the breathing resistance and heat build-up was significantly lower in the powered respirator group.

Conclusion(s): Powered air-purifying respirators seem to improve the wearer comfort and they do not appear to reduce mobility or delay treatment during a simulated resuscitation scenario inside an ambulance vehicle with a single CBRN casualty.

Acknowledgements: We wish to thank Surgeon Lieutenant Commander Kate Prior, British Royal Navy, for her assistance and Scott Health and Safety-UK and Bluecher-Germany for the provision of the personal protection equipment.

References:

13AP2-2
Effect of the 30:2 chest compression (CC)/ventilation ratio on oxygen consumption (VO2) and fatigue of French medical emergency personnel (SAMU) during cardiopulmonary resuscitation (CPR)
C. Dagron, F. Aubour, L. Lamhaut, J. Dali Ava, P. Caifi
SAMU de Paris, Hopital Necker - Enfants - Maladies, Paris, France

Background and Goal of Study: The management of cardiac arrest replaced the 15:2 CC/ventilation ratio (ILCOR 2000) with 30:2 (ILCOR 2005). A preliminary study [1] indicated that this change induced an increase in fatigue among medical first responders during CPR.

Materials and Methods: This comparative randomised auto–paired study was conducted by personnel of the SAMU de Paris on a voluntary basis using simulated CPR on a manikin during different CPR sequences. After randomisation, subjects commenced 10-minutes sequences of CPR according to either 2000 or 2005 guidelines, during which VO2 was measured. These sequences were conducted at intervals of several hours. A Resusci Anne Sidsguide Manikin was used to analyse the quality of CC. Cardiac frequency, systolic and diastolic arterial pressures and SpO2 were recorded. During the CPR oxygen consumption was recorded continuously using a pneumotachograph and a VO2 sensor medic gas analyzer “Vmax sensor medical®”. The paired Student’s t-test was used to analyse differences between the parameters. Results are expressed as mean ± SD.

Results and Discussion: Sixty-two CPR sequences were analysed. As compared to the 2000 CPR protocol, the 2005 CPR protocol significantly increased cardiac frequency (respectively 129±18 vs 143±19, p<0.001), VO2 during the first 2-minutes (42.7±10.7% vs 46.3±11.5%, p<0.007) and the last 2-minutes of CC (42.9±10.6% vs 48.1±13.5%, p<0.002). There was no significant difference in VO2 during the first and last 2-minutes of CC for either the 2000 (42.7±10.7% vs 42.9±10.6%, p=0.88) or 2005 guidelines (46.3±11.5% vs 48.1±13.5%, p<0.08). The 30:2 sequence caused a significant increase in physical effort expended by SAMU teams compared to the 15:2 sequence. In addition, the increase in fatigue noticed during the use of the 2005 guidelines tended to increase throughout the period of resuscitation.

Conclusion(s): Improvement in haemodynamic and prognosis expected from the new guidelines might be counterbalanced by an increased fatigue among the resuscitation teams.

References:

13AP2-3
Surviving a cardiopulmonary arrest in a Portuguese hospital – Results from a two-year programme
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Background and Goal of Study: Recent data report that fewer than 20% of the patients suffering an In-Hospital Cardiopulmonary Arrest (IHCA) will be discharged alive [1]. Our 540-bed tertiary care center has In-Hospital Resuscitation Teams (IHRT) working 24 hours a day. This study was undertaken to assess information about outcome and predictors of survival after an IHCA at our Hospital.

Materials and Methods: Retrospective review of all records regarding IHCA intervened by IHRT, occurring between January 2005 and December 2006. All records were registered according to the Utstein recommendations [2]. To determine survival to discharge, medical records were reviewed. Survivors discharged alive or their families were contacted and a Cerebral Performance Category (CPC) scale was applied.

Results and Discussion: A total of 243 IHCA [152 male (62.6%), 91 female (37.4%); age 0 day-95 years (mean ± SD. = 70.4±14.67 years) were included. Ninety-two events (37.9%) occurred in monitored areas and 149 (61.3%) in non-monitored areas. Resuscitation was attempted in 195 (80.2%) patients. First Monitored Rhythm was more frequently Non-Shockable (NSR [N=115 (47.3%)]. Seventy-five (30.9%) patients attained Return of Spontaneous Circulation (ROSC), and 71 (29.2%) survived the event and were admitted to ICU or ER; 26 patients (10.7%) survived to Hospital discharge. Cardiac etiology was significantly associated with higher discharge rates, when compared to Respiratory and Other causes (23.3% vs 8.0% vs 8.6%, p=0.02). Patients with Shockable Rhythm (SR) were more likely to be discharged alive than patients with NSR (33.7% vs 8.0%, p=0.001). Moreover, SR (vs NSR) was found to be more predictive of discharge [OR (95% CI) 2.99-17.99, chz (1) = 12.18, p<0.0001]. There were no significant effects on discharge regarding age, sex and place of event. Nineteen patients or relatives could be reached for functional outcome evaluation according to the CPC scale. At discharge, 11 patients (42.3%) had CPC levels of 1-2, and 8 (30.8%) had levels of 3-4. Better functional performance at discharge was significantly associated with Cardiac etiology [vs Respiratory and Other causes (83.3% vs 0% vs 33.3%, p=0.03) and SR [vs NSR (100% vs 37.5%, p=0.03)].

Conclusion(s): In our setting, survival to discharge is 10.7%. Cardiac etiology and Shockable Rhythm are strongly associated with higher discharge rates and better CPC levels.

Acknowledgements: The authors would like to thank Dr. Sónia Lobo.

References:

13AP2-4
Comparison of intravenous and intraosseous access, by medical emergency personal with and without CBRN equipment on a training manikin
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Department of Anaesthesiology and Intensive Care - SAMU, Hopital Necker Assistance Publique Hôpitaux de Paris, Paris, France

Background and Goal of Study: In 2005, ERC first included intraosseous routes as an option for delivery of resuscitation drugs in adult [1]. Aim of this study was to compare time for intravenous access to time for intraosseous access.
access, performed by medical emergency personnel without and with CBRN equipment.

Materials and Methods: Twenty-five medical emergency personnel performed 4 experiments, in a randomly assigned order: with CBRN equipment (CBRN group, butyl gloves and gas mask) and without CBRN equipment (NoCBRN group), both for intravenous (IV) and intracranial (IO, EZ-IOT device) access. Experiments were performed respectively on a Multi-Venous-IV-Training-Arm Kit and an Intracranial-Trainer (Laerdal™). For each access attempt, materials were presented in pre-set sterile packages, excepted pre-filled infusion line, and personal were mandatory to perform skin disinfection. We measured time between arrival of the personal at the experiment site and starting of the infusion line. Times were compared using Student’s t-test. Results are expressed as means±SD.

Results and Discussion: Time was significantly increased in CBRN-group as compared to NoCBRN-group for IV access (respectively 103±30 vs 65±30sec, P<0.001), IO access (respectively 70±17 vs 50±17sec, P<0.001). Both for CBRN-group and NoCBRN-group, time for IO access was significantly shorter as compared to IV access (P<0.001). Time saved by IO access over IV access was 39±20sec (P<0.001) in CBRN-group and 30±24sec (P<0.001) in NoCBRN-group.

Conclusion(s): In our experimental model with manakin training parts, CBRN equipment significantly delayed time both for IV and IO access, mainly because of impediment from butyl gloves and gas mask. Elsewhere, IO access was significantly faster than IV access, either with or without CBRN equipment. This could be related to the less precise movements needed for IO access than for IV access. Further clinical investigations are mandatory to evaluate the benefit of primary IO access in emergency cases such as cardiac arrest.

Acknowledgements: Mariant Barbola, Elea Caroline, Vivien Benoit, Télton Caroline.

References:

13AP2-5

Efficacy of external cardiac compression in a dental chair
T. Yokoyama, H. Matsugi, T. Yatabe, Y. Kamimoto, K. Yoshida
Department of Anaesthesiology and Critical Care Medicine, Kochi Medical School, Nankoku, Kochi, Japan

Background and Goal of Study: Dental treatment is often stressful for patients, and sometimes worsens basic illness and/or causes accidental systemic symptoms. In such situation, cardiopulmonary resuscitation (CPR) may be required. Patients in dental chair are often stressed and anxious, some patients need sedation. Efficacy of external cardiac compression (ECC) was evaluated.

Materials and Methods: Twenty-seven dental hygienists with no experience of ECC participated in this study. They repeated these ECC procedures in the dental chair in comparison with ECC on the floor.

Results and Discussion: ECC was performed twice on the floor and twice in the dental chair, and commented the preferable setting. The efficacy of ECC was evaluated by the average depth and the percentage of ECC with adequate depth; 34.8±7.2 mm and 37.8±39.8% on the floor, and 36.6±5.9 mm and 49.7±42.1% in the dental chair. The percentage of ECC with adequate depth was higher in the dental chair setting than that of the floor setting, although it did not reach statistical significance (P=0.088). In the twenty questionnaires, 11 of them preferred dental chair setting, 4 of them had no difference between both settings, and 5 of them preferred the floor setting.

Conclusion(s): ECC in the dental chair can be performed effectively, and we can start CPR immediately without moving the patient on the floor.

13AP3-1

Declamping shock prevention during reconstruction of abdominal aorta using solution of hypertonic/hyperoncotic infusion in therapeutic manner
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Anesthesia and Intensive Care, Institute for Cardiovascular Diseases, KCS, Belgrade, Serbia, Yugoslavia

Background and Goal of Study: The aim of the study was to examine the effects of hypertonic/hyperoncotic solutions and their capacity to prevent declamping shock during reconstruction of abdominal aorta.

Materials and Methods: 40 patients were enrolled in the study. It was randomized, prospective and controlled study which compared of two groups of patients: investigative (20 pts) and control (20 pts). During the period of aortic clamping (ACC), investigative group received infusion of NaCl 7.2%±6% dextrose 70% vs. the controlled group who was given NaCl 0.9% during the same period of ACC on. The route for fluid administration was through central venous catheter at doses of 4ml/kg of hypertonic saline, were given during 20 minutes period of ACC. Following parameters were monitored: heart rate (HR), blood pressure (BP: systolic, diastolic, mean), central venous pressure (CVP), cardiac output (CO), pulmonary artery pressure (PAP), pulmonary capillary wedge pressure (PCWP), mixed venous oxygen saturation (SvO₂), arterial gas analysis. Four different time intervals were observed: immediately after ACC on, 5 min. after ACC off, 30 min. ACC off, and 24 hours ACC off. Statistical data processing included the methods of descriptive statistics, and bilateral analysis of variance, Student’s t-test, Mann Whitney U – test were used to determine the level of significance between parameters of interest.

Results and Discussion: All patients in both groups were homogenous in sex, age, height, weight and duration of cross clamping of aorta. Statistically significant difference was observed in CVP, PAP (diastolic), CO, SvO₂, A-aDO₂ between the groups. Among the rest of the observed parameters there was not statistically significant difference: HR, BP, PAP (systolic and mean) and PCWP.

Conclusion(s): Declamping shock prevention is feasible by using hypertonic/hyperoncotic solutions and also patients needed less infusion of albumin, crystalloids and whole blood translation.

13AP3-2

Bag valve mask ventilation in simulated CBRN environments
A. Brinker, W. Stratling, S. Gray, L. Weidelt, J. Schumacher
Department of Anaesthesiology, Medway Maritime Hospital, Gillingham, Kent, United Kingdom

Background and Goal of Study: In the UK, as in several other countries, plans are now in place to bring emergency medical care into a civilian contaminated zone [1]. The aim is to provide advanced life support in addition to antibiotic therapy for patients affected by chemical, biological or radiological (CBRN) hazards. Bag Valve Mask (BVM) ventilation is a key component in life support in toxic disasters [2,3]. However, only one BVM resuscitator is designed (CBRN) hazards. Bag Valve mask ventilation (BVM) ventilation is a key component in life support in toxic disasters [2,3]. However, only one BVM resuscitator is designed to operate in toxic atmospheres. We therefore aim to determine the efficacy and feasibility of this CBRN hand held BVM resuscitator.

Materials and Methods: The study was approved by the Institutional Review Board. The distal trachea of a Laerdal© Airway Management Trainer was connected to a mechanical Draeger Volumeter 3000©, to enable determination of the minute volume delivered by BVM ventilation. Nineteen paramedics wearing CBRN protective equipment were asked to ventilate this modified airway trainer, either with or without a CBRN filter (Draeger) attached to the inlet filtration system of the AMBU© Mark III resuscitator. We compared the maximum minute ventilation achieved. Values are given as mean ± SD. A paired T-Test was used to detect any differences between the two groups, p values of <0.05 were defined to show significance.

Results and Discussion: The described model allowed a reproducible and reliable measurement of the delivered minute ventilation. All paramedics were able to operate the device without prior CBRN training. The maximum minute volume achieved without the filter was 9.5 ±2.7 l/min. Use of the inlet CBRN filtration system reduced the maximum minute volume significantly to 6.3 ±2.0 l/min, reduction: 30%. The achieved maximum minute volumes ranged from 15 to 4.9 l/min in the controls and from 9.8 to 1.4 l/min in the CBRN group. Four paramedics were unable to achieve a minute volume greater than 5 l/min in the CBRN group, one participant failed to achieve that value in the control group. The inherent breathing resistance of the CBRN filter appears to reduce the inflow of air into the self-inflatable bag. This delay in refilling may have resulted in a reduced achievable minute volume.

Conclusion(s): The range of maximum minute volumes observed in both groups highlights the need for continuous bag valve mask ventilator training.

Acknowledgements: We wish to thank Surgeon Lieutenant Commander Kate Prior, British Royal Navy and Draeger Safety for their assistance.
Emergency cricothyroidotomy is the last stage of most airway management algorithms. We investigated the frequency and success of this intervention in a physician based pre-hospital trauma service. We also investigated what proportion of surgical airways were performed as primary procedures rather than following failed intubation. We tried to define which patient groups were most likely to require this intervention.

Materials and Methods: A retrospective database review was conducted of an urban physician based pre-hospital trauma service. The following data was collected: number of cricothyroidotomies performed, success rate, whether intubation was attempted first and injuries present. Until 2004 all patients who could not be intubated had cricothyroidotomy performed. After that the option of ProSeal laryngeal mask airway was introduced. The number of LMA uses was recorded and implication on frequency of surgical cricothyroidotomy considered.

Results and Discussion: During the period studied (17 years) 18902 patients were attended. 3925 were intubated and 59 cricothyroidotomies performed.

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given as mean ± standard deviation for continuous variables. P was considered significant <0.05.

Results and Discussion: We analyzed 95 patients who received a MET call in 5 months. Table 1 gives general information of the population studied.

Table 1. Characteristics of the 95 patients

| Age (70.5 ±15) | Length of stay 23.4 days ±(23.9) | Male 54% | Surgical 36% | Cardiac history 41% | Non-responders 26% | Mortality 34% | Mean BNP 561 pg/ml ±(780) | MET trigger: respiratory distress 36% | MET trigger: neurologic abnormalities 24% | MET trigger: hypotension 21% |

In 72 patients BNP was above the normal value of 100 pg/ml. BNP levels in survivors and non-survivors were elevated in 67% and 84% (p = 0.067). In the 39 patients with a known history of cardiac disease BNP was elevated in a higher percentage (85% ± 0.029) and with a higher value (810 pg/ml ± 0.003) than in patients without known heart disease. Although mortality was higher in non-survivors, BNP was significantly lower in survivors (606 ± 620) than in non-survivors (1268 ± 1310 pg/ml, p < 0.001). Eight patients were diagnosed as having acute heart failure. BNP was 928 ±1192 pg/ml significantly higher than in patients with other diagnoses (p<0.001). BNP was higher in non-survivors (1175 ±1558 pg/ml) then in survivors (679 ±849 pg/ml, p=0.012). Sensitivity, specificity, negative and positive predicted value for acute heart failure were 75, 24, 91, 8%.

Conclusion(s): In our pilot study in MET call patients BNP was increased in most patients with a mean level 5 times above normal. In patients with a history of cardiac disease BNP was more commonly elevated and it was higher in non-survivors. In patients who received a MET call for acute heart failure BNP levels were the highest and significantly higher in non-survivors. BNP was useful in ruling out acute heart failure.

13AP3-7
Airway management of maxillofacial trauma by pre-hospital physicians
P. Bredmosse, D. Lockey, G. Davies
Department of Pre-hospital Care, Royal London Hospital, London, United Kingdom

Background and Goal of Study: Intubation is expected to be more difficult in trauma patients than elective patients and particularly difficult in the pre-hospital phase [1] and in those with facial trauma [2]. We studied airway management of pre-hospital trauma victims with facial injuries managed by physicians using a simple airway algorithm to assess how difficult it really is.

Materials and Methods: A retrospective database review was conducted of all patients brought to our base hospital by our physician-paramedic pre-hospital trauma service with an Abbreviated Injury Score (AIS) (Face) of 2 or more in a five year period. We recorded ISS, whether they were intubated, the incidence of failed intubation and mortality. For comparison we also recorded our overall failed intubation rate for pre-hospital trauma patients.

Results and Discussion: In a five year period 7427 patients were attended and 206 (2.8%) had an AIS Face score of 2 or more. Median ISS was 23, 154 (75%) had haemorrhage and attempted intubation on scene and one (trapped) patient had a primary surgical airway. 51 (25%) were managed awake. Of those in whom intubation was attempted there were 2 failed intubations (1.3%). These were managed with one surgical airway and one ProSeal laryngeal mask airway. 38 patients died (18%). Of those that died 33 (87%) had AIS scores of 4 or more in other body areas (20 (53%) had AIS scores of 5 for the Head area). Our failed intubation rate for all pre-hospital trauma patients intubated in the last 17 years (9925 patients) was 1.0%.Using a simple airway algorithm which was applied by doctors with an anaesthesia or emergency medicine background our rates of failed intubation for seriously injured patients with facial injuries were no greater than reported rates for trauma patients intubated in the emergency departments of US trauma centres (1.7% [1]).

Conclusion(s): Patients with facial injuries are relatively uncommon and often have co-existing serious injuries in other body areas. When physicians use a simple airway management algorithm to manage patients with trauma and facial injuries relatively low rates of failed intubation can be achieved even in pre-hospital care.

References:

13AP3-8
Courrières – Europe’s worst ever mining disaster and its’ consequences for modern anaesthesiology
M. Stratling, C. Range, A. Peters, D. Bunckett-St. Laurent, K. Wullenweber
Directorate of Anaesthesiology, Cardiff and Vale NHS Trust, University Hospital of Wales, Cardiff, Wales, United Kingdom

Background and Goal of Study: On 3rd March 1906 Courrières colliery in northern France was devastated by a methane explosion. About 1100 miners died – the worst ever mining disaster in Europe so far [2, 3].

Materials and Methods: Parallel to a more general historic analysis of the international consequences of this catastrophe (especially on the European Coal and Steel community and their shared cultural identity: “Montanakultu” [1]), we examined its’ impact, focusing more specifically on the general history of medicine and particularly on the spectrum of modern anaesthesiology [4].

Results and Discussion: We can show [4], that this incident became crucial not only for the history of modern social- and community medicine and occupational health, but also for the spectrum of modern anaesthesiology and medical technology. Many technologic, physiologic and logistic developments, which were in consequence triggered on the fields of modern respiratory self-protection devices (respirators, gasmasks), the ventilation of mines and of resuscitation and general rescue medicine [2, 3] proved – until today – cornerstones also of contemporary ventilator- and anaesthesis technology and of A&E medicine [4].

Conclusion(s): Additionally, these developments were originally not initialized by medical professionals, but by simple miners, nameless and forgotten members of mining-rescue teams, fire brigades and by engineers and technicians [2, 4]. Remembering the disaster of Courrières provides an opportunity also to assess and to acknowledge their valuable contributions to the spectrum of modern anaesthesiology.

Acknowledgements: The authors express their gratitude to the Draeger Company, Lübeck, Germany (est. 1889) for granting free access to their archives.

References:
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13AP3-9
Increased troponin concentrations following anaesthetic related anaphylaxis in the absence of significant coronary artery disease: A report of 3 cases
P. McKinnon
Department of Anaesthesia and Pain Management, Concord Repatriation General Hospital, Sydney, NSW, Australia

Background and Goal of Study: Cardiac troponins are highly sensitive and specific biomarkers for myocardial injury and with the ECG are important tools for the diagnosis of acute coronary syndromes (ACS). Fortunately, ACS are rare following anaphylaxis and are believed to be more frequent in patients with pre-existing coronary artery disease. Three cases of anaesthetic related anaphylaxis with elevated troponins and ischemic ECG changes, but without significant coronary artery disease, are reported.

Materials and Methods: Three patients referred to an anaesthetic allergy clinic were found to have elevated troponins but without significant coronary artery disease. A raised mast cell tryptase and positive skin tests confirmed the diagnosis of anaphylaxis.

Results and Discussion: All patients had anaphylactic reactions following induction of anaesthesia. All presented with hypotension and were treated with metaraminol and adrenaline. Only patient A had a history of preexisting cardiovascular disease; hypertension that was treated with atenolol. She developed bronchospasm and was treated with salbutamol and hydrocortisone. All had

Table 1. Case summary

<table>
<thead>
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1558 < 0.01

13AP3-9
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<th>Patient</th>
<th>Laporoscopy</th>
<th>Cystoscopy</th>
<th>Vasosar Vasos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opation</td>
<td>Age (y)</td>
<td>Gender (MF)</td>
<td>55</td>
</tr>
<tr>
<td>Male</td>
<td>44</td>
<td>F</td>
<td>F</td>
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<tr>
<td>Troponin (μg/l)</td>
<td>(normal range)</td>
<td>156 44</td>
<td>38.4</td>
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<tr>
<td>Causative Agent</td>
<td>Rocuronium</td>
<td>Anggliclin</td>
<td>-</td>
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</tbody>
</table>
new antero-lateral ST depression on their ECGs that subsequently resolved. Patient B did not have angiography, but remains symptom free. The table summarises the reactions.

Three possible mechanisms may explain these findings. First, myocardial oxygen balance mismatch or inflammatory mediators may cause direct myocardial injury but this is unlikely as the insult is not sustained. Two, there may be a transient release of troponins from the cytoplasmic pool as occurs in endurance athletes. Third, intense coronary artery vasospasm (by the mediators of anaphylaxis) may increase troponin concentrations before sustained myocardial damage occurs.

Conclusion(s): In patients without significant coronary artery disease elevated troponin concentrations may not be uncommon following anaphylaxis. Their detection does not imply sustained myocardial injury and this has important implications for their ongoing management.

Acute and Chronic Pain Management

14AP1-1
Protective effects of gabapentin on allodynia and \( \alpha_2\delta_1\)-subunit of voltage dependent calcium channel in spinal nerve ligated rats

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Background and Goal of Study: Protective analgesia is a strategy to administer drugs before an injury to reduce the intensity of pain experienced afterwards. This study was designed to determine whether early gabapentin treatment has a protective analgesic effect on neuropathic pain compared to the late treatment. And as the potential mechanism of protective action, the \( \alpha_2\delta_1\)-subunit of the voltage-dependent calcium channel (\( \alpha_2\delta_1\)-subunit) was evaluated.

Materials and Methods: Neuropathic pain was induced in male Sprague-Dawley rats by a surgical ligation of left L5 nerve. For the early treatment group, rats were injected with gabapentin (100 mg/kg) intraperitoneally 15 min prior to surgery and then every 24 h during postoperative day (POD) 1-4. For the late treatment group, the same dose of gabapentin was injected every 24 h during POD 8-12. For the control group, L5 nerve was ligated but no gabapentin was administered.

Results and Discussion: In the early treatment group, the development of allodynia was delayed up to POD 10, whereas allodynia was developed on POD 2 in the control and the late treatment group. The paw withdrawal threshold was higher in the early treatment group than the control and the late treatment group until POD 14.

Figure 1. Development of allodynia in each group.

The up-regulation of \( \alpha_2\delta_1\)-subunit occurred at 2 weeks in the control and the late treatment group and at 3 weeks in the early treatment group, however, there was no difference in the level of the \( \alpha_2\delta_1\)-subunit among the three groups.

Conclusion(s): Early treatment with gabapentin offers some protection against neuropathic pain but it is unlikely that this action is mediated through modulation of the \( \alpha_2\delta_1\)-subunit.

14AP1-2
Pain and opioid exposure induce long-term latent pain sensitization

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Background and Goal of Study: Abnormal persistence of nervous system sensitization subsequent to tissue injury, i.e. excitatory neuroplasticity expressed as exaggerated post-operative hyperalgesia, is now considered a major candidate mechanism for the development of chronic pain. Although it is well admitted that stress induces analgesia (SIA) via endogenous opioid release, there is evidence that stressful events play a role in the pathogenesis of pain. Previous studies reported that a single opioid exposure activates NMDA-dependent pronociceptive systems leading to long-term pain vulnerability after analgesia. Here, we studied whether prior inflammatory pain or opioid experiences may favour both the development of a long-term pain vulnerability after non-nociceptive environmental opioid-dependent stress and the resistance to analgesic effects of opioids.

Materials and Methods: Nociceptive threshold (NT) was evaluated with the paw pressure vocalization test. On DO, the pro-inflammatory drug carrageenan was injected in one hind paw of rats treated with fentanyl (4 x 100 \( \mu \)g/kg, s.c.). Rats were exposed 2 weeks later to i) repeated non-nociceptive environmental stress (NNES) for 1 hour, ii) a fentanyl ultra-low dose (iULD, 50\( \mu \)g/kg), mimicking SIA in naive rats, or iii) an analgesic dose of fentanyl (25 \( \mu \)g/kg). The effects of the NMDA receptor antagonist BN2572 on NT changes induced by both NNES and iULD were evaluated.

Results and Discussion: In contrast to discrete SIA observed in naive rats, 1 hour stress induced hyperalgesia (SIH) for 4 hours (15 to 65% NT decrease) in pain and opioid-experienced rats. Similarly, a IULD administration induced hyperalgesia (85% NT decrease, 4 hours) in pain and opioid-experienced rats, not analgesia as observed in naive rats. This indicates that low levels of opioids induce opposite effects, i.e. hyperalgesia versus analgesia dependent on prior life events. Moreover, a resistance to analgesic effect of fentanyl (25 \( \mu \)g/kg), i.e. tolerance, was observed in pain and opioid-experienced rats. When injected just before NNES or IULD in pain and opioid-experienced rats, the NMDA receptor antagonist BN2572, completely prevented hyperalgesia. Repetition of 1 hour NNES for 3 times induced an 18-22 fold SIH enhancement which lasted 3-4 days, whereas SIA decreased. SIH was still observed 4 months after pain and opioid experiences.

Conclusion(s): Latent pain sensitization induced by a single opioid exposure in pain-experienced rats may play a critical role in the transition from acute to chronic pain after tissue injury.

14AP1-3
Development of mechanical hypersensitivity in young versus old individuals in an animal model of persistent postoperative pain

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Background and Goal of Study: Persistent pain (PP) occurs after different surgical procedures and affects a high number of patients (1). Recently, a new animal model of persistent postoperative pain evoked by skin/muscle incision and retraction (SMIR model) has been developed which mimics clinical conditions (2). Because younger age represents a significant risk factor for PP in patients (1), the study evaluates and compares the development of mechanical hypersensitivity in young and old rats undergoing SMIR procedure.

Materials and Methods: After animal care committee approval, under
Background and Goal of Study: The antidepressant mirtazapine is known to antinociceptive in experimental neuropathic pain and is underlied by central sensitization. As found in patients, younger individuals are more prone to develop PP after surgery. Our data support the hypothesis than PP syndrome evoked by mechanical allodynia with Y rats showing more profound and longer lasting hypersensitivity than O rats. With electronic von Frey baseline PWT value was 148±3 g in O rats and 123±29 g in Y animals. After surgery, dPWT magnitude was smaller in Y rats and even decreased with time, revealing an extensive central sensitization.

### Materials and Methods:

The study was designed to evaluate the validity of this pain model for ROS and pain research. Herein we show superoxide, which was produced during reperfusion after 3 hrs hindpaw ischemia, produces N-methyl-D-aspartate (NMDA)-mediated mechanical allodynia.

### Materials and Methods:

Male adult SD rats were used for neuropathic pain model. Plasma superoxide production rates of before ischemia (BI) and 5 min after reperfusion (AR) were measured via cytochrome c reduction in the presence of xanthine (without xanthine oxidase, kinetics, 550 nm). Mechanical allodynia was measured in both hindpaws. The activations of NMDA receptor subunit 1 (P-NR1) of lumbar spinal cord (L4-L6) in accordance with the change of alldynia (after reperfusion) and during ischemia were analyzed by the Western blot. The effect of superoxide dismutase (SOD, 4000 U/kg), which was treated at BI, was evaluated to confirm the pathomechanism of this pain model using P-NR1 Western blot analysis.

### Results and Discussion:

Allopurinol-inhibitable, xanthine oxidase-mediated plasma superoxide production was increased at AR. Mechanical allodynia was present in both hindpaws as early as 1 hr after reperfusion, and lasted at least 1 week. The expression of P-NR1 was the highest at the 3 days after reperfusion when the withdrawal threshold was the lowest point. SOD significantly blocked alldynia was measured in both hindpaws. The activations of NMDA receptor subunit 1 (P-NR1) of lumbar spinal cord (L4-L6) in accordance with the change of alldynia (after reperfusion) and during ischemia were analyzed by the Western blot. The effect of superoxide dismutase (SOD, 4000 U/kg), which was treated at BI, was evaluated to confirm the pathomechanism of this pain model using P-NR1 Western blot analysis.

### Conclusion(s):

This study suggests that ischemia/reperfusion injury induced neuropathic pain model is a good candidate for the research fields of ROS and pain mechanism. The generation of ROS, especially superoxide is partly responsible for NMDA-mediated mechanical allodynia.

### References:


14AP1-6

### Reactive oxygen species and N-methyl-D-aspartate receptor-mediated central sensitization in hindlimb ischemia/reperfusion injury-induced mechanical allodynia

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### Background and Goal of Study:

Reactive oxygen species (ROS) and inflammatory responses contribute to development of neuropathic pain [1,2]. Superoxide and nitric oxide serve to mediate cell signaling processes, directly induce tissue injury during inflammation. A neuropathic pain syndrome was produced in rats following prolonged hindpaw ischemia/reperfusion injury, creating an animal model of complex regional pain syndrome-Type I (CRPS-I) [3]. This study was designed to evaluate the validity of this pain model for ROS and pain research. Herein we show superoxide, which was produced during reperfusion after 3 hrs hindpaw ischemia, produces N-methyl-D-aspartate (NMDA)-mediated mechanical allodynia.

### Materials and Methods:

Male adult SD rats were used for neuropathic pain model. Plasma superoxide production rates of before ischemia (BI) and 5 min after reperfusion (AR) were measured via cytochrome c reduction in the presence of xanthine (without xanthine oxidase, kinetics, 550 nm). Mechanical allodynia was measured in both hindpaws. The activations of NMDA receptor subunit 1 (P-NR1) of lumbar spinal cord (L4-L6) in accordance with the change of alldynia (after reperfusion) and during ischemia were analyzed by the Western blot. The effect of superoxide dismutase (SOD, 4000 U/kg), which was treated at BI, was evaluated to confirm the pathomechanism of this pain model using P-NR1 Western blot analysis.

### Results and Discussion:

Allopurinol-inhibitable, xanthine oxidase-mediated plasma superoxide production was increased at AR. Mechanical allodynia was present in both hindpaws as early as 1 hr after reperfusion, and lasted at least 1 week. The expression of P-NR1 was the highest at the 3 days after reperfusion when the withdrawal threshold was the lowest point. SOD significantly blocked alldynia was measured in both hindpaws. The activations of NMDA receptor subunit 1 (P-NR1) of lumbar spinal cord (L4-L6) in accordance with the change of alldynia (after reperfusion) and during ischemia were analyzed by the Western blot. The effect of superoxide dismutase (SOD, 4000 U/kg), which was treated at BI, was evaluated to confirm the pathomechanism of this pain model using P-NR1 Western blot analysis.

### Conclusion(s):

This study suggests that ischemia/reperfusion injury induced neuropathic pain model is a good candidate for the research fields of ROS and pain mechanism. The generation of ROS, especially superoxide is partly responsible for NMDA-mediated mechanical allodynia.

### References:


14AP1-7

### Immune cells-mediated opioid release controls inflammatory pain

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### Background and Goal of Study:

Opioid peptide-containing leukocytes accumulate in inflamed tissue, where they liberate opioids which bind to peripheral opioid receptors leading to antinociception. Neutral endopeptidase (NEP) and aminopeptidase N (APN) degrade endogenous opioids. Here, we assess peripheral analgesic effects of classical inhibitors of NEP (thiorphan) and of APN (bestatin) as well as RB3008, a novel dual inhibitor of NEP and APN in inflammatory pain.

### Materials and Methods:

Inflammation was induced with complete Freund’s adjuvant injected into one hind paw in Wistar rats. Experiments were performed 4-5 days later. Expression of opioid peptides, NEP and APN was analyzed with immunohistochemistry. Nociceptive thresholds were assessed with the paw pressure test, and edema (paw volume) was evaluated with a plethysmometer. RB 3008 or bestatin together with thiorphan were injected into inflamed paws without or with α4 antibodies against beta-endorphin (END), Met-enkephalin...
(Met-ENK), Leu-ENK or dynorphin A (DYN); b) selective antagonists of mu-(CTOP), delta- (ICP 174.864) and kappa- (nor-binaltorphimine; norPHN) opioid receptors; c) peripherally restricted opioid receptor antagonist (naloxone methiodide; NLM). The antinociceptive effects of RB 3008 were also assessed after pretreatment with Cyclosporin A (CSA) intraperitoneally.

Results and Discussion: NEP, APN and the opioid peptides beta-endorphin, Met- and Leu-enkephalin were expressed in leukocytes in inflamed paws. Co-injection of thiorphan and bestatin or application of RB3008 into inflamed paws inhibited mechanical hyperalgesia. These antinociceptive effects were reversed by local pre-treatment with antibodies against beta-endorphin, Met- and Leu-enkephalin and dynorphin A, with selective mu-, delta- and kappa-receptor antagonists and with the peripherally restricted opioid receptor antagonist naloxone-methiodide. Also, RB3008-induced antinociception was blocked by immunosuppression with cyclosporin A, suggesting that NEP/APN blockade promotes analgesia by immune cell-derived opioids.

Conclusion(s): 1. NEP, APN and opioid peptides are present in immune cells accumulating in inflamed tissue. 2. Single (bestatin and thiorphan) and a novel dual (RB 3008) enkephalipherase inhibitors produce analgesia via opioid peptides acting at peripheral opioid receptors directly in inflamed tissue. 3. NEP/APN blockade promotes analgesia by leukocyte-derived opioids. 4. Preventing the degradation of endogenous opioids in injured tissues offers an interesting strategy for control of inflammatory pain.

14AP1-8

Longlasting hyperalgesic effects of intraoperative high dose of fentanyl in a new animal model of persistent postoperative pain

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Background and Goal of Study: A state of central sensitization underlies persistent postoperative pain induced by prolonged tissue retraction and nerve damage. Opioids which are widely used as perioperative analgesics paradoxically also promote CNS sensitization and enhance postoperative pain [1,2]. The study evaluates the long-term effect of perioperative Fentanyl (F) high dose in a new animal model of persistent postoperative pain evoked by skin/muscle incision and retraction [3].

Materials and Methods: Under sevoflurane general anesthesia, adult male Wistar rats underwent skin/muscle incision and retraction (SMIR) surgery: Fentanyl group (F, n=6) received 4x60 ug/kg subcutaneous Fentanyl injection at 15 min interval during surgery and control group (C, n=6). Postoperative development of mechanical hyperalgesia (MH) and mechanical allodynia (MA) were assessed by paw withdrawal threshold (PWT, in g) to electronic and manual von frey filament application at day 2, 5, 7, 10, 14, 17, 21 and 28 after surgery. Statistical analysis used ANOVA repeated measures and t-test, p<0.05 was considered significant.

Results and Discussion: Baseline D2 D5 D7 D10 D14 D17 D21

<table>
<thead>
<tr>
<th>Material</th>
<th>F (n=6)</th>
<th>C (n=6)</th>
<th>Placebo Dexamethasone Rofecoxib Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH/PWT</td>
<td>71±10</td>
<td>71±8</td>
<td>72±15</td>
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<tr>
<td>C contralateral MH/PWT</td>
<td>119±10</td>
<td>109±28</td>
<td>93±28</td>
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<tr>
<td>C ipsilateral MA/PWT</td>
<td>9±4</td>
<td>9±3</td>
<td>12±4</td>
</tr>
<tr>
<td>F ipsilateral MA/PWT</td>
<td>84±8</td>
<td>83±13</td>
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</table>
| SMIR surgery induced significant MH and MA compared to baseline in ipsilateral paw. MH appeared in contralateral paw later. Association of F during surgery induced mechanical hypersensitivity in ipsi- and contra-lateral paw.

Conclusion(s): SMR-operated rats display longlasting (at least 3 weeks) mechanical hypersensitivity in ipsilateral paw. Perioperative use of high dose opioid induces early hypersensitivity in contralateral paw in SMIR model. The results support the hypothesis of a persistent pain syndrome driven by central sensitization in this new animal model. Further, the results also demonstrate that intraoperative use of opioid high dose enhances secondary hyperalgesia and central persistent postoperative pain.


14AP2-1

Pre-emptive administration of etoricoxib in major abdominal surgery

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2nd Department of Anaesthesiology, School of Medicine, University of Athens, “Attikon” Hospital, Athens, Greece

Background and Goal of Study: The most important conditions for establishment of effective pre-emptive analgesia are the establishment of a sufficient level of antiinociception before injury and the continuation of this analgesic level well into the post-injury period to prevent central sensitization during the inflammatory phase [1]. Peri-operative use of cox 2 inhibitors is associated with reduced postoperative pain and analgesic consumption [2]. In this randomized-controlled trial we evaluated the effect of administering etoricoxib pre os pre-emptively versus parecoxib intra-operatively on postoperative quality of analgesia.

Materials and Methods: This trial was approved by ethics hospital committee and required written informed patient consent. 31 patients scheduled for elective surgery for colorectal cancer were randomly divided in two groups. Group PRE (16 patients) received etoricoxib 120 mg per os 1 hour approximately before skin injury and Group INTRA (15 patients) received parecoxib 40 mg IV 1 hour approximately before skin closure. A standard anaesthetic technique with sevoflurane, cis-atracurium and fentanyl and a standard postoperative PCA with PCA morphine and parecoxib 40 mg IV every 12 hours were administered in both groups. Pain scores at rest, during coughing and mobilisation using VAS scale and PCA morphine consumption were assessed at 1, 6, 18 and 24 hours after surgery.

Results and Discussion: The two groups did not differ significantly regarding age, sex, weight and duration of surgery. Mean pain scores were significantly lower in Group PRE at 1 hour (p-value: 0.023), 6 hours (p-value: 0.027) during rest, at 1 hour (p-value:0.007), 6 hours (p-value: 0.021) during coughing and at 1 hour (p-value: 0.038), 6 hours (p-value: 0.038) and 18 hours (p-value: 0.024) during mobilization. Morphine consumption was significantly lower in group PRE at 6 hours (p-value: 0.08), 18 hours (p-value: 0.001) and at 24 hours (p-value: 0.001) postoperatively.

Conclusion(s): Premedication with etoricoxib 120 mg seems to reduce the severity of postoperative pain and morphine consumption in patients undergoing major abdominal surgery. Still, more patients should be included in the study.


14AP2-2

Dexamethasone, rofecoxib or a combination of both for oral premedication before abdominal hysterectomy. A randomized placebo-controlled trial

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Background and Goal of Study: Previous studies have demonstrated an analgesic effect of corticosteroids, e.g. in ENT-surgery. The aim of this randomized trial was to evaluate whether an additive synergistic effect can be achieved with dexamethasone alone or in combination with a COX-2-inhibitor.

Materials and Methods: 80 elective patients undergoing abdominal hysterectomy (non-cancer surgery) were randomized to an oral premedication with placebo, 8mg dexamethasone, 50mg rofecoxib, or a combination of 8mg dexamethasone+50mg rofecoxib. General anaesthesia was standardized using propofol, fentanyl (max. dose 0.5mg), cis-atracurium, desflurane in oxygen-air and a continuous infusion of remifentanil. Postoperatively, on-demand analgesia was provided by small repeated doses of piritramide. Postoperative pain (assessed by a numeric rating scale) and other side effects were assessed for 24 hours. A p<0.05 using the the U-Test and chi-test were considered significant.

Results and Discussion: There were no relevant differences in biometric data

Opioid requirements, pain scores, and side effects

<table>
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<tr>
<th>Material</th>
<th>Placebo (n=20)</th>
<th>Dexamethasone (n=20)</th>
<th>Rofecoxib (n=20)</th>
<th>Combination (n=20)</th>
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<tbody>
<tr>
<td>PONV (%)</td>
<td>48</td>
<td>28</td>
<td>42</td>
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Other opioid related side effects [%]

<table>
<thead>
<tr>
<th>Material</th>
<th>Placebo (n=20)</th>
<th>Dexamethasone (n=20)</th>
<th>Rofecoxib (n=20)</th>
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</thead>
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<tr>
<td>Values are median [25th/75th percentile] and percentages.</td>
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</table>
Acute and chronic pain management

14AP2-3

Protective pre-medication with paracetamol, pregabalin and dexamethasone for postoperative pain control. A randomized controlled study in abdominal hysterectomy

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Background and Goal of Study: To investigate the effect of multimodal analgesic regimens with combinations of paracetamol, pregabalin and dexamethasone for postoperative pain control in abdominal hysterectomy. A randomized double blind study.

Materials and Methods: One hundred and sixteen patients, aged 31-67 years, scheduled for abdominal hysterectomy were randomly assigned to either group: A (paracetamol), group B (paracetamol + pregabalin), or group C (paracetamol + pregabalin + dexamethasone). Before surgery and according to their groups, patients received paracetamol 1 g, pregabalin 300 mg, dexamethasone 8 mg or matching placebo. General anaesthesia with infusions of propofol and remifentanyl was performed. All patients received morphine 0.2 mg/kg 30 min. before awakening. Postoperative pain treatment in all groups consisted of paracetamol 1 g every 6 h and patient controlled intravenous morphine (PCA). 2.5 mg bolus, 10 min. lockout time. First postoperative hour additional morphine 2.5 mg was supplied on request. Nausea was treated with ondansetron. Morphine consumption, pain score at rest and during mobilisation (visual analog scale (VAS): 0 - 100 mm), nausea, sedation and dizziness (verbal scale: none, slight, moderate, severe), number of vomits and consumption of ondansetron, were recorded 2, 4 and 24 postoperatively. P < 0.05 was considered statistically significant.

Results and Discussion: For postoperative morphine consumption and pain score, at rest and during mobilisation, the difference between treatment groups was not significant. Total 24-hour morphine consumption was: group A: 40 (25 - 55) mg; (median and quartiles); group B: 35 (24 - 45) mg and group C: 35 (20 - 45) mg. For nausea, sedation and dizziness there were no significant differences between groups, whereas the total number of vomits were significantly less in group C vs. group A (p = 0.003). Consumption of ondansetron was also significantly less in group C vs. group B (p = 0.003) and vs. group A (p = 0.00).

Conclusion(s): Compared to treatment with paracetamol, combinations of paracetamol + pregabalin (300 mg) or paracetamol + pregabalin + dexamethasone (8 mg), did not result in improved postoperative morphine consumption and pain score in abdominal hysterectomy. Number of vomits and use of ondansetron were significantly improved in the dexamethasone group. Other side effects were unaffected between groups.

References:

14AP2-4

Preemptive administration of gabapentin decreases significantly post-operative morphine consumption after total abdominal hysterectomy

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Background and Goal of Study: Gabapentin was introduced as an antiepileptic drug with analgesic [1], antinociceptive and anti-allodynic properties. We examine the effect of gabapentin administered before total abdominal hysterectomy upon postoperative pain.

Materials and Methods: In a double-blind, prospective study thirty-three (33) patients, ASA I-II, scheduled for total abdominal hysterectomy under general anaesthesia were randomly assigned to receive gabapentin per os 1600mg, divided into four (4) equal doses of 400mg each, initiated 14h before surgery (group G) or placebo (group P). All patients received meloxicam per os 15mg preoperatively as supplementary analgesic in two doses of 7.5mg each. The analgesic effect was maintained with intravenous patient-controlled analgesia (IV-PCA) with 1.5mg morphine IV on demand. Visual analogue scale (VAS) (0-10) and Prince pain score [2] (0-4) were assessed at 0, 4, 8, 12, 24 and 48h after operation. Total morphine consumption was measured at the end of the first 24 and 48h postoperatively. Nausea, vomiting and other side-effects were recorded, as well. Statistical analysis was performed with Student’s t-test. P < 0.05

Results and Discussion: Demographic data and initial dose of morphine administered in the PACU for postoperative analgesia were comparable. Morphine consumption during the first 24h postoperatively was 17.7±6.53mg in group G vs 30±8.13mg in group P (P=0.00009) and after operation it was 23.1±6.50mg in group G vs 45.7±11.41mg in group P (p=0.00002). Statistically VAS was significantly reduced at 12, 24 and 48h postoperatively in group G vs group P (p<0.05).

Conclusion(s): Preemptive oral gabapentin decreased the incidence and intensity of acute postoperative pain with a reduction in opioid requirements in total abdominal hysterectomy without any side-effects.

References:

14AP2-5

Preemptive analgesic effect of remifentanyl on tourniquet pain

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Background and Goal of Study: The mechanism of tourniquet-induced blood pressure increase is unknown. We previously reported that both bolus and continuously administered fentanyl were effective to attenuate tourniquet-induced blood pressure increase, however the effect of bolus administered fentanyl diminished after 30 min from its administration and its minimum effective effect-site concentration (Ce) was 2.55 ng/ml (mean) [1]. So we hypothesized that high Ce of opioids are necessary to attenuate tourniquet-induced blood pressure increase under general anaesthesia.

Materials and Methods: This study protocol was approved by the local ethical committee and the study was performed in a prospective fashion. Nine patients undergoing upper or lower limb surgeries with ASA I-II were included in this study. Continuous infusion of remifentanyl was started at the rate of 0.2-0.3 μg/kg/min (γ) five min before the induction. To avoid marked decrease of blood pressure and heart rate, remifentanyl infusion rate was decreased to 0.1γ after the induction. Remifentanyl administration rate was increased up to 0.6γ after tourniquet inflation. Anaesthesia was maintained with continuous infusion of propofol and air in 50% oxygen. Propofol was administered in target-controlled fashion with Diprifusor to maintain BIS at 40-60. Ce of remifentanyl was plotted with BIS analyzer. Storystic and diastolic blood pressures, and heart rate were measured at 0.3γ and 60 min after tourniquet inflation. Statistical comparison was made between values which were measured at 30 and 60 min after tourniquet inflation by using the two-tailed Student’s t-test. P < 0.05 was considered statistically significant.

Results and Discussion: Ce of remifentanyl was 6.30±2.65 ng/ml (mean ± SD) at 30 min and 8.63±2.87 ng/ml at 60 min after tourniquet inflation respectively. Systolic blood pressure and heart rate showed no statistically significant changes between 30 and 60 min after tourniquet inflation, however diastolic blood pressure showed statistically significant increase between 30 and 60 min after tourniquet inflation. P < 0.05. In one patient systolic and diastolic blood pressure increased markedly at 60 min after tourniquet inflation, however it increase remifentanyl infusion rate from 0.4 to 0.5γ attenuated blood pressure increases.

Conclusion(s): Remifentanyl was effective to attenuate tourniquet-induced blood pressure and heart rate increases under general anaesthesia, however it was suspected that high Ce of remifentanyl was necessary to attenuate them.

References:
14AP2-6
Preemptive ketamine usage with peroperative paracetamol or tenoxicam in laparoscopic cholecystectomy pain relief
A. Bagubek, Z. Akcaboy, E. Akcaboy, M. Baydar, N. Gogus
Anesthesiology Department, Ankara Numune Research and Training Hospital, Ankara, Turkey

Background and Goal of Study: Non-steroidal anti-inflammatory drugs are proposed for pain relief after laparoscopy. Preemptive treatment with a N-methyl-D-aspartate receptor antagonist improves postoperative pain relief. In this study, we compared the effects of preemptive ketamine usage when combined with either paracetamol or tenoxicam on laparoscopic cholecystectomy (LC) pain relief.

Materials and Methods: In this prospective study, after ethic committee approval was attained, 100 ASA I-II patients were enrolled and randomized into 4 groups. Groups Ketamine-Paracetamol (KP, n=25) and Ketamine-Tenoxicam (KT, n=25) received a loading dose of 25 mg/kg iv tramadol, 0.5 mg/kg iv meperidine and groups Placebo-Paracetamol (PP, n=25) and Placebo-Tenoxicam (PT, n=25) received an additional 25 mg bolus and 0.5 mg/kg iv meperidine was added for inadequate pain relief. Standard patient controlled analgesia was programmed to provide bolus, 1 mg/kg/iv infusion) + lornoxicam (8 mg/iv bolus) 30 minutes before the induction of anesthesia followed by a continuous infusion during induction of anesthesia and during the rest of the ICU stay.

Results and Discussion: Group KT (n=25) and Placebo-Tenoxicam (PT, n=25) received equal amount of saline before induction. Anesthesia was standardized using patient-controlled intravenous bolus (15 mg/kg/iv infusion) and groups Placebo-Paracetamol (PP, n=25) and Placebo-Tenoxicam (PT, n=25) received equal amount of saline before induction. Anesthesia was standardized using patient-controlled intravenous bolus (15 mg/kg/iv infusion) + lornoxicam (8 mg/iv bolus). VAS scores at 15 and 30 minutes were recorded for 24 hours. The VAS were lower at rest (3.9+/-1.8) and during movement (5.1+/-1.4) in group KP and KT compared to the baseline. The total tramadol consumption was lower in Group PL (p<0.001). The recovery room VAS values were similar at the following measurement points. The time to first bolus request was longer in Group PL (p<0.001). The total tramadol consumption was lower in Group PL (324.06+/-65.5 versus 477.00+/-83.2) (p<0.001). The incidence of nausea and vomiting was higher in Group P (p<0.05) and patient satisfaction was higher in Group PL (p<0.05).

Conclusion(s): The paracetamol (15 mg/kg/iv infusion) + lornoxicam (8 mg/iv bolus) combination administered intravenously preoperatively for renal surgery was found to decrease total tramadol consumption and incidence of adverse effects and increase patient satisfaction, therefore increasing postoperative analgesia quality, when compared with paracetamol only (15 mg/kg/iv-infusion).

14AP2-7
Comparison of the effect of paracetamol with the paracetamol-lornoxicam combination on postoperative anaesthesia quality when administered intravenously before renal surgery
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Background and Goal of Study: The aim of this study was to compare the effect of paracetamol with the paracetamol-lornoxicam combination when administered intravenously preoperatively for pain treatment following renal surgery on postoperative tramadol consumption, adverse effect incidence and patient satisfaction. The visual analog pain scores for pain and side-effects (nausea, vomiting, dizziness), and the amount of analgesics needed were recorded for the first 48 hours.

Materials and Methods: We studied 174 patients undergoing scheduled surgical procedures such as laparoscopic or open cholecystectomy, randomly divided into two groups: group A (n=87) received a premedication of paracetamol 600mg and group B (n=87) midazolam 15mg. Up until the 1st postoperative morning, analgesia was provided by morphine using patient-controlled analgesia. The combined effect of a single dose of pregabalin was a reduction of opioid consumption equivalent to 27+/-3 mg of morphine during the first 48 hours after surgery. Pregabalin also reduced opioid-related adverse effects, such as nausea and vomiting (35 patients needed to treat in group B compared to 12 in group A). The most common adverse effects of pregabalin was sedation and dizziness (45 patients needed to treat in group A compared to 15 in group B).

Conclusion(s): The objective of this study was to examine the analgesic effectiveness, opioid-sparing and side effects of pregabalin when used as premedication, compared to midazolam. Our conclusions are that pregabalin reduced the need for opioids and the adverse effects associated with them, but lead to an increased incidence of sedation and dizziness during the first 48 hours after operation.

14AP2-8
Perioperative use of pregabalin for surgical patients. Is there a benefit?
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Background and Goal of Study: Pregabalin is a relatively new drug with anxiolytic and anticonvulsant properties useful for treating neuropathic pain as well as postherpetic neuralgia. In this study we wanted to estimate whether these properties apply also to acute postoperative pain. This is a randomised, controlled single-blind trial examining the analgesic efficacy, adverse effects and clinical value of pregabalin in postoperative pain.

Materials and Methods: We studied 174 patients undergoing scheduled surgical procedures such as laparoscopic or open cholecystectomy, randomly divided into two groups: group A (n=87) received as premedication pregabalin 600mg and group B (n=87) midazolam 15mg. Up until the 1st postoperative morning, analgesia was provided by morphine using patient controlled analgesia. The visual analog pain scores for pain and side-effects (nausea, vomiting, dizziness), and the amount of analgesics needed were recorded for the first 48 hours.

Results and Discussion: The combined effect of a single dose of pregabalin was a reduction of opioid consumption equivalent to 27+/-3 mg of morphine during the first 48 hours after surgery. Pregabalin also reduced opioid-related adverse effects, such as nausea and vomiting (35 patients needed to treat in group B compared to 12 in group A). The most common adverse effects of pregabalin was sedation and dizziness (45 patients needed to treat in group A compared to 15 in group B).

Conclusion(s): The objective of this study was to examine the analgesic effectiveness, opioid sparing and side effects of pregabalin when used as premedication, compared to midazolam. Our conclusions are that pregabalin reduced the need for opioids and the adverse effects associated with them, but lead to an increased incidence of sedation and dizziness during the first 48 hours after operation.

14AP2-9
Do s-ketamine or the combination of s-ketamine and magnesium reduce postoperative opioid requirements after abdominal surgery?
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Background and Goal of Study: Nausea and vomiting are frequently limiting factors of the use of opioids for postoperative analgesia. Multimodal analgesia techniques are advocated in order to achieve sufficient postoperative analgesia with minimal side-effects of the analgesics. This study was designed to determine whether the addition of s-ketamine or the combination of s-ketamine and magnesium to a PCA with pethidine results in a reduction of postoperative opioid consumption. Secondary endpoints of the study were intensity of postoperative pain and side-effects of postoperative analgesia.

Materials and Methods: 45 patients scheduled for elective abdominal surgery were included in this prospective, randomized, double-blind study. The patients were divided into three groups. Study medication was given as an intravenous bolus (i.v.) during induction of anesthesia followed by a continuous infusion during 24 hours. In group C the study medication consisted of NaCl 0.9% (bolus and infusion). In group K the study medication consisted of s-ketamine (bolus: 0.2 mg/kg; infusion: 2 μg/kg/min) and MgSO4 (bolus: s-ketamine 0.2 mg/kg and MgSO4 15 mg/kg; infusion: s-ketamine 2 μg/kg/min and MgSO4 5 μg/kg/h). All patients received general anesthesia in a standardized manner. Before emergence every patient received a loading dose of pethidine 0.15 mg/kg i.v. Postoperatively every pa-
Acute and chronic pain management

tient received i.v. PCA with piritramide (bolus dose 1 mg; lock out 5 minutes; no background infusion). Use of piritramide, painscores (visual analogue scale), vital parameters and side-effects (nausea, vomiting, pruritus, urine retention, se-
dation, hallucinations) were recorded for 48 hours.

Results and Discussion: The cumulative dose of piritramide after 48 hours was significantly lower in group K compared to group C. The cumulative dose of piritramide after 48 hours was significantly higher in group KM compared to group C. Painscores, vital parameters and side-effects did not differ significantly between groups at 12 hours, 24 hours and 48 hours postoperatively.

Conclusion(s): The addition of s-ketamine to a PCA with piritramide reduced the total postoperative opioid consumption. The addition of the combination of ketamine and MSO4 increased the total postoperative opioid consumption. Neither s-ketamine nor the combination of s-ketamine and MSO4 led to a clinically relevant reduction of side-effects or improvement of postoperative analgesia using PCA with piritramide for abdominal surgery.

14AP1-10
Diclofenac/orphenadrine versus tramadol attenuates early and late pain after spine surgery

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Background and Goal of Study: Effective postoperative pain management should provide subjective pain relief, minimize adverse effects and allow the patients to return to normal daily activities as soon as possible. This study examined the efficacy and safety of diclofenac/orphenadrine and local anesthetics in treating postoperative pain following spine surgery.

Materials and Methods: After IEB approval and patient informed consent, 82 patients scheduled for spine surgery under general anaesthesia were enrolled in a prospective, randomized controlled study over 6 months period (Feb–Nov 2007). Group N (44 patients) received an iv infusion of diclofenac 75mg + orphenadrine 30mg before surgical incision, while group T (38 patients) received 100mg tramadol 20min before completion of surgery. All patients had local wound infiltration with 20ml ropivacaine 0.125%. The iv infusion was repeated at 12h in group N and at 8h in group T up to 24 hs. For supplemen-
tary anaesthesia, iv paracetamol was used for maintaining VAS<40mm (maximum 4g/d) in the first 24h. We assessed the incidence of bleeding and blood transfusion requirements, incidence of gastrointestinal events, VAS at rest and at movement 2, 6, 12 and 24 hs, paracetamol consumption, incidence of pain at 48h and at discharge were recorded. Statistics used were t-test, χ2-test and Mann-Whitney U-test.

Results and Discussion: No significant differences between groups were registered in demographics, surgery duration, blood losses intra- and postoperatively, number of thrombocytes, creatinin levels. Patients in group N had lower incidence of nausea and vomiting episodes (p<0.05), lower number of thrombocytes, creatinin levels. Patients in group N had lower vital parameters and side-effects did not differ significantly between groups at 12 hours, 24 hours and 48 hours postoperatively.

Conclusion(s): The addition of s-ketamine to a PCA with piritramide reduced the total postoperative opioid consumption. The addition of the combination of ketamine and MSO4 increased the total postoperative opioid consumption. Neither s-ketamine nor the combination of s-ketamine and MSO4 led to a clinically relevant reduction of side-effects or improvement of postoperative analgesia using PCA with piritramide for abdominal surgery.

References:

14AP1-11
Preemptive or preventive? The best time for pre-operative analgesia using dexketoprofen in laparoscopic surgery

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Background and Goal of Study: The issue of preemptive vs preventive using NSAIDs still raises questions in terms of multimodal analgesia. This prospective, randomised, double-blinded study compares postoperative pain intensity and analgetic consumption when Dexketoprofen-based analgesia was used at two different moments perioperatively in laparoscopic surgery.

Materials and Methods: Two demographically equivalent groups of 50 pa-

<table>
<thead>
<tr>
<th>Group</th>
<th>2h</th>
<th>6h</th>
<th>12h</th>
<th>24h</th>
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<tbody>
<tr>
<td>N (44)</td>
<td>4.2±1.5 6*</td>
<td>3.85±1.47 6*</td>
<td>3.90±1.35 6*</td>
<td>3.52±1.16 6*</td>
</tr>
<tr>
<td>T (38)</td>
<td>2.87±1.28</td>
<td>2.96±1.24</td>
<td>3.12±1.50</td>
<td>2.56±1.32</td>
</tr>
</tbody>
</table>

*p<0.05.

Pain scores at 48h and at discharge time were better in group N vs T (p<0.05).

Conclusion(s): Diclofenac/orphenadrine iv administered before surgical inci-
sion provides good analgesia with no side effects and faster recovery comparing with tramadol. Tramadol and Metamizol using a predefinite analgesia prescription. Pain intensity, analgetic consumption and rescue analgesia (Pethidine 25 mg iv boluses when VAS was greater than 3/10) were recorded for the first 24 hours postoperatively. To test the statistic signficance of the differences observed in the time-related evolution of these variables, Student test for central tendency (average) and dispersion indices (standard deviation, dispersion quotient) were used.

Results and Discussion: Patients in group A had a better postoperative anal-
gesia, in terms of VAS pain score (mean VAS 0.7±0.04 vs 1.1±0.07) and pain free hours (10.1±1.2 vs 7.3±1.4), a lower number of Pethidine mean doses (5.6±1.4 vs 11.8±2.1 mg), all results with p<0.05 and a better sleep (qualitative assessment of the patient) than subjects in group B. Side effects (nausea, vom-
iting, excessive sedation, gastro-intestinal bleeding) were comparable in both groups.

Conclusion(s): While both methods being better analgetic regimens when compared with postoperative standard analgesia, preemptive intervention with Dexketoprofen appears more effective than preventive analgesia in moderate amplitude laparoscopic surgery.

References:
1. G. Iohom et al., Effect of perioperative administration of dexametazone on opioid require-

14AP1-4
The postoperative analgesic effect of local applied S(+)-ketamine after inguinal hernia surgery: A double-blinded, randomized, controlled trial

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Anesthesiology, University Hospital of the Saarland, Homburg, Germany

Background and Goal of Study: Caudal applied S(+)-ketamine has been shown as effective for analgesic supplementation in patients who underwent groin hernia repair [1]. No data are available about the effect of intraoperatively perineural applied S(+)-ketamine on acute postoperative pain after hernial repair.

Materials and Methods: IRB-approved randomised, double-blinded study in 85 patients undergoing open groin surgery under general anesthesia. Anesthetic equipment and intraoperative management was standardized in all patients. According to previous randomisation either local perineural S(+)-ketamine (0.5 mg/kg in 4 ml saline, group KET) or Placebo (4 ml saline, group SAL) was appli-
ced around N. Lumbalis before final wound closure. Postoperative pain intensity according to VAS at PACU, 6h, 24h, additional morphine consump-
tion, duration of hospital stay, and patients’ satisfaction with postoperative pain therapy (rated as excellent or not excellent) were evaluated by an independent investigator. Statistics:U-test, χ2-test.

Results and Discussion: Demographic data, duration of anaesthesia and surgery were comparable between the two groups. Exclusion of five patients due to protocol violation. Severity of postoperative pain and consumption of additional morphine (CM) are shown in table 1. Patients with local applied S(+)-ketamine rated the quality of pain management significantly more often as “excellent” (p<0.001). Also the length of hospital stay was significantly reduced in KET-patients (p=0.03).

<table>
<thead>
<tr>
<th>Table 1</th>
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</thead>
<tbody>
<tr>
<td>KET (n=38)</td>
</tr>
<tr>
<td>VAS at PACU</td>
</tr>
<tr>
<td>VAS at 6h</td>
</tr>
<tr>
<td>VAS at 24h</td>
</tr>
<tr>
<td>CM (mg)</td>
</tr>
</tbody>
</table>

Data are expressed as mean (±SD) or median values.

Conclusion(s): Perineural applied S(+)-ketamine may reduce the severity of acute post-hernorhapy pain significantly and may improve patients’ satisfac-
tion with postoperative pain therapy. Further studies should examine the effects of this technique on chronic post-hernorhapy pain during a long-term follow-
up.

References:
1. G. Iohom et al., Effect of perioperative administration of dexametazone on opioid require-
14AP3-2

Gabapentin attenuates late but not early postoperative pain after thyroidectomy with peripheral cervical plexus block

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Background and Goal of Study: The interest of the adjunction of gabapentin to superficial cervical plexus block (SCPB) on early and late postoperative pain 6 months after thyroidectomy was investigated in a double blinded randomized study.

Materials and Methods: Fifty consecutive consenting patients were randomized to receive 1200mg of gabapentin (group G) or placebo (group P) two hours before surgery. Preoperative anxiety score was noted with a numeric scale from 0 to 6. A SCPB was performed after a standardized induction of the anesthesia. Intravenous basal analgesic drugs consumption and duration of stay in the postoperative care unit were noted. During the first 24 postoperative hours, pain levels at rest and during swallowing were measured by a numeric scale from 0 to 10, as well as analgesic consumption, which was the primary outcome. If the pain level was superior to 4/10 at rest, patients received 16/8th of intravenous paracetamol and/or 50mg/6th of intravenous tramadol as a rescue analgesic treatment in the interval. The day before surgery and 6 months after thyroidectomy, included patients were asked to answer a neuropathic pain diagnostic questionnaire (DN2) and the French Short MPQ-QDSA questionnaire. A pre-protocol analysis was performed with non parametric tests for quantitative variables, and $\chi^2$ test or Fischer exact test when appropriate for qualitative variables. Results are shown as median [range].

Results and Discussion: Population characteristics, anxiety level, intraperoperative drug consumption and time spent in the postoperative care unit were comparable in both groups. Total analgesic consumption during the first 24 postoperative hours was similar in both groups (G: 3 [0;5.5] doses/24h; P: 3.7 [0;5] doses/24h; P=NS), as well as consumptions of paracetamol (G: 6 [0;4] g vs P: 5 [0;4] g; p=NS) and tramadol (G: 0 [0;52] mg vs P: 0 [0;150] mg; p=NS). Pain levels were comparable at rest (G:2 [2;2;0;2;7]; P: 2 [0;2;3;7]; P=NS), and during swallowing (G: 2 [0;8;6;8]; P: 3 [0;1;6;3]; P=NS). Eight patients had a DN2 score $\geq$ 3 six months after surgery versus two in preoperative period ($p=0.04$). Among the eight patients, seven belonged to the group G ($p=0.01$ vs group G). QDSA-s score revealed a decrease of sensorial pain in the gabapentin group (G: 0 [0;4]; P: 0 [0;16]; $p=0.02$), but without any difference in affective compound (G: 0 [0;2]; P: 0 [0;13]; P=NS).

Conclusions: Oral preoperative administration of gabapentin did not modify immediate pain management after thyroidectomy under SCPB, but seems to prevent delayed pain at 6 months.

14AP3-3

Acute postoperative pain in laparoscopic bariatric surgery

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Background and Goal of Study: Anesthesia of the obese patients represents a challenge for the anaesthesiologist who must face the anatomic landmark techniques difficulties as well as frequent comorbidities (diabetes, hypertension, obstructive sleep apnoea) of these patients. Postoperative analgesic requirements for bariatric surgery have decreased since laparoscopic techniques have extended in the last years; consequently it has been necessary to adapt the analgesic protocols to the new surgical techniques. The purpose of our study is to assess the quality and safety of multimodal drug regime with intravenous PCA morphine in laparoscopic bariatric surgery.

Materials and Methods: We evaluated the daily records of postoperative acute pain treatment of 15 consecutive patients operated of bariatric surgery in order to know the intravenous morphine requirements until hospital discharge. Postoperative analgesic regime consisted of intravenous paracetamol alternated with dipyrone or desketoprofen q 8 h plus intravenous PCA morphine. The variables analyzed are represented in table 1.

Results and Discussion: see table 1.

Conclusion(s): Multimodal drug regime with intravenous PCA morphine is an effective and safety postoperative analgesic regime for laparoscopic bariatric surgery avoiding the technique difficulties associated to epidural analgesia in obese patients. - It would be necessary to design prospective large studies comparing the safety and efficacy of intravenous PCA morphine with other analgesic regimes for laparoscopic bariatric surgery.

References:

14AP3-4

Morphine sparing effect of a combination of diclofenac and orphenadrine (Neodolpasse®) during the first 24 hours after primary cementless unilateral total hip arthroplasty

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Background and Goal of Study: Parenteral administration of angesics is preferable in postoperative patients due to fast onset of action and lack of any first pass effects. Thereby a drug combination of different pharmacological classes with different biochemical pathways may improve analgesia while reducing or preventing adverse side effects. This prospective randomized, double-blind, placebo-controlled, multicenter clinical trial investigated efficacy and safety of a combination of the NSAID diclofenac and the centrally acting analgesic orphenadrine which has also muscle relaxing properties (Neodolpasse® Infusion, Fresenius Kabi).

Materials and Methods: 120 patients (62 m, 58 f, mean age 62.9±10.1) scheduled for primary unilateral total hip arthroplasty were enrolled. 15 mg bupivacain was used for spinal anaesthesia. Morphine was the primary anaesthesics for postoperative analgesia administered by patient-controlled-analgesia (PCA). Single PCA bolus was 2 mg morphine, lockout period was 10 min, and up to 5 boluses per hour were allowed. For study reasons patients received additionally either 2 infusions of Neodolpasse® (75 mg diclofenac and 30 mg orphenadrine in 250ml saline) or saline (250ml) during the first 24 hours after surgery. Primary parameter was total PCA morphine dose over the first 24 hours post-surgery. VAS score was assessed to measure pain intensity. Statistics were performed using two-sample t-tests with $p=0.025$ one-sided. Assuming a mean treatment difference of 10±20 mg and 60 patients per group the power of the study was 80%.

Results and Discussion: Subjective pain intensities were comparable in both groups (Figure 1) and there were no relevant adverse side effect. Neodolpasse® significantly reduced PCA morphine by approx. 31% compared to saline (38.7±41.3 vs. 55.9±31.1 mg; mean±SD; p=0.025). Also the total postoperative use of morphine was reduced after Neodolpasse® (45.0±3.7 vs. 64.3±4.1 mg; mean±SD; p=0.025).

Table 1. Variables analyzed

<table>
<thead>
<tr>
<th>Sex</th>
<th>Female (66%)</th>
</tr>
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<tbody>
<tr>
<td>Age (years)</td>
<td>42.3±12.2</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>48.3±6.8</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>7 (46%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Obstructive Sleep Apnoea</td>
<td>10 (66%)</td>
</tr>
<tr>
<td>Others</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Morphine consumption (mg/day)</td>
<td></td>
</tr>
<tr>
<td>Day of surgery</td>
<td>31.4±20</td>
</tr>
<tr>
<td>First postoperative day</td>
<td>12.4±16</td>
</tr>
<tr>
<td>Adverse effects</td>
<td></td>
</tr>
<tr>
<td>Sedation/respiratory depression</td>
<td>0</td>
</tr>
<tr>
<td>Insufficient analgesia (VAS=3)</td>
<td>0</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>1</td>
</tr>
<tr>
<td>Pruritus</td>
<td>1 (6%)</td>
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</tbody>
</table>

Hospital stay (days) 2.8±0.85

Conclusion(s): Additional use of Neodolpasse® significantly reduces the postoperative morphine requirements of patients undergoing primary unilateral total hip arthroplasty.
Acknowledgements: The authors are grateful to Fresenius Kabi for supporting this study.

Disclosure: This clinical trial was financially supported by Fresenius Kabi Deutschland GmbH.

14AP3-5
Postoperative epidural analgesia with sufentanil or morphine in patients with gastrointestinal surgery, a prospective randomized control study
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Department of Anesthesia, Fudan University Cancer Hospital, Shanghai, China

Background and Goal of Study: The gastrointestinal surgery is associated with severe postoperative pain which interferes patient’s early rehabilitation if insufficient treatment is delivered. The purpose of the study is to detect the effect of sufentanil or morphine on postoperative pain relief, in combination with ropivacaine by using patient-controlled epidural analgesia setting, and the minimum effective dosage of sufentanil.

Materials and Methods: Eight-four patients with gastrointestinal surgery were randomly allocated to 0.58 μg/ml sufentanil (group 1), 0.5 μg/ml sufentanil (group 2), or 0.03 mg/ml morphine (group 3), respectively, which was solved to 0.9% NS in a patient-controlled epidural analgesia combination with ropivacaine. The loading volume of group 1 or group 2 was 5 ml, respectively. The loading dose of group 3 was 3 mg morphine. The basal rate was 3 ml/h, and demand rate was 2 ml for 20 minutes. The visual analogue scale for pain, solution consumption, breath rate, heart rate, and blood pressure in 24 hours and 48 hours postoperatively were recorded. The side effects were evaluated by the level of patient’s nausea, vomiting and itching.

Results and Discussion: Group 2 was significantly different from group 1 and group 3 regarding visual analogue scale for pain. The effect of analgesic in group 2 is significant weakly. Patients in group 2 used more local anesthetic than those in groups 1 and 3 (p<0.05). The side effects of group 3 were more than group 1 and group 2. There were no significant difference in the three groups in patient’s breath rate, heart rate and blood pressure. Sufentanil is a weekly opioid receptor agonist. Characteristics include high lipid solubility, high analgesia effect, wide safety range, less respiration depression, and low incidence of side effects. We choose 0.58 μg/ml sufentanil as standard dose to study, which is more effective on pain relief than that of 0.5 μg/ml sufentanil. Its analgesia effect was as the same as the 1 in 0.03 mg/ml morphine. There were more side effects, such as nausea, vomiting and itching in 0.03 mg/ml morphine, which was significantly different from other two groups.

Conclusion(s): Sufentanil (0.58 μg/ml) is better used in patient-controlled epidural analgesia after gastrointestinal surgery with less side effects.

14AP3-6
The analgesic efficacy of intravenous paracetamol in acute postoperative pain after gynaecological laparoscopy
I. Vanags, A. Sondore, I. Kokans, A. Sleznina
Department of Anaesthesiology and Reanimatology, Riga Stradiņa University, Riga, Latvia

Background and Goal of Study: The goal of this study was to determine whether the administration of single dose of paracetamol before end of surgery could reduce postoperative pain which interferes patient’s early rehabilitation if insufficient treatment is delivered. The purpose of the study is to compare the efficacy of paracetamol in a dose of 1000 mg, administered intraoperatively before the end of the gynaecological laparoscopy, decreases postoperative pain and reduced fentanyl consumption with 25% during the first 24 h following surgery. 2. The analagic effect of paracetamol was more demonstrative during first four postoperative h. 3. No significant differences in side-effects were observed between study-groups.

References:

14AP3-7
Loading dose of intravenous paracetamol for postoperative analgesia for minor hand surgery: Comparison between 1g and 2g
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Department of Anaesthesia and Intensive Care, University of Lége, CHU Sart Tilman, Lége, Belgium

Background and Goal of Study: Paracetamol (PCTM) is widely used for postoperative analgesia at a recommended dose of 1g per six hours for an adult undergoing low to mild painful surgery (1). Some authors suggested to use 2g as a starting dose without risk of toxicity for ASA II adult patients (2, 3). However, there are few published data to assess this practice.

Materials and Methods: After IRB approval and informed consent, 60 adult patients (ASA II-III) scheduled for minor hand surgery (carpal tunnel release or arthrodynovaly cysts) were enrolled in a prospective study. Anaesthesia was achieved with intravenous regional anaesthesia by using 40 ml of lidocaine 0.5%. Patients were randomized in two groups, the first one (n=30) received 1g of PCTM and the second one (n=30) 2g of PCTM during surgery. Analgesic consumption, verbal numeric score (VNS) from 0 to 10, first night sleep quality and patient’s satisfaction were recorded. ANOVA for repeated measures, Mann-Whitney, t-test and Fischer exact test were used with p < 0.05 as significant.

Results and Discussion: No difference in demographic data was found between the two groups. We didn’t observe any significant difference in the rescue analgesic consumption, sleep efficiency and patient’s satisfaction. However, analgesic scores were significantly reduced (p = 0.044) in the group who received 2g of IV PCTM peroperatively (figure).

Conclusion(s): Postoperative analgesia is improved with increased loading dose of PCTM. We recommend thus the use of 2g of PCTM as a starting dose postoperatively.

References:

14AP3-8
Efficacy of intrathecal morphine with or without clonidine for postoperative analgesia after radical prostatectomy
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Background and Goal of Study: Rachialalgesia (RA) has proved to be effective in various surgical procedures. However very few has been published about RA combined with Clonidine in urological surgery. The aim of this study was to assess the efficacy and safety of morphine RA without clonidine after major carcinologic urologic surgery.

Materials and Methods: After approval of our local ethic committee, 50 patients have been included in 3 groups (C = control, M = RA/morphine, MC = RA/morphine + clonidine). In all groups a PCA morphine was systematically given...
to the patients for postoperative analgesia. Before induction of general anesthe-
sia, morphine (4 mcg/kg) was administered by intrathecal route in group 2, in
association with clonidine (1 mcg/kg) in group 3. Induction and maintenance of
general anesthesia were standardized. Delay of tracheal extubation and first de-
mand on PCA, morphine consumption, VAS score at rest and after cough and adverse
effects (pruritus, PONV, respiratory depression) within the first 48 hours were recorded. We also reported epinephrine consumption and perfusion load in all groups. A Kruskal Wallis or a Mann Whitney test were used for statistical analysis of quantitative values with P<0.05 to indicate statistical significance.

Results as median [Interquartiles 25-75].

Results and Discussion: There was no significant clinical or demographic dif-
ference at baseline. Morphine consumption (65.5mg [25-76.8] vs. 25mg [6.5-
54] vs 18mg [3.75-42.5], P<0.01) and VAS scores at rest and after cough were
significantly lower in groups M and MC. First demand on PCA was earlier in
group C than in other groups. There was no difference in delay of tracheal extu-
bation and adverse effects in all groups. Epinephrine consumption and perfusion load were higher in the MC group compared to other groups.

Conclusion(s): In conclusion, RA improve postoperative analgesia after radical
retropubic prostatectomy in comparison with PCA alone. This benefit is ac-
quired until the first 18 postoperative hours and prolonged until the 24th hour if
clonidine is added. No major adverse effect was found in any group of this study.

14AP3-9

Intrathecal midazolam enhances the anaesthetic and postoperative analgesic effects of Meperidine; a prospective randomised controlled double blind clinical trial comparing intrathecal Meperidine and Meperidine with Midazolam

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Background and Goal of Study: Safe intrathecal local anaesthetics are not
available in some parts of the world and 5% Lignocaine is still being used
at some places inspite of concerns with transient neurological symptoms. Meperidine is the only member of the opioid family that has clinically impor-
tant local anaesthetic activity in the dose range normally used for analgesia. A dose of 1mg/kg intrathecal Meperidine provides surgical anaesthesia for 40-77
minutes, a duration that may be too short for some procedures. Intrathecal mi-
dazolam has shown a moderate prolongation of postoperative analgesia when
used as an adjunct to bupivacaine in patients undergoing LSCS. We wished
to investigate the feasibility of using Meperidine and Midazolam as intrathecal
adjuncts for anaesthetic effects and postoperative analgesia.

Materials and Methods: After institutional ethics committee approval, 100 pa-
tients (ASA I-II) scheduled for lower limb and perineal surgery, gave written
consent and were randomised to receive 1mg/kg Meperidine (group-I; n=50) or 1mg/kg Meperidine + 2mg Midazolam (group-II; n=50), intrathecally. Pain
was measured with VAS. Parameters observed were sensory and motor block,
time to first pain, time from first pain to distressing pain (VAS 5 at rest and 8
on cough), total duration of analgesia.Side effects noted were sedation, urinary
retention, respiratory depression, nausea, vomiting, pruritus, hypotension and
bradycardia. One way analysis and student’s t test with bonferreni correction
was used for analysing the differences in parametric data among the groups.
P<0.05 was considered statistically significant.

Results and Discussion: Demographic data, Baseline heart rate, blood pres-
sure, and the surgical procedures did not differ significantly among the groups. 3 patients in group I required GA. Motor block was comparable in both the groups whereas the sensory block was prolonged in Group-II (75±14) vs Group-I (124±22 minutes; p<0.001). Time to first pain, time from first pain to distressing
pain, and total duration of analgesia was also prolonged in group-II vs group-I.
Sedation was seen in 2 (4%) patients in Group-II. Nausea, Vomiting was less
in group-II (4%) than group-I (14%). No pruritus, urinary retention, respiratory depression or bradycardia was seen in any of the patients.

Conclusion(s): Intrathecal Midazolam enhances the anaesthetic and analgesic effects of Meperidine. We reccomend the use of Meperidine and Midazolam in
combination as an alternative to spinal anaesthesia where safe local anaesthetic
ics are not available.

14AP3-10

Placebo-controlled study of the opioid-sparing effect of intravenous paracetamol after lumbar laminectomy and discectomy

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Background and Goal of Study: Paracetamol, a centrally acting inhibitor of
cyclooxygenases, doesn’t have the adverse effects of non steroidal antiin-
flammatory drugs. We aimed to evaluate analgesic efficacy, opioid-sparing and
opioid-related adverse effects of intravenous paracetamol, in combination with
iv morphine after lumbar laminectomy and discectomy.

Materials and Methods: Forty ASA I-II patients scheduled for lumbar discectomy-
laminectomy were enrolled to this study. Standard general anes-
thesia was performed to each patient. Patients were randomly divided into two
groups. Paracetamol 1g in Group I (Paracetamol group) and 0.9% NaCl 100
ml in Group II (placebo group) was infused at the end of the operation and at
6 hours intervals over 24 hours. Iv patient-controlled analgesia (PCA) morphine
was used as a rescue analgesic in both groups. Pain was evaluated at rest and
on movement at the 1st, 2nd, 4th, 6th,12th, 18th and 24th hours by using
Visual Analog Scale (VAS);(0:no pain, 10:most severe pain). Hemodynamic pa-
rameters, morphine usage, patient satisfaction and probable side effects were
also evaluated.

Results and Discussion: Pain scores at rest and on movement at the 12th,
18th and 24th hours were significantly lower in group I (p<0.001).

Figure 1. VAS level during movement in both groups. Group I: paracetamol, Group II: placebo. "p<0.05.

In all evaluation times morphine consumptions were lower in group I than group
II, but the difference wasn’t statistically significant (p>0.05). Vomiting in group II
was significantly higher (p=0.027). Significantly more patients in the paracetamol
group rated their pain management as excellent (65% versus 5%) (p=0.008).

Figure 2. Global Evaluation Rating Scores in Group I (paracetamol) and Group II (placebo) at the end of 24th postoperative hour (p<0.05).

Conclusion(s): After lumbar laminectomy- discectomy iv paracetamol com-
bined with iv PCA morphine doesn’t cause significant opioid-sparing effect but
decreases VAS scores and incidence of vomiting and increases the rate of pa-

tient satisfaction.
Comparison of remifentanil PCA effect site TCI versus morphine PCA for treatment of acute pain after uterine artery embolization

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Background and Goal of Study: Postoperative pain is a major issue during the first 12 hours after uterine artery embolization (UAE). This prospective, double-blind, randomized study was designed to compare a conventional morphine PCA with a remifentanil PCA effect site TCI system.

Materials and Methods: Nineteen patients (ASA I, II), suffering from a uterine leiomyoma and scheduled for UAE, gave written informed consent. The endpoint was the measurement of pain intensity using a Numerical Rating Scale (NRS; 0 = no pain, 10 = worst pain). These scores were obtained from the start of the procedure, at 15 minutes intervals during the first 2 hours and thereafter at 4, 8, 12 and 16 hours. Morphine was administrated by a conventional PCA system, administering 2 mg of bolus dose with a lock-out period of 10 minutes and a dose limit of 30 mg every 4 hour. Remifentanil was titrated using the TOOLS-BOX TCI software using the Minto set. The algorithm started at 0.5 μg/ml with stepwise increments of 0.5 μg/ml up to 2 μg/ml and 0.2 μg/ml above 2 μg/ml, at each patients demand. If the patient didn’t push for 30 minutes, the concentration was decreased by 0.2 μg/ml. Both PCA systems were commanded by the same handset button.

Results and Discussion: During the first 2 hours, NRS values were statistically lower in the remifentanyl group. After that, the NRS values of the morphine group decreased and there was no more statistical difference. In terms of efficacy, the remifentanil delivering system achieved a mean NRS lower or equal than 3 from the beginning whereas the morphine system needed 240 minutes to stay below 4.

During the first 12 hours, a mean remifentanil Ce of 1.95±1.09 ng/ml was obtained. The highest calculated mean Ce was 3.36 ng/ml 4 hours after arrival. In the other group, a mean dose of 21.2 mg ±3.0 iv morphine was necessary to achieve efficacy at 4 hour.

Conclusion(s): The tested algorithm of the remifentanil effect site PCA TCI system is a faster and more efficient treatment for acute pain observed after uterine embolization than a standard morphine PCA. In the future, the efficacy and safety of remifentanil PCA TCI must be confirmed in other contexts of painful procedures and in larger trials.
analysis was used. Statistical analysis was performed with the use of Student’s t-test.

**Results and Discussion:** GBP and TGB produced a dose-dependent inhibition of both phases of the formalin test. Both drugs exerted the antinociceptive effect increasing by 30% (AEDO) in the hot plate test. The isobolographic analysis revealed that the combination between studied drugs was synergistic in the second phase of the formalin test and additive in the first phase of the formalin test and in the hot plate test in mice.

**Conclusion(s):** From a preclinical pain of view, combination between GBP and TGB seems to be effective in the management of neuropathic pain due to the synergistic interaction in the second phase of the formalin test in mice.

14AP4-4

Polyamine deficient diet opposes the development of pain sensitization after surgery in rats

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**Background and Goal of Study:** The concept of pre-emptive analgesia is defined as a treatment initiated before surgical procedure to prevent pain sensitization. After tissue injury, it does exist an abnormal persistence of nervous system sensitization. This neuroplasticity leads to exaggerated NMDA-dependent post-operative hyperalgesia and is also now considered as a major mechanism for chronic pain development. However, long-term treatments with NMDA-receptor antagonists are limited by unacceptable side effects. Since polyamines modulate NMDA-receptor function and mainly originate from normal dietary intake and bacterial metabolism in the gut, we developed a nutritional therapy based on a polyamine deficient diet (PDD) for preventing exaggerated post-operative pain and long-lasting pain vulnerability.

**Materials and Methods:** Since tyrosine phosphorylation enhancement of the spinal NR2B subunit of NMDA-receptors is associated with inflammatory hyperalgesia we evaluated the PDD ability to opposes overactivation of NR2B subunits. Carrageenan inflammatory model and incisional pain model were used in one hind paw of rats treated or not with fentanyl (4 x 100μg/kg, s.c.). Noxious threshold (NT) was evaluated using the paw pressure-vocalization test. Postural disequilibrium was also evaluated in rats. Once NT returned to normal values, rats were exposed to repeated non-noxious environmental stress (NINES) for 1 hour.

**Results and Discussion:** We reported that a preventive polyamine deficient diet (PDD) for 7 days prevented the enhancement of tyrosine phosphorylation of the spinal NR2B subunit of NMDA-receptors is associated with inflammatory hyperalgesia we evaluated the PDD ability to opposes overactivation of NR2B subunits. Carrageenan inflammatory model and incisional pain model were used in one hind paw of rats treated or not with fentanyl (4 x 100μg/kg, s.c.). Noxious threshold (NT) was evaluated using the paw pressure-vocalization test. Postural disequilibrium was also evaluated in rats. Once NT returned to normal values, rats were exposed to repeated non-noxious environmental stress (NINES) for 1 hour.

**Conclusion(s):** Since PDD was devoid of any noticeable side effects, this nutritional therapy could be an "ideal" and safe strategy for pre-emptive analgesia to reduce or inhibit the transition from acute to chronic pain and its outcomes in various pain syndromes.

**References:**

14AP4-6

Acute tolerance to remifentanil modifies the sevoﬂurane MAC in the rat

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**Background and Goal of Study:** Although remifentanil can produce acute tolerance in the postoperative period, no studies have been conducted to determine whether this effect has clinical significance in the intraoperative period or whether it can actually increase analgesic requirements. Our hypothesis was that remifentanil could induce clinically relevant tolerance in the very short term so the objective was to determine if in rats, the decrease in MAC produced by remifentanil is reversed with time.

**Materials and Methods:** Twenty-one male Wistar rats were anaesthetised with sevoﬂurane in oxygen, and the MAC was determined before (MACso) and after (MACcor) the administration of a continuous infusion of remifentanil. Ninety minutes later MACcor was re-determined, MAC was determined from intratracheal gas samples. Tail clamping was used as the supramaximal stimulus. Samples were assayed using a side-stream analyser (Capnomac Ultima, Datex). Two remifentanil infusion rates were tested: 120 or 240 μg/kg/h. Basic cardiovascular and respiratory parameters were recorded. Statistical analysis was performed with Statview software (Abacus Concepts). The study was approved by the Institutional Ethics Committee.

**Results and Discussion:** Both remifentanil infusion rates reduced the MACso in a dose-dependent fashion by 24% for the low dose and 36% for the high dose at the first measurement and by 13% and 19%, respectively, at the second measurement.

**Conclusion(s):** Remifentanil induces acute tolerance, i.e., in less than two hours, as determined by decrease in the reduction of the MACso produced by remifentanil. The observed effect may have clinical implications although further work is needed to determine if the effect also occurs in humans and is of clinical significance.

14AP4-7

Effect of duloxetine on FOS expression in the brain stem of rats

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**Background and Goal of Study:** Many drugs studied for neuropathic pain were originally created for other purposes, but with current use a niche has been found for their use in the relief of symptoms in patients with persistent neuropathic pain. Our objective is to study the effect of duloxetine, on the expression of protooncogen c-fos in the central nervous system, specifically on the key pain-controlling centres of the brain stem, the periaqueductal grey matter (PAG) and the nucleus raphe magnus (rMg) in healthy animals.

**Materials and Methods:** The study used 10 male Sprague-Dawley rats weighing 250g, divided into two groups: CSF group (physiological control) received an iaperitoneal injection of 1 ml of saline and the DUL group (duloxetine) an intraperitoneal injection 30 mg/kg of duloxetine. After 150 minutes the animal was anaesthetised and sacrificed, taking samples of the area to be studied, undergoing different immunocytochemical procedures to reveal fos protein expression. The levels corresponding to the brain stem were selected with the aid of the Paxinos and Watson atlas. The distribution pattern of Fos-immunoreactive cells was obtained from drawings in which the Fos-positive neurons were plotted manually. These drawings were prepared by an experimenter who did not know which experimental group the preparations belonged. The statistical was carried out using SPSS software.

**Results and Discussion:** Table I shows the results of the mean number of immunoreactive cells of the two groups at the level of the hemisection 40 microns thick of the caudal portion of the PAG and the rMg at Bregma level -8.30 mm. In the CSF group there was a mean of 5 Fos cells in the PAG, mainly at the rostral level. In the DUL group there was an overall significant increase (p<0.001) in Fos expression in the PAG, especially at the lateral and ventrolateral level, and in rMg. Demonstrates that the application of a stimulus such as duloxetine causes changes in the pattern of c-fos expression in the structures of the pain control circuit, the increase in c-fos expression standing out particularly in the ventrolateral subregion of the PAG and the rMg.

**Conclusion(s):** These results indicate that the nucleus rMg and part of the PAG are clearly involved in the anesthetic effect of this drug.

**References:**

14AP4-8

Comparison of the recovery profile of hyperalgesia tested by three different stimuli in postoperative pain model of rats

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Background and Goal of Study: A surgical incision model of rats is used to study postoperative pain (1). Usually, von Frey filament withdrawal response or thermal withdrawal response is used to analyze hyperalgesia induced by incision. However, hyperalgesia tested by different stimuli might have different profiles. This study was performed to know the different recovery profiles of hyperalgesia tested by three different stimuli.

Materials and Methods: Eight male Sprague-Dawley rats with lumbar intrathecal catheters were anesthetized with halothane. A 1 cm longitudinal incision was made through skin and fascia of the plantar aspect of the foot, starting 0.5 cm from the proximal edge of the heel. The plantaris muscle was elevated. The skin was apposed with 2 mattress sutures of 5-0 nylon. Before surgery and 2, 24, 48, 72, 96, 120, 144, and 168 hours after surgery, withdrawal response to von Frey filament application, thermal withdrawal response to light beam, and weight bearing were tested on both paws.

Results and Discussion: Non-operated paw did not show any changes in all three tests during the study period. Withdrawal threshold for von Frey filament stimulus, thermal withdrawal latency, and weight bearing significantly decreased on the operated paw. The former two had the lowest values at 2 to 48 hours and gradually increased thereafter. The increase was larger with thermal withdrawal response. Recovery of weight bearing was faster with thermal withdrawal latency followed by von Frey filament withdrawal threshold. The recovery in weight bearing was not observed in 7 days.

References:

14APS-1
Pain management after major abdominal surgery: A cost-effectiveness analysis of different analgesia regimens
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Background and Goal of Study: The goal of our study is to assess the efficacy, safety and economic aspects of different regimens used for postoperative pain management in major abdominal surgery patients.

Materials and Methods: 288 patients with major abdominal procedures between January-June 2007, have been retrospectively selected from data base of Emergency County Hospital of Constanta. During postoperative follow-up period of 5 days, the subjects ASA I-II, aged 30-65 years, have received continuous epidural analgesia with local anesthetic (group E, n = 86), IV/M morphine (group M, n = 86) and IV/Parecoxib (group P, n = 94). Pain scores, rate of catheter associated complications, incidence of postoperative nausea and vomiting and CNS symptoms, incidence of thromboembolic events and supplemental analgesia were daily recorded for all groups. Total hospitalization costs per patient were calculated from hospital billing records. Statistical analysis has used t test and chi-square as required.

Results and Discussion: Satisfaction analgesia was found in 84 cases (97.67%) in group E, in 71 cases (80.68%) in group M and in 73 cases (77.65%) in group P. The rate of epidural catheter associated complications was 1.18% in group E, 5 subjects in group E have experienced postoperative nausea or vomiting (10.46%), whereas these side effects have appeared in 76 subjects in group M (86.36%), respectively in 30 subjects in group P (31.91%) (p < 0.05). CNS symptoms were detected in 2 cases in group E (2.32%), in 56 cases in group M (63.62%) and in 4 cases in group P (4.25%), (p < 0.05). Thromboembolic events were registered in only 1 case in group P (1.06%). 4 patients required for rescue analgesia in group E (4.65%), whereas additional analgesia was administered for 7 patients in group M (7.95%), respectively for 30 patients in group P (31.91%), (p < 0.05). Total hospitalization costs per patient during follow-up period were 1350±28 for group E, 2790±16 for group M, 2012±30 for group P, (p < 0.05). These statistically significant differences could be explained by the incidence of analgesic regimen side effects that significantly impacted hospital costs.

Conclusion(s): Continuous epidural analgesia seems to be the most cost-effective method for postoperative pain relief in major abdominal surgery patients. Parecoxib therapy could be a satisfactory alternative but it is associated with additional analgesia requirements. Although morphine has a good analgesia profile, the associated motilities and their correspondent costs decrease its effectiveness.

14APS-2
Assessing the incidence of postoperative nausea and vomiting after intrathecal morphine using the Apfel score
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Background and Goal of Study: Intrathecal administration of morphine for postoperative analgesia is common. It results in a lesser need for opioids in the direct postoperative phase. Postoperative Nausea and Vomiting (PONV) is reported as a major drawback. Only in a minority of publications, PONV was the primary subject of study. Apfel suggested a risk classification (Apfel-Score) and advised on a grading of PONV. In none of the studies on intrathecal morphine, PONV was examined using the Apfel Score. Assessment of the incidence of PONV according to the Apfel Score could guide the prevention of PONV. We investigated the occurrence of PONV related to the Apfel Score in patients treated with intrathecal morphine.

Materials and Methods: An observational study was conducted on all patients scheduled for spinal anaesthesia and intrathecal morphine in a 4 month period. Patients with a history of PONV were excluded because they received antiemetic prophylaxis. Patients were graded by the Apfel Score. Classification of PONV was done as follows: 1. Nausea: No vomiting or retching. 2. Retching: vomitting like movements without expelling gastric content. 3. Vomiting: Expelling gastric content. Patients were followed till 24 hour postoperatively. PONV was assessed at 2 hours and 24 hours postoperatively. Any PONV during those periods was recorded.

Results and Discussion: 80 patients were included. In the first two hours postoperatively 7 patients complained of PONV. In the 2-24 hour period 26 patients complained of PONV. Further details on the classification of PONV will be presented. Patients receiving postoperative opioids had a remarkable higher frequency of PONV than patients who only received intrathecal morphine.

Table 1. PONV sorted by Apfel score

<table>
<thead>
<tr>
<th>Apfel Score</th>
<th>PONV 0-2h postop</th>
<th>PONV 2-24h postop</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>13 (not studied)</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2. Postoperative opioids and PONV

<table>
<thead>
<tr>
<th>Postop. Opioids</th>
<th>Only intrathecal opioids</th>
</tr>
</thead>
<tbody>
<tr>
<td>PONV 0-2h postop</td>
<td>26</td>
</tr>
<tr>
<td>PONV 2-24h postop</td>
<td>0</td>
</tr>
<tr>
<td>Apfel score avg.</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>0.75</td>
</tr>
</tbody>
</table>

Conclusion(s): Our study finds a similar high incidence of PONV in patients with a score of 3 as reported by Apfel. This correlates with the use of postoperative opioids. Although the number of patients in this study is small, especially the group only receiving intrathecal morphine, the occurrence of PONV seems to be more dependent on postoperative opioids than on the use of intrathecal morphine.

References:

14APS-5
Combined (general/epidural) versus general analgesia after major abdominal surgery: A randomized controlled trial on intraoperative hemodynamic stability and early postoperative recovery variables
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Background and Goal of Study: The method of analgesia (regional or general) influences surgical outcome. The aim of this study was to compare combined (general/epidural) analgesia and general analgesia following major abdominal surgery with regard to intraoperative hemodynamic parameters, and on recovery profile in PACU.

Materials and Methods: 40 patients undergoing open surgery for neoplastic colorectal resection received sevoflurane anesthesia followed by a randomised epidural infusion of ropivacaine 0.75% (Group C) or intravenous infusion of remifentanil (Group G). Hemodynamic parameters as well as consumption of anesthetic drugs were recorded at 15 min intervals during anesthesia. Recovery times and tracheal extubation time were calculated. Pain was assessed...
at rest and during mobilization using the VAS score [0-100]. Motor block was quantified with the Bromage scale. Patients were asked about sensory deficits. Verbal rating scores were used for sedation. The incidence of side effects was recorded. Statistical analysis included repeated-measures of analysis of variance, analysis of covariance, Fisher’s exact test, Mann-Whitney U-test, and Student’s t-test.

Results and Discussion: Haemodynamic sequelae were similar between groups. The recovery profiles are shown in table 1.

<table>
<thead>
<tr>
<th></th>
<th>General (Median)</th>
<th>Combined (Median)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracheal extubation (min)</td>
<td>15.6(14.1)</td>
<td>7.07</td>
<td>2.93 0.001</td>
</tr>
<tr>
<td>Spontaneously breathing (min)</td>
<td>11.16(12)</td>
<td>5.51</td>
<td>2.78 0.001</td>
</tr>
<tr>
<td>Ongoing verbal commands (min)</td>
<td>22.99(22.3)</td>
<td>10.07</td>
<td>5.3   0.001</td>
</tr>
<tr>
<td>Orientation (min)</td>
<td>33(0)</td>
<td>12.69</td>
<td>8.37 &lt;0.001</td>
</tr>
<tr>
<td>Pain score VAS (1-100)</td>
<td>12(3)</td>
<td>11.29</td>
<td>8.14 0.130</td>
</tr>
<tr>
<td>Score pain VAS (1-100)</td>
<td>14(5)</td>
<td>1.47</td>
<td>13.38 0.105</td>
</tr>
<tr>
<td>Sedation score N (%)</td>
<td>1 N (%)</td>
<td>14(5)</td>
<td>0.425</td>
</tr>
<tr>
<td>0</td>
<td>42(1.1)</td>
<td>7(3.3)</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>15(3)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

No major respiratory complication or side effects were observed throughout the study.

Conclusion(s): Sevoflurane/epidural anaesthesia seems to be equally safe and effective as sevoflurane/remifentanil anaesthesia for major abdominal surgery. Remifentanil was as effective as epidural block in providing intraoperative analgesia and suppressing physiological responses to surgical stimuli in patients undergoing major surgery. Combined (general/epidural) anaesthesia was associated with faster recovery postoperatively.

References:

14AP5-4

Fast-track surgery: A prospective audit of epidural efficacy and length of stay in colorectal surgical patients

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Background and Goal of Study: Enhanced recovery after surgery (fast-track surgery) is a philosophy of peri-operative management based on a pooling of available evidence to promote rapid mobilisation of patients and reduced duration of hospital stay. One of the principle architects is Professor Henrik Kehlet. Length of stay in many UK hospitals for colorectal resections traditionally approaches 10-12 days. After visiting Kehlet’s unit in September 2006, we introduced an enhanced recovery programme for colorectal resections and retrospectively saw a reduction in median length of stay from 12 to 7 days. Quality of epidural blockade and length of stay was then analysed in a prospective audit to determine how we compare to the more experienced fast-track units.

Materials and Methods: Patients undergoing major colorectal resections for cancer between October 1st and December 5th 2007 were followed prospectively. Baseline data included age, sex, surgical incision and level of epidural insertion. The quality of the epidural blockade was assessed with subjective pain scores (numerical rating score) in recovery (day 0) and on the first and second postoperative days. Interventions to the epidurals were recorded (bolus, rate change, patient position) as well as the need to convert to opioid analgesia. Median and mean length of stay was determined by the electronic patient discharge database.

Results and Discussion: 31 consecutive patients (20 males) with an average age of 68 (range 38 to 88) were included. One patient died following a postoperative myocardial infarction on day 2. Epidural intervention was required in 18 patients (58%), all of whom reported pain scores ≥5 on at least one occasion. Median length of stay was 6 days (range 3-37). There were major surgical complications of wound dehiscence and subsequent sepsis in two patients, resulting in a postoperative stay of 34 and 37 days respectively. This increased the mean (±SD) to 9.63 (±7.96) days.

Conclusion(s): Length of stay is not as good as in Kehlet’s unit, but our heterogeneous case mix of colorectal and rectal resections makes results less comparable. We may need to re-define entry criteria as our unit does not deal exclusively with colorectal surgery. Acute surgical admissions to the same ward also divert nursing time away from fast-track.

Acknowledgements: We would like to thank Mr Riz Farouk and Mr Simon Middleton for their help in this study.

References:
10). Respective records done by the external observer had a value of 3.0 ± the events recorded by the UBI Algigraph had a average value of 5.7 ± mean a high degree of specificity, with a false positive observed, in average, recorded by the UBI Algigraph during a total of 108 minutes of records. This device show sensibility to 98.4% of events. Three false positive events were observed.

Results and Discussion: Sixty-three pain episodes were observed by the analogue scale (VAS). UBI Algigraph values and observer VAS values were treated separately to dental interventions under local anesthesia. This device was used to monitor a pain value from 0 to 10.0, a figurative equivalent of this value and an indication of patients with immigration background. First results indicate room for improvement in some outcome parameters of acute pain management, e.g. the treatment.

Materials and Methods: With institutional approval and written informed consent, 14 adult patients, 8 male and 6 female, with 54.1 ± 16.0 years old, scheduled to dental interventions under local anesthesia, were included in this study. Before administration of the local anesthetic, patients were taught about how to communicate the degree of pain by hand squeeze of a pressure sensor connected to a UBI Algigraph (University of Beira Interior, Portugal). This device produces a vibrant sound depending from the degree of pain and show in the monitor a pain value from 0 to 10.0, a figurative equivalent of this value and an oscilloscope with a line which position depend of the pain degree. During all the duration of the procedures, an independent observer detect pain episodes and, as they can be externally perceived, scored then based on a visual analogue scale (VAS). UBI Algigraph values and observer VAS values were treated by Spearman correlation. Data as mean ± standard-deviation.

Results and Discussion: Sixty-three pain episodes were observed by the external evaluator. From these, UBI Algigraph recorded 62, meaning that the device show negligibility of 98.4% of events. Three false positive events were recorded by the UBI Algigraph during a total of 108 minutes of records. This mean a high degree of specificity, with a false positive observed, in average, each 36 minutes of clinical use of the UBI Algigraph. Excluding false positives, the events recorded by the UBI Algigraph had an average value of 5.7 ± 3.0 (in 13). Respective records done by the observer had an average of 3.0 ± 1.9 (in 13). In spite of all that difference, they showed a significant positive correlation (r=0.38, p=0.002).

Conclusion(s): In our study, UBI Algigraph showed a high accuracy to pain communication and record. Further studies, including a large number of patients, are necessary to confirm our preliminary data and to study individual discrepancies with traditional VAS values recorded by an external observer. Improvements in sensor design and technology are also promising fields to be explored.

14APS-8
Postoperative pain management following gastroectomy: Quality evaluation of one protocol
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Background and Goal of Study: Postoperative pain management has a humanitarian role, but medical and economic benefits are also important. The objective of this study was to evaluate the quality of one protocol used in our institution during the year 2007 for the management of postoperative pain following Gastrectomy (GT).

Materials and Methods: We conducted a retrospective analysis of the protocol assessing the effectiveness [incidence of severe pain (Numerical Rating Scale >7/10), safety [incidence of hypotension (systolic/diastolic arterial pressure < 90/60 mmHg)] and tolerability [incidence of vomiting, excessive sedation, pruritis, and urinary retention]]. The values considered were the worst ones found during the 3-6 Hours (6H), 6-12H (12H), 12-24H (24H) and 24-48H (48H) time intervals after the GT. After collecting those data we compared our results with some standards of care suggested by the bibliography consulted (1, 2, 3).

Results and Discussion: 10 patients were analysed and their age was 63.5 ± 11.9 years. The gender distribution was: 36.4% female, 63.6% male. The patients were treated with a protocol based on Epidural therapy (EPI) [Morphine 2mg + Ropivacaina 0.2% (16mg) epidural 0.8/10 paracetamol 1g iv 6H/6]. The results are shown in the Table 1.

Conclusion(s): The effectiveness, safety and tolerability of the protocol used are satisfactory. Nevertheless it is necessary to introduce ventilatory parameters to improve the assessment of safety. Some concerns remain about the incidence of hypotension, severe pain and excessive sedation.

References:

14APS-7
Evaluation of the accuracy and record patient pain during dental treatments under local anesthesia – A preliminary report
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Faculty of Health Sciences, University of Beira Interior, Covilhã, Portugal

Background and Goal of Study: The UBI Algigraph, when utilized in dentistry, allow patient to communicate to the stomatology doctor, in a non-verbal way, the degree of pain that the patient suffers during oral treatments under local anesthesia. This study have two objectives: to evaluate the sensibility and specificity of the UBI Algigraph to record pain episodes during dental surgery and to compare the Algigraph values with VAS values recorded in real time by an independent observer.

Materials and Methods: With institutional approval and written informed consent, 14 adult patients, 8 male and 6 female, with 54.1 ± 16.0 years old, scheduled to dental interventions under local anesthesia, were included in this study. Before administration of the local anesthetic, patients were taught about how to communicate the degree of pain by hand squeeze of a pressure sensor connected to a UBI Algigraph (University of Beira Interior, Portugal). This device produces a vibrant sound depending from the degree of pain and show in the monitor a pain value from 0 to 10.0, a figurative equivalent of this value and an oscilloscope with a line which position depend of the pain degree. During all the duration of the procedures, an independent observer detect pain episodes and, as they can be externally perceived, scored then based on a visual analogue scale (VAS). UBI Algigraph values and observer VAS values were treated by Spearman correlation. Data as mean ± standard-deviation.

Results and Discussion: Sixty-three pain episodes were observed by the external evaluator. From these, UBI Algigraph recorded 62, meaning that the device show negligibility of 98.4% of events. Three false positive events were recorded by the UBI Algigraph during a total of 108 minutes of records. This mean a high degree of specificity, with a false positive observed, in average, each 36 minutes of clinical use of the UBI Algigraph. Excluding false positives, the events recorded by the UBI Algigraph had an average value of 5.7 ± 3.0 (in 13). Respective records done by the observer had an average of 3.0 ± 1.9 (in 13). In spite of all that difference, they showed a significant positive correlation (r=0.38, p=0.002).

Conclusion(s): In our study, UBI Algigraph showed a high accuracy to pain communication and record. Further studies, including a large number of patients, are necessary to confirm our preliminary data and to study individual discrepancies with traditional VAS values recorded by an external observer. Improvements in sensor design and technology are also promising fields to be explored.

14APS-9
Benchmarking for improving quality of postoperative pain management – Steps towards a European project
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Background and Goal of Study: Benchmarking can be used as a tool for quality improvement in postoperative pain management. Like in other fields (e.g. comparison of education systems – PISA), international rather than national benchmarking can strengthen quality improvement also in this field, however there are no such international initiatives so far. It was our aim to investigate the feasibility of the German benchmark tool, QUIPS (quality improvement in postoperative pain) in a large London hospital. QUIPS collects outcome parameters (e.g. pain intensity, satisfaction) via a patient questionnaire, performs a benchmarking analysis, and feeds back results to participating hospitals.

Materials and Methods: The validated patient questionnaire was translated into English. During 3 months, 48 patients from 2 wards were asked to fill in the questionnaire on their first postoperative day. Also data on surgery, anaesthesia and analgesia were collected.

Results and Discussion: We received questionnaires from 30 patients (62%). Data input and feedback procedures of the QUIPS website worked without any problems. Refusal to participate (23%) was more frequent than in the German hospitals. Linguistic difficulties (9%) appear more often due to a large proportion of patients with immigration background. First results indicate room for improvement in some outcome parameters of acute pain management, e.g. the proportion of patients wishing more pain killers (43%) was significantly higher the average (15%).

Conclusion(s): The benchmark tool showed its feasibility for European usage. We highlight specific concerns in the London hospital e.g. exclusion of non – English speakers. This is the first step into a European benchmarking project in future.
14APS-10
Our experience in treatment of abdominal postoperative pain with epidural morphine

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Background and Goal of Study: Epidural analgesia (EA) is a widely used technique for treatment of post-operative pain improving the overall result of surgery and patient’s comfort.

Materials and Methods: 300 patients (age 47.2±12.54 years, F:M=3:1, ASA I-II) were enrolled for the surgery for cholecystectomy, hysterectomy, and stomach resection were randomly divided in two equal groups for postoperative pain treatment. Epidural analgesia through insertion of a catheter into intervertebral spaces T11-T12 and pushed two levels higher was provided with Morphine 4mg for group 1, 2, 10mg of Morphine were administered intra muscular (IM). Delivery of analgesia was started after the admission to recovery room. Dizepam and Diclofenac were used in group 2 to potentiate narcotic.

Results and Discussion: Analgesia was restored immediately after insertion of EA group I-st, while in group II-st analgesia was restored 2-3h. With 10 mg epidural morphine, the patients were maintained for two days without pain. While Dizepam and Paracetamol was used for the patients of group II-nd. In-group I-st level of glicemia was 99.92±21.07mg%, while in-group II-nd 132.59±33.03mg%. Initial values of respiratory frequency are approximately (22.3±4.24 and 24.1±2.65/min). In-group I-st there is noticed a gradual reduction of respiratory frequency, the lowest value 9, average values 15.3±1.34/1’, minimal value - 12 respiration’s were noticed at 6th hour. Group II-nd manifests lowest values on 2nd hour (16.46±3.24), values, which statistically change in a considerable way as against those of the 1st hour (p<0.05).

Maximal value 29, at zero hour and minimal 13 at the end of 1st hour. Complications in the C V system only complication noticed is YES in 12 patient’s in group I-st, except epidural analgesia in 4 cases; we used lignocain with Potassium chloride 7.5%.

Conclusion(s): Use of epidural morphine controls better post-operative pain and for more time compared with IM route in our patients. It causes less respiratory depression, rate of blood sugar and postoperative pulmonary complica tion.

References:

14APS-11
Diclofenac/paracetamol decreases tramadol consumption and incidence of nausea and vomiting (PONV) after laparoscopic cholecystectomy

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Background and Goal of Study: NSAD’s as part of multimodal analgesia after laparoscopic surgery are very popular. Still, many patients need rescue analgesics, i.e. weak opioids in the first 24 hours after surgery. These may have some side effects, that preclude early mobilization and discharge. Our study hypothesis was that a combination of a NSAID with a muscle relaxant could decrease the dose of tramadol consumption after laparoscopic cholecystectomy.

Materials and Methods: After Hospital Ethical Board approval and patient informed consent, 65 patients scheduled for laparoscopic cholecystectomy performed by the same surgeon were enrolled in a randomized, double-blind, controlled trial, over a 5 months period (Feb-June 2007). Prior to general anesthesia induction, a iv infusion of diclofenac 75mg + orphenadrine 30mg (group N, n=32 patients) or saline (group C, n=33 patients) was started and repeated after 12hs. All patients received the same scheme of general anesthesia and iv paracetamol in the first 24 hs, starting immediately after surgery. Tramadol boluses of 100mg (up to 400mg/d) were used as rescue analgesic. Primary objectives were postoperative analgesia (VAS at mobilization, 0-100mm) at 0, 2, 6, 12 and 24hs, tramadol consumption, incidence of PONV and hospital length of stay (LOS). Secondary objectives were incidence of gastrointestinal symptoms, postoperative nausea and vomiting, and incidence of hypoglycemia.

Results and Discussion: We found no differences regarding demographics, postoperative gastrointestinal symptoms, postoperative blood loss and length of hospital stay. VAS was significantly lower in group N vs C at 0, 2, 6, 12 and 16 hs (p<0.05), as well as the incidence of PONV (8 vs 12 pts, respectively; p<0.05). The number of tramadol boluses (1.07±0.75 vs 3.7±5.24, p<0.001) and also the number of patients requiring rescue analgesic (6 vs 21, p<0.01) was lower in group N vs C, respectively.

Conclusion(s): Diclofenac/paracetamol provides better analgesia after laparoscopic cholecystectomy than paracetamol alone. The combination also decreases tramadol consumption and the incidence of PONV.

14AP6-1
Successful treatment in monarchsh (Acyonine) intoxication with magnesium sulfate

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Background and Goal of Study: To describe severe deliberate aconite intoxication in which cardio toxicity responds to magnesium sulfate.

Materials and Methods: Case report.

Results and Discussion: A 77-year-old man was admitted to ICU for severe muscarinic syndrome associating hypotension, bradycardia, wheezing, sweating, nausea and vomiting, only 20 minutes after the intentional ingestion of 5 grams of crushed roots of Aconitum napellus. The patient complained numbness, dizziness and ascending paresthesia. Important features of ECG consisted of ventricular bigeminy, then severe bradycardia (50 bpm), long QTc (524 msec) and polymorphic ventricular extrasystoles. Saline infusion, atropine (0.5 mg loading dose, and 0.5 mg/h during 48 hours) and magnesium sulfate (6 g loading dose, and 3 g/24 hours for 48 hours) were administered to treat hypotension, muscarinic signs and arrhythmias, respectively. Plasma magnesium levels remained below 6 mmol/L. Symptoms rapidly disappeared and return to regular sinus rhythm (80 bpm) was observed. Further evolution was uneventful. Aconitine is the major toxic alkaloid in monkshood. LD50 is about 5 mg which represents 2 to 4 grams of crushed roots. Cardiac and neurological toxicities, as well as increased vagal tone, are due to activation of voltage-dependent sodium channels. Cardiotoxicity consists in early and delayed afterdepolarisation. Indeed, during late (delayed) repolarisation (phase 4 of the action potential) of the Purkinje cells, aconitine-attached Na channels open, allowing sodium influx and depolarization. This results in increased automaticity (prema ture ventricular beats). During late phase 2 or early phase 3 (of the action potential), aconitine-induced Na accumulation induces early afterdepolarisation. This results in long QT interval with a risk of torsades de pointes. Anti-arrhythmic agents have inconsistent results in aconite intoxication. Especially amiodarone could promote torsades. The effects of magnesium sulfate on aconitine-induced ventricular arrhythmias have been studied in animal models (1). In contrast to other anti-arrhythmic agents, it abolishes early afterdepolarisation and shortens the prolonged duration of the Purkinje cell action potential.

Conclusion(s): To our knowledge, this is the first clinical report of aconitine induced polymorphic ventricular arrhythmias successfully treated with magnesium sulfate.

References:

14AP6-2
Feasibility and safety of various infusion pumps for postoperative pain therapy

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Background and Goal of Study: Continuous spinal anesthesia is an established form of local anesthetic infusion mainly used in orthopedic and obstetric surgery. However, up to date there are no pumps available that are specifically designed for that use. In this study we evaluated three different pump types concerning their safety and feasibility for use in postoperative pain therapy via a spinal microcatheter in a liquor model environment.

Materials and Methods: Three different portable pump-types, a CADD pain system, a perfusor and an electronically driven syringe pump “Braun perfusor space” were selected for testing. In order to infuse 10 ml of bupivacaine 0.25% over 24 hours time the continues rate was set to 0.4 ml/h. We developed an artificial cerebrospinal fluid model, measuring the increasing volume per precision balance, time the continues rate was set to 0.4 ml/h.

Results and Discussion: All pumps infused without interruption for 24 hours. No alarm was noticed during infusion process. None of the tested pumps showed a completely aberrant infusion manner. The overall intergroup concordance for each pump was less than 10 percent between the first three trials. In the first two hours after start of the infusion regimen, all infusion devices showed the highest deviation of the predetermined infusion rate. Afterwards we found discrepan-
cies of less than 5 percent to the chosen infusion rate. We found an average volume delivered by the CADD-pump of 9.48 ml (SD: 0.06 ml). This corresponded to 98.8% (SD: 0.64%) of the expected total volume. Syringe-pumps ME and Syntec showed a volume of 9.53 ml (SD: 0.10 ml) and 9.59 ml (SD: 0.15 ml) of the expected volume of 10 ml.

Conclusion(s): For continuous spinal analgesia requiring only small doses of local anesthetics ranging around 0.4 ml/h due to direct intrathecal application, all pumps demonstrated safety.

14AP6-3
Incidence of postoperative severe pain is higher after orthopedic surgery than after laparotomy; ketamine is effective in relieving such pain
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Background and Goal of Study: Clinical observation documented that surgery may be associated with intense immediate postoperative pain that is unresponsive to standard morphine analgesia. We aimed to assess and compare the magnitude of immediate (0-3h) postoperative severe pain among orthopedic and general surgery patients in the Post Anesthesia Care Unit (PACU) despite standard morphine therapy, and evaluate the efficacy of the administration of various analgesics after orthopedic surgery.

Materials and Methods: This prospective 1 year study assessed the 3 hour analgesia requirements of patients who underwent abdominal and orthopedic surgery under general anesthesia and whose pain in the PACU was unacceptably severe despite the administration of 110 μg/kg intravenous (IV) morphine.

Results and Discussion: Of 3206 sampled PACU patients, 285 were in pain (6.1% of 4546 patients). They received rescue analgesia with either morphine (n=192), or paracetamol (n=93), or ketamine (n=8). The difference was highly significant (P<0.001).

Conclusion(s): Morphine was effective in relieving such pain. Women complain about higher pain scores compared to men during epidural analgesia. This, however, seems to be age dependent because with decreased age of patients the relationship inverts. Women receiving PCA showed higher pain scores but presumably because men consumed more morphine.

References:

14AP6-5
Postoperative analgesia-screening regarding efficacy of current routine and patient satisfaction in four university hospitals from Romania
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Anesthesiology, ICU and Pain Management Department, University Hospital, Bucharest, Romania

Background and Goal of Study: In order to optimise postoperative analgesia at national level and initiate the activities of a 4 university hospital acute pain services network we chose to screen all patients having surgery between January- March 2007, for analgesia technique, substances used and patient satisfaction with postoperative quality of life as the first step of this project.

Materials and Methods: 755 consecutive patients in the 4 hospitals were screened for restoring/paourolymal analgesia requirements, pain satisfaction of patients with analgesia, and postoperative pain in the PACU. Key words were controlled by adding low dose ketamine to morphine.

Results and Discussion: Resting pain score was the main determinant of patient satisfaction in the first 48 postoperative hours. The patients most unsatisfied with their postoperative quality of life were those having the highest resting and paroxysmal pain scores. Paroxysmal pain was the next determinant followed by side effects (nausea and vomiting, but not pruritus) at any moment. The highest pain scores/the lowest patient satisfaction estimates were in the OG and thoracic surgery patients. High pain scores were noticed at the end of surgery and in the first 3 postoperative hours. Epidural analgesia was superior to iv analgesia in the first 6 postoperative hours (P<0.046-0.008). Overall postoperative analgesia was mainly iv bolus analgesia (85.2%) using: iv metamizole (57.2%, av. 5 boluses), iv paracetamol (38.9%, av. 3 boluses) and minor opioids (iv tramadol- 31.7%, av. 2.4 boluses, pentazocine- 7.8%, with low use of major opioids only for severe paroxysmal pain. Only in 7.3% of patients was used continuous iv analgesia. Nurses were very reluctant to deliver epidural bolus analgesia (av. 2/24 hours).

Conclusion(s): Postoperative analgesia prescribting pattern relies mainly on a nurse based bolus iv strategy with metamizole overdosing and minor opioids for paroxysmal pain; high pain scores and nausea/vomiting directly influenced quality of life in postoperative period. High pain scores 3 hours after surgery require further attention in the next step of this project.

14AP6-6
Evaluation of the process and costs associated with the use of the fentanyl iontophoretic transdermal system (ITS) versus intravenous (IV) patient-controlled analgesia (PCA) for postoperative pain management
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Background and Goal of Study: To evaluate the efficacy and costs of continuous transdermal fentanyl versus IV PCA using data from 2 separate studies in Germany and the United States.

Materials and Methods: During Study 1, the costs, staff time, and processes associated with administering fentanyl ITS versus IV PCA were compared at 2 German hospitals. During Study 2, a research pharmacist interviewed and observed 61 personnel in anesthesia, surgery, nursing, and pharmacy during the prescription and administration of fentanyl ITS demonstration systems to mock patients at 11 US hospitals; parallel data concerning IV PCA were collected from similar interviews conducted at 9 US hospitals. Process analysis data were collected using a standardized interview guide.

Conclusion(s): Our data indicate that gender differences in postoperative pain exist. Women complain about higher pain scores compared to men during epidural analgesia. This, however, seems to be age dependent because with decreased age of patients the relationship inverts. Women receiving PCA showed higher pain scores but presumably because men consumed more morphine.

References:
Results and Discussion: In Study 1, PCA was administered for a mean of 35.3 hours; fentanyl ITS versus IV PCA was associated with fewer separate activities (84 vs. 146, respectively), less hospital staff time (21.4 minutes vs. 69.6 minutes, respectively), and a lower mean labor-associated process cost ($23.90E vs. $63.19E, respectively) per patient per course of therapy. In Study 2, fentanyl ITS was associated with 46 separate steps where a decision was required from a staff member per patient per course of therapy, compared with between 70 and 104 for IV PCA. The difference between the 2 in the number of activities/steps required to administer treatment with either modality may have been caused by different hospital regulations and/or guidelines. 

Conclusion(s): Data from these studies suggest that fentanyl ITS administration may be more convenient, time-efficient, and cost-effective than IV PCA.

Acknowledgements: Supported by Ortho-McNeil Pharmaceuticals, Inc., Raritan, New Jersey, United States, and Janssen-Cilag EMEA, a division of Janssen Pharmaceutica,Beerse, Belgium.

Disclosure: Supported by Ortho-McNeil Pharmaceuticals, Inc., Raritan, New Jersey, United States, and Janssen-Cilag EMEA, a division of Janssen Pharmaceutica,Beerse, Belgium.

14AP6-7
Monitoring of safety and effectiveness of femoral nerve analgesia by an acute pain unit
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Background and Goal of Study: It has been shown that continuous peripheral nerve block analgesia provides significant improvement in postoperative pain control compared with opioids. Continuous peripheral nerve block (CPNB) is widely used for postoperative analgesia in orthopedic and traumatology surgery. The objectives of our study are: 1. To evaluate the safety and effectiveness of femoral nerve analgesia monitored by our Acute Pain Unit (APU). 2. To compare our results with available data extracted from literature review [2,3].

Materials and Methods: We designed an observational study from January 05 to October 07 in which patients scheduled for lower limb orthopedic or traumatologic surgery receiving CNFB analgesia were included (n = 356). We analyzed APU computerized data (shown in tables 1 and 2) until APU discharge.

Results and Discussion: We classified the indicators in 4 blocks: Case-mix, Satisfaction, Effectiveness and Safety. Some results of our study were:

Table 1. Case-mix and Satisfaction

<table>
<thead>
<tr>
<th>I. CASE-MIX</th>
<th>Total Patients CNFB</th>
<th>356</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average time followed-up</td>
<td>1.8 day</td>
<td></td>
</tr>
<tr>
<td>% Patient satisfied</td>
<td>89%</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Effectiveness and Safety

<table>
<thead>
<tr>
<th>I. EFFECTIVENESS</th>
<th>III. SAFETY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness (% patients NAS-3 at discharge, w/o adverse events solved with treatment) 91%</td>
<td>85.96%</td>
</tr>
<tr>
<td>Not effectiveness</td>
<td>9%</td>
</tr>
<tr>
<td>IV. SAFETY</td>
<td>% Adverse Events</td>
</tr>
<tr>
<td>% Serious Adverse Events</td>
<td>73%</td>
</tr>
<tr>
<td>% Serious Adverse Events</td>
<td>0</td>
</tr>
</tbody>
</table>

SLL: Son Llatzer; NAS: numerical analogue scale.

Conclusion(s): CNFB is an effective and safe technique which produces a high patient satisfaction. Systematized follow-up data registration of postoperative analgesia allows us to analyse the effectiveness and security of treatments. It is necessary to promote the standardization of outcome indicators that will be required to enhance safety of the treatment provided by the APU. Supporting setup of APP databases (4) would allow us to validate outcome indicators that will be required for evaluation, comparison and improvement of our clinical practice.

References:

14AP6-9
Single-dose haloperidol does not reduce nausea and vomiting following epidural morphine for postoperative pain control
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Background and Goal of Study: The role of haloperidol has recently been studied in preventing nausea and vomiting following general anesthesia and after intrathecal morphine, but the results have been inconsistent, with some reporting potent antiemetic efficacy, while others suggesting the limited effectiveness of the drug itself. We studied its prophylactic antiemetic efficacy after epidural anesthesia using local anesthetic with morphine.

Materials and Methods: We randomly recruited 140 adult patients undergoing lower limb orthopedic procedures using epidural anesthesia to receive iv haloperidol 2 mg (Group H) or iv saline placebo (Group P). Following epidural morphine 3 mg was given to all the patients for postoperative pain relief. The occurrences of any medications-related side effects were recorded for 24 h after surgery. Group size was determined to be 66 patients to detect a decrease of nausea from 50% to 25% at the 0.05 significance level (2-tailed) with 80% power.

Results and Discussion:

Table 1. Patient demographics

<table>
<thead>
<tr>
<th>Group P (n=66)</th>
<th>Group H (n=66)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>46.7 (14.8)</td>
</tr>
<tr>
<td>Sex (F/M)</td>
<td>32/34</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>160.0 (8.9)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>63.4 (13.0)</td>
</tr>
</tbody>
</table>

Values are mean (SD) or number. The two groups were similar.

Table 2. Medications-related side effects and the requested treatment

<table>
<thead>
<tr>
<th>Effect</th>
<th>Group P</th>
<th>Group H</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of nausea</td>
<td>20 (30.3%)</td>
<td>32 (48.5%)</td>
<td>0.36</td>
</tr>
<tr>
<td>Incidence of vomiting</td>
<td>24 (36.4%)</td>
<td>21 (30.4%)</td>
<td>0.47</td>
</tr>
<tr>
<td>Highest nausea score recorded</td>
<td>0 (0-10)</td>
<td>0 (0-10)</td>
<td>0.46</td>
</tr>
<tr>
<td>% of patients treated for nausea and/or vomiting</td>
<td>11 (16.7%)</td>
<td>9 (13.1%)</td>
<td>0.67</td>
</tr>
<tr>
<td>Incidence of pruritus</td>
<td>35 (53%)</td>
<td>43 (65.3%)</td>
<td>0.3</td>
</tr>
<tr>
<td>Highest pruritus score recorded</td>
<td>0 (0-10)</td>
<td>1 (0-8)</td>
<td>0.97</td>
</tr>
<tr>
<td>% of patients treated for pruritus</td>
<td>16 (24.2%)</td>
<td>12 (17.4%)</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Values are number (%) or median (range). No statistical difference was found.
Contrary to previous reports, we did not find any antimetric effect of haloperidol against epidural morphine-induced nausea or vomiting. Moreover, 6 patients (8.7%) reported having a feeling of inner restlessness (akathisia) in Group H as compared to none in Group P (P = 0.03). Despite a good safety profile described in the literature, the distressing haloperidol-induced akathisia renders haloperidol an unattractive antimetric of choice in surgical patients receiving neuraxial opioids for postoperative pain control.

Conclusion(s): Single, low-dose i.v. haloperidol (2 mg) does not prevent epidural morphine (3 mg)-induced PONV in elective lower limb orthopedic procedures.

During every visit. We studied the incidence of nausea, vomiting and pruritus as minor complications and the incidence of sedation and hemodynamic instability as major complications. The results are presented as percentages (%).

Results and Discussion: From the 706 patients studied 217 (31%) received PCA, 323 (46%) SEA and 151 (21%) CEA. The total visits to the patients were 8672. The incidence of major and minor complications is shown in Table 1.

Table 1. Incidence of complications by analgesia method

<table>
<thead>
<tr>
<th>Complication</th>
<th>PCA</th>
<th>SEA</th>
<th>CEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>16  (7.7%)</td>
<td>89  (21%)</td>
<td>108 (26%)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>10  (4.6%)</td>
<td>42  (13%)</td>
<td>7  (4.6%)</td>
</tr>
<tr>
<td>Pruritus</td>
<td>22  (10.13%)</td>
<td>42  (13%)</td>
<td>28 (18.5%)</td>
</tr>
<tr>
<td>Sedation</td>
<td>0  (0%)</td>
<td>21  (6.5%)</td>
<td>0  (0%)</td>
</tr>
<tr>
<td>Hemodynamic instability</td>
<td>11 (5.5%)</td>
<td>6 (1.5%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

In 5 (23, 8%) cases with sedation we had severe respiratory depression which needed immediate tracheal intubation while the remaining patients were recorded as mild sedation incidents. Finally, there were 4 cases in 474 in epidural analgesia (0, 83%) recorded with subarachnoid migration of the epidural catheter. In all 4 cases the migration recorded in the third day of postoperative analgesia and all the patients were in the SEA group.

Conclusion(s): The Continuous Epidural Analgesia (CEA) method seems to be related to less either minor or major of the most common complications when used for postoperative analgesia. On the other hand Sequential Epidural Analgesia (SEA) method seems to be related most frequently to major complications such as hemodynamic instability.

14AP7-1
Thermographic assessment of Stellate ganglion block on physical change of head, neck and upper extremities in Bell’s palsy patients

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Background and Goal of Study: Stellate ganglion block (SGB) was reported to improve the perfusion of head and neck in Bell’s palsy (1). The goal of this study was to present thermographic assessment of the effectiveness of stellate ganglion block in Bell’s palsy patients.

Materials and Methods: We collected 30 Bell’s palsy patients (17 females, 13 males, average age 36.7 years old) in this study in pain clinic. We performed SGB at the base of 6th cervical transverse process with 6 ml of 1% plain lidocaine. The extent and degree of sympathetic blockade before and after SGB was evaluated by the digital infrared thermography system. Thermography was performed before and 5, 10, 15, 20, 25, 30 minutes after SGB respectively. We documented temperature change at 5 areas of both lesion and non-lesion sides: (1) Frontal, (2) cheeks, (3) nuchal, (4) neck, (5) palm. Paired t-test was applied to examine our result.

Results and Discussion: We noted that after SGB surface temperature of bilateral five detected areas were increasing as time went by. The highest temperature occurred at 10 minute after SGB, and average increase temperature was 1.40±0.54° which was of statistical significance (P<0.05). Among all 5 areas we investigated, labial region was of highest increased surface temperature at 10 minute post-SGB; it was 2.50° higher than surface temperature pre-SGB. Average increased surface temperature of lesion side was 0.22±0.07° higher than non-lesion side, but it was not of statistical significance (P>0.05).

Conclusion(s): We concluded that thermography is a useful method for the assessment of stellate blockade effectiveness. Our result supported the affirmative value of stellate ganglion block in improving the blood circulation of Bell’s palsy patients.

14AP7-2
Chronic pain post mastectomy with reconstruction – Associations with changes on quantitative sensory testing, the A118G polymorphism and adequacy of peri-operative analgesia

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Background and Goal of Study: Chronic post surgical pain (CPS) post mastectomy and breast reconstruction has a prevalence of 49% (1). Quantitative Sensory Testing (QST) reveals lesser pressure pain thresholds in patients with CPS post breast surgery (2). The mu-opioid polymorphism A118G results in minor complications and the incidence of sedation and hemodynamic instability as major complications. The results are presented as percentages (%).

Results and Discussion: From the 706 patients studied 217 (31%) received PCA, 323 (46%) SEA and 151 (21%) CEA. The total visits to the patients were 8672. The incidence of major and minor complications is shown in Table 1.

Table 1. Incidence of complications by analgesia method

<table>
<thead>
<tr>
<th>Complication</th>
<th>PCA</th>
<th>SEA</th>
<th>CEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>16  (7.7%)</td>
<td>89  (21%)</td>
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<tr>
<td>Vomiting</td>
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<td>Sedation</td>
<td>0  (0%)</td>
<td>21  (6.5%)</td>
<td>0  (0%)</td>
</tr>
<tr>
<td>Hemodynamic instability</td>
<td>11 (5.5%)</td>
<td>6 (1.5%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>
reconstruction and changes on QST, post-operative pain scores, analgesic requirements, mental status and the A118G mu-opioid polymorphism.

Materials and Methods: In a retrospective study, patients who had undergone mastectomy and breast reconstruction in the previous six years were assessed. The McGill’s pain questionnaire, the Rand 36-Item Health Survey, the Patient-Specific Functional Scale, the Hospital Anxiety and Depression Score, and Visual Analog Scale’s for anxiety and pain were completed. The pain perception threshold to an electrical stimulus was established over the T4 dermatome. Serum was taken for genetic analysis. For this study, the student’s t-test, the Fischer’s exact test, and Bland-Altman plots were used. P < 0.05 was considered significant.

Results and Discussion: Of 68 patients, 42 (62%) attended for assessment and 18 (26%) reported CPSP. Patients with and without CPSP had similar characteristics (56.4 ± 10.8 years vs 67.6 ± 8.3 cm, 64.9 ± 14 Vs 67.6 ±13kg). None had been referred for treatment. Patients with CPSP had lower scores for physical functioning.

Physical function

Table 1. VAS trend

<table>
<thead>
<tr>
<th>Group</th>
<th>CPSP</th>
<th>no CPSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>median ± standard deviation</td>
<td>6.4±3.0</td>
<td>8.3±2.0</td>
</tr>
</tbody>
</table>

Patients with CPSP had lower scores on the PSFS vs 67.6 ± 8.3 cm, and 18 (43%) reported CPSP. Patients with and without CPSP had similar characteristics (56.4 ± 10.8 years vs 67.6 ± 8.3 cm, 64.9 ± 14 Vs 67.6 ±13kg). None had been referred for treatment. Eight patients had the A118G polymorphism, three with CPSP. No evidence significant was found.

Conclusion(s): Chronic pain following mastectomy and breast reconstruction has a high prevalence, is under-diagnosed and results in a significant decrease in function.

References:

14AP7-3

Zonisamide administration for the treatment of diabetic peripheral neuropathy: Safety and efficacy

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Background and Goal of Study: Most of anticongulants are used as off-label indications in management of neuropathic pain (1). This double-blinded study was aimed at showing how Zonisamide (inhibition of T-type Ca, Na, Glu) (2) could have a good therapeutic efficacy in diabetic neuropathy.

Materials and Methods: Under Ethical Committee approval and after individual consent, 60 patients were enrolled during 30 months, female/male 23/37, mean age 65.2 years, weight 68.5 ± 24, height 172.3 ± 14, suffering from diabetic neuropathic syndrome, clinically diagnosed and proved by Galer score (T2). Patients were blindly and randomly assigned to 2 groups: Group P (30 patients) received Pregabalin (150-300mg/die), while Group Z (30 patients) received Zonisamide (50-100mg/die). The doses of Pregabalin and Zonisamide were achieved after titration. All patients had administration of analgesics: Tramadol (50 mg/die), plus gabapentin (1 g) were given before closing, and boluses of 30 mg tramadol administered in the PACU until VAS < 3. Six months after surgery CPP was assessed in a personal interview (VAS). Patients were asked if they had pain in the previous 24h: at rest, during daily life or during exercise, and the worst pain experienced.

Results and Discussion: Fifty patients were evaluated, of which 36% had CPP: 22% reported a VAS 3-5 (all of them in the D and DK Groups), while 78% had a VAS < 3 (mild pain). There were no significant differences between groups regarding number of patients with pain at rest (10%), in daily life (26%) or during exercise (28%). Less number of patients in group K presented a worst pain and pain intensity was significantly lower.

<table>
<thead>
<tr>
<th>Group</th>
<th>Evaluated/lost patients</th>
<th>Patients with worst pain</th>
<th>VAS of the group Median (Interquartile range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>16/4</td>
<td>4 (5)</td>
<td>0 (0-1.13)</td>
</tr>
<tr>
<td>DK</td>
<td>18/2</td>
<td>8 (5)</td>
<td>0.2 (0.1-3.8)</td>
</tr>
<tr>
<td>K</td>
<td>19/2</td>
<td>2 (1)</td>
<td>0 (0-2)</td>
</tr>
</tbody>
</table>

*p < 0.040 Chi-square. **p = 0.037 Kruskal-Wallis.

Conclusion(s): Thirty six percent of patients had mild-moderate CPP six months after surgery. Ketamine alone, seems to be the better treatment to prevent the development of CPP after IHR. Partially supported by FIS P006699, Madrid Spain.

14AP7-4

Effect of dexamethasome and/or ketamine on the development of chronic post-operative pain after inguinal hernia repair

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Anesthesiology, Hospital del Mar, Barcelona, Spain

Background and Goal of Study: Chronic postoperative pain (CPP) is the main complication after inguinal hernia repair (IHR). Our aim was to assess if the administration of IV dexamethasone or ketamine, alone and combined, would prevent CPP in patients undergoing IHR under sevoflurane/remifentanil anaesthesia.

Materials and Methods: After approval by the Ethical Committee, 60 male patients were randomly assigned to receive a double blind manner, one of the following: intravenous treatments: dexamethasone 8 mg, 1 h before surgery (Group D). A bolus of racemic ketamine 0.5 mg.kg-1 after endotracheal intubation (Group K). A combination of both (Group DK). Anaesthesia was maintained with 1% sevoflurane (fixed concentration) and remifentanil (0.29-0.37 μg kg-1 min-1). Desketoprofen (50 mg), plus paracetamol (1 g) were given before closing, and boluses of 50 mg tramadol administered in the PACU until VAS < 3. Six months after surgery CPP was assessed in a personal interview (VAS).

Conclusion(s): Five patients were evaluated, of which 36% had CPP: 22% reported a VAS 3-5 (all of them in the D and DK Groups), while 78% had a VAS < 3 (mild pain). There were no significant differences between groups regarding number of patients with pain at rest (10%), in daily life (26%) or during exercise (28%). Less number of patients in group K presented a worst pain and pain intensity was significantly lower.

Table 1. VAS trend

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>Z (mean ± standard dev.)</th>
<th>P (mean ± standard dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>7.5 ± 1.2</td>
<td>7.5 ± 0.7</td>
</tr>
<tr>
<td>T15</td>
<td>4.0 ± 1.8</td>
<td>5.2 ± 2.2</td>
</tr>
<tr>
<td>T30</td>
<td>3.4 ± 0.9</td>
<td>3.4 ± 0.6</td>
</tr>
<tr>
<td>T60</td>
<td>2.4 ± 0.6</td>
<td>2.4 ± 0.6</td>
</tr>
<tr>
<td>T120</td>
<td>2.5 ± 0.6</td>
<td>2.3 ± 1.1</td>
</tr>
</tbody>
</table>

*p < 0.040 Chi-square. **p = 0.037 Kruskal-Wallis.

Conclusion(s): Zonisamide is well suited as optional drug in the therapy of diabetic peripheral neuropathy, with the advantage of a low adverse-effect burden.

References:
mg/kg MgSO₄ in 4 hours for 5 days. In order to blind patients and researcher, 2 patients received NaCl 0.9% solution (data not analysed). All patients received standardised physical therapy. Pain was assessed on a 11-point Box scale 3 times daily for a week and the McGill pain questionnaire (number of chosen words sensory (NWCs) and pain rating index sensory (PRIs)). The sensitivity of the skin was measured with the Semmes Weinstein Monofilaments (SWM) by comparing the affected with the unaffected extremity. Assessments were performed at baseline, T1 (T1), T3 (T3), T6 (T6) and T12 (T12) 12 weeks after intervention. The Wilcoxon signed rank test was used to compare baseline values with follow up measurements.

Results and Discussion: Significant reductions of median pain week scores were found at all follow up measurements compared to baseline (T1, median pain reduction 0.98 (QR. 70-1.48), p=0.01, T3, 1.02 (QR. 19.1-2.7), p=0.04, T6, 1.50 (QR. 10.1-2.9), p=0.02, T12, 2.19 (QR. 6.2-2.52), p=0.02). A significant improvement was found for the McGill NWCs and PRIs at T1 compared to baseline (NWCs: median reduction 2.00 (QR. 2.00-3.00), p=0.03 and PRIs 4.00 (IQ 3.00-6.00), p=0.03). Changes in absolute sensory thresholds of the skin were small and not statistically significant. Although a significant reduction in pain was observed, the changes in other sensory complaints were limited. Furthermore, the standardised physical therapy received by all patients may have contributed to the observed reduction of complaints.

Conclusion(s): The reduction of pain observed in this study suggests that MgSO₄ may be a possible treatment method for pain in CRPS1. Whether the observed beneficial effects for CRPS1 patients can be attributed solely to MgSO₄ is determined in a RCT.

References:
1 Arch Neurol 2001; 58(10): 1547-1550.

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14AP7-7

**Lumbar paravertebral block versus epidural injection of steroid and low dose of levo-bupivacaine to treat radicular lumbosacral syndrome**

D. Quattrocchi, G. Bova, P. Di Mari, F. Belingheri

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Background and Goal of Study: The lumbosacral radicular syndrome (LRS) is a disorder with radiating pain in one or more lumbar or sacral dermatomes and with phenomena associated with nerve root tension or neurological deficits (1). Most patients with LRS may be treated during the acute and subacute phases with different strategies. Paravertebral block is effectiveness for treating of post-operative and chronic pain of unilateral origin from the chest and abdomen. The aim of this four week, randomized, double blind study is to compare the clinical improvement and safety of lumbar paravertebral block versus epidural injection of steroids and LA in patients affected radicular lumbosacral pain.

Materials and Methods: Of 34 consecutive patients recruited, 31 completed the study. All patients were treated with oxycodon 5 mg twice and pregabalin 50 mg twice. They were randomly allocated to tree group. The paravertebral group (PG) (n=10) received 3 ml of 0.375% levubupivacaine and methylprednisolone (40 mg). The second group (EG) (n=11) was treated with lumbar epidural injection of a methylprednisolone (80 mg), levubupivacaine 0.25%. For both groups local anesthetics were performed every 7 days for 4 weeks. The pain and duration of (IPA) was treated only pharmacologically. The following data were collected before the block (T0) and 30 min (T1), 1 hour (T2), and 1 hour after the block (T3), 7 days (T4), 14 days (T5) and 28 days (T6): pain intensity at rest and during lastagile manoeuvre by using the VAS score (main outcomes); sensory level as assessed by sensitivity to cold (ice test); motor block; and cumulative analgesic consumption (secondary outcomes), patients satisfaction with pain management using the following score: 1=very unhappy, 2=unhappy, 3=happy, 4=very happy.

Results and Discussion: The main outcomes recorded during 30 and 60 minutes after the block were pain scores using the VAS at rest median (25th-75th percentiles) and in EG was 30.5 (17.5-40.0), in PG was 31.0 (20.0-55.0) respectively. The difference between the two groups was not statistically significant (P=0.10). The differences among the three group at T3, T4, T5, T6 was statistically significant (P<0.05). Patients satisfaction was higher in PV and EG rather than patients of CG because of immediate relief after the block. No motor block was recorded. No differences were found the incidence of any side-effects between groups.

Conclusion(s): Paravertebral block represent a safe and effective treatment for the management of LRS.

References:
14AP7-9
The use of pregabalin in patients under intrathecal infusion of morphine and clonidine via implantable pump
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Background and Goal of Study: The use of neuralpathic techniques for providing functional analgesia is the next step beyond the administration of oral and transcutaneous agents, opioids administration via an implantable pump placed under the skin or abdominal fascia has evolved into an alternative treatment for complex pain syndromes. Usually positive results are obtained but some times pain is controlled well immediately or after a period of time (e.g. opioid tolerance, technical problems etc). Pregabalin (P) is used for neuropathic pain the last years, we would like to determine the efficacy of P when we have used it for the treatment of patients that had an intrathecal implantation 5 years ago and they deteriorated de novo.

Materials and Methods: 8 patients having neuropathic pain and were receiving intrathecal morphine (4.5mg/day) plus clonidine (7.5mg/day) via a constant flow pump (flow rate 0.5ml/day, volume of the pump 40ml) needed additional treatment. The problem that we had to face was that the concentration of morphine that is on market in Greece is 10mg/ml and the clonidine is 150mg/ml so we could not achieve higher dose of morphine or clonidine. The cost of changing a pump is high and we decided to use pregabalin as additional therapy: starting dose 75mg/day final full dose 600mg/day. Pain was assessed withVAS score before initiating the therapy with Pregabalin, and after 12 weeks of therapy. All adverse events and complications were recorded. All the patients responded satisfactorily to therapy, with no major side effects.

Results and Discussion: Results are expressed as mean ± standard deviation (SD). The mean ± SD before the therapy were 6.625±0.916 and after the therapy mean ± SD 4.625±0.518. The standard deviation of the difference was 0.778. P-value=0.0076 when the sign test was used for the statistic analysis, P-value=0.0001 when the t-test was used. Conclusion(s): Combination of Pregabalin per os and intrathecal infusion of morphine and clonidine is effective and it can be used as an alternative solution in patients that are worsening and they don’t respond satisfactorily to the current therapy because of opioid tolerance or any other reason.

14AP7-10
5% lidocaine patch for treatment of neuropathic pain.
Outcome, adverse events and patient satisfaction
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Department of Anaesthesitics, East Surrey Hospital, Redhill, Surrey, United Kingdom

Background and Goal of Study: Topical lidocaine patch is licensed for the treatment of post herpetic neuralgia and provides several distinct advantages over currently used oral agents, such as the tricyclic antidepressants, anticonvulsants and opiates. The patch does not cause any systemic side effects, does not require dermo-tissue and is simple to use. Peripheral neuropathic pain can occur following surgery or over areas of minor injury. This usually manifests as painful scars or tender trigger points. Usually these conditions are treated with local anaesthetic and steroid injections. The patch was used in a group of patients suffering from these conditions to assess its efficacy.

Materials and Methods: 25 patients with peripheral neuropathic pain resulting from surgery or trauma were offered off license treatment with 5% lidocaine patch. Brief pain inventory was used to assess the symptoms before and after the treatment.

Results and Discussion: 16 out of 25 patients responded to the treatment and were prepared to continue with this treatment. No one stopped treatment due to side effects. The only adverse effect reported was mild skin irritation.

Conclusion(s): 5% lidocaine patches are useful in treating peripheral neuropathic pain resulting from surgery and trauma.

14AP8-1
Surgical treatment of chronic postherniotomy pain?
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Background and Goal of Study: Chronic postherniotomy pain affects every day activities in 5-8% of patients one year postoperatively [1]. However, no established treatment for this pain syndrome exists and previous reports on the effect of surgical intervention suffer from severe methodological problems [2]. The neurophysiological characteristics have recently been described, suggesting that pain arises from deeper neuronal structures injured during surgery or by ongoing inflammation from the mesh. Thus, we wanted to assess the effect of mesh removal and selective neuroectomy on patients with chronic postherniotomy pain affecting daily activities.

Materials and Methods: Patients with postherniotomy pain >1 year and a well defined maximum pain localization where included after written informed consent. Inserted mesh was removed from neuronal structures and the was deferens. A selective neuroectomy was done in case of macroscopic nerve injury. The primary endpoint was changes in pain related impairment of everyday activities assessed by the validated Activities Assessment Scale (AAS) [3] before and 3 and 6 months after surgery. The study was approved by the local ethics committee.

Results and Discussion: Twenty-one patients were operated and completed the 3 and 6 months follow up. 20 patients had a complete or partial mesh removal. Eighteen patients had one or more neuroectomies. A significant improvement in the AAS score for the whole group was seen (figure 1), although three patients experienced increased pain with impairment of daily activities.

![Figure 1. Activities Assessment Scale (AAS) scores before and 3 and 6 months after surgery. 100 points indicate maximum impairment and 0 points no impairment. Friedman's test was used for nonparametric comparison of the three time points, with a significance level of 0.05.](image-url)

Conclusion(s): Mesh removal and selective neuroectomy may improve pain related activity impairment in chronic postherniotomy pain patients. However, longer follow-up is needed in larger cohorts to identify patients who may or may not benefit from mesh removal/neuroectomy.

References:

14AP8-3
Pain relief and quality of life improvement in fibromyalgia patients following adjuvant drugs therapy
P. Bonaccia, D. Pinto, R. Vignale, M. Ferrara, R. Palomba
Department of Anaesthesia and Intensive Care, Unit of Pain Therapy, University Federico II, Naples, Italy

Background and Goal of Study: Fibromyalgia (FM) is a syndrome characterized by chronic, diffuse musculoskeletal pain, a low pain threshold at specific anatomical points and significant interference with daily activities. The aim of this blind randomized coorte study was to value adjuvants therapy efficacy on clinical symptoms and Quality of Life (QoL) in FM patients.

Materials and Methods: During the last year we examined 19 females suffering from diffuse pain, muscular spasm, fatigue, sleep disturbance and receiving FANS, antidepressants, steroids, without good results because of wrong...
Background and Goal of Study: Distraction and imagination are well established instruments for reduction of subjective pain perception. In this study we tested whether a simple and everywhere available intervention for distraction by watching TV might have an impact on pain intensity and stress parameters.

Conclusion(s): In FM patients adjuvants use induced pain relief since the first 15 days of treatment but improvement in QoL needs a longer time therapy.

References:

14AP8-5
Analysis of the rejection to take opioid analgesics among patients with chronic non-oncological pain

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Background and Goal of Study: Prescription of opioids to treat the chronic non-oncological pain is a therapeutic option valid in case of patients that can hardly be controlled with analgesics. Among the reasons why this therapy does not work is that medical staff and patients reject to prescribe or receive opioids (opiophobia). OBJECTIVES: Analyse the failure of opioid treatment, taking into consideration the patients’ rejection.

Materials and Methods: Prospective and descriptive study on people who attended the Pain Treatment Centre as chronic non-oncological pain patients. They were candidates to receive a strong opioid treatment for the first time. METHODS: prescription of Fentanyl TTS 12 microg/h and later evolutionary control by call phone in two weeks.

Results and Discussion: 37 out of 91 (33.63%) studied patients interrupted the treatment. 35.14% stopped it due to the appearance of secondary effects. Taking into consideration those patients on whom the treatment was a failure due to non-pharmacological reasons, we can observe that a high percentage of them (51.36%) decided not to start it or interrupted it because they were afraid of opioids.

Conclusion(s): Opiophobia is a significant reason of opioid failure. Its prevalence among sanitary staff has been highly studied although this is not the case among patients. The incidence found in this study shows that half of the patients that abandoned the treatment did it due to this cause. A right explanation of the proposed treatment and the description of the balance between risks and benefits is essential to solve any doubt the patient may have and ensure the analgesic success.

References:

14AP8-4
Does the use of a distraction strategy in the recovery room reduce postoperative pain and need for analgesics?

A. Zimmer, M. Schulte, W. Meissner
Dep. of Anesthesiology and Intensive Care, Friedrich Schiller University Jena, Jena, Germany

Background and Goal of Study: Distraction and imagination are well established instruments for reduction of subjective pain perception. In this study we tested whether a simple and everywhere available intervention for distraction by visual and acoustic stimuli (television) could lower the perception of pain and augment the tolerance of pain after medium-sized surgery. In addition, we measured salivary cortisol levels as a parameter of stress reaction.

Materials and Methods: Patients after medium-sized surgery were randomly allocated to the treatment (watching a motion picture in the recovery room) or control group (standard treatment). Patients were not informed about the study aim. Pain intensity (NRS) and use of analgesics were documented as primary outcome parameters. Preoperatively, general patient data including pain intensity, long-term medication, and hemodynamic parameters were collected (3). Standardized general anesthesia was used in all patients. In the recovery room, the patients received a PCA-pump with Primamid. The treatment group in the recovery room could choose from a selection of motion pictures. At the start of the film (t1), after 45 (t2), 90 (t3), 135 minutes (t4), and one day after surgery (t5) pain intensity and use of analgesics were documented. The control group was assessed identically.

Results and Discussion: Of 40 patients, 20 were allocated at the treatment group (10 males, 4 females), and 20 (13 males, 7 females) at the control group.

6 patients did not wish to watch a film. Demographic and clinical data were identical. There were no significant differences in pain intensity at any measurement time point, however pain intensity decreased by 16% after starting the film in the treatment group (11 to 2), whereas pain intensity increased in the control group by 7% (p>0.055). Use of analgesics did not differ in the two groups. Salivary cortisol levels were slightly lower in the treatment group. The incidence of vomiting did not differ, the use of antemetics was 0.4/patient in the treatment group vs. 1.0/patient in the control group. Both in experimental and in clinical studies there is evidence for a substantial increase in pain tolerance by various non-drug treatments. Nevertheless, these methods are not routinely used in clinical routine. This is possibly due to the time and staff demand of these methods.

Conclusion(s): Our study suggests that a simple and easily available distraction method (watching TV) might have an impact on pain intensity and stress parameters.

Transdermal and transmucosal fentanyl in patients undergoing hemodialysis

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Dipartimento Universitario Di Scienze Chirurgiche Anestesologiche Rianimazione e Dell’Emergenza, Università degli Studi di Napoli “Federico II”, Napoli, Italy

Background and Goal of Study: Dialysis patients, treated with Transdermal Fentanyl, and with good control of painful symptoms, have complained of a worsening of symptoms at the end of dialysis. The objective of our study is to assess the effectiveness of Transmucosal Fentanyl as starter doses post-hemodialysis in patients treated with Transdermal Fentanyl.

Materials and Methods: We have recruited 6 patients with renal failure, undergoing hemodialysis, treated with Transdermal Fentanyl, and with good control of painful symptoms, have complained of a worsening of symptoms at the end of dialysis. The objective of our study is to assess the effectiveness of Transmucosal Fentanyl as starter doses post-hemodialysis in patients treated with Transdermal Fentanyl.

Results and Discussion: Using some dialyzer, during hemodialysis, there was...
a 32% decline in blood concentration of Fentanyl. Therefore, we have to admin-
ister other opioid when dyalysis is finished. Transmucosal Fentanyl gives a
rapid increase of the opioid blood concentration while Transdermal Fentanyl
comes back its sufficient blood concentration. In fact, with transdermal Fen-
tanyl blood opiate concentration increases gradually (peak plasma within 12-24
hours), while Transmucosal Fentanyl approximately 25% of the total dose of
opioid is rapidly absorbed by the oral mucosa with an appearance peak plasma
after 20-40 minutes after taking the drug.

Conclusion(s): Based on results obtained in this small number of patients, we
believe that we can use Transmucosal Fentanyl for the treatment of the increase
of pain intensity in patients where there has been a reduction in the dosage of
Transdermal Fentanyl.

14AP9-7
Chronic pain after surgery: Our pain clinic reality
H. Rebeke, M. Ferra, D. Gomes, A. Milheiro, A. Marcos
Anesthesiology, Centro Hospitalar Gaia Espinho EPE, Vila Nova Gaia, Portugal

Background and Goal of Study: One of the potential adverse outcomes fol-
lowing surgery is the development of chronic pain. About 20% of patients at-
tending chronic pain clinics implicated surgery as one of the causes of their
chronic pain. The aim of this study was to describe the patients with chronic pain
after surgery that are followed in our Multidisciplinary Pain Clinic (MPC).

Materials and Methods: We retrospectively reviewed records of all patients
with chronic pain after surgery except those with cancer. Qualitative variables
(age, sex, treatment, initial and final VAS) were characterized.

Results and Discussion: From the universe of 531 patients in our MPC, 67
(12%) were sent to us with chronic pain after surgery, 69% of these pa-
tients were male. Most of patients were send to us by orthopaedics (23,8%).
Failed Back Surgery Syndrome was the most frequent cause of chronic pain
after surgery (40,3%). In the first consultation 58,2% had pain for more than 6
months, 55% had moderate pain according the visual analogue scale, 59,7%
were medicated with NSAIDs and 20,8% with minor opioids. Our therapeutic
strategy combined invasive procedures in 22,3%, drugs (NSAIDs 56,7%, strong
opioids 22,3%, tranxadone 52,2%, bupivacaine antidepressants 64,1% and anti-
convulsants 68,6%), TENS, psychological guidance and physiotherapy. After
3 month the intensity of pain was mild in 32 patients and controlled in 14.

Conclusion(s): Chronic pain after surgery is a significant problem which has
only recently been recognized. It poses many diagnostic and therapeutic chal-
lenges to the clinician. Treatment options vary depending the history and phys-
ical findings. The majority of patients in this series were successfully managed
with drugs, physical and psychological measures.

14AP9-1
Comparison of continuous versus intermittent epidural analgesia in patients with
chronic pain in different regimens in elders after total hip arthroplasty
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Department of Anesthesia, General Hospital of Nikaia, Piraeus, Greece

Background and Goal of Study: Several studies support either continuous or
intermittent epidural analgesia for postoperative pain relief after total hip artro-
plasty. Our objective was to evaluate the analgesic efficacy of continuous versus
intermittent epidural analgesia in the elders and also the incidence of postoper-
ative respiratory depression, pruritus, nausea and vomiting.

Materials and Methods: Ninety patients older than 65 years, scheduled for
total hip arthroplasty, were randomly allocated in two groups. In all patients
we performed a combined spinal epidural anaesthesia at the L1-L2 or L2-L3
interspace and inserted an epidural catheter. In the first group, we performed
postoperatively, a continuous epidural regimen consisting of ropivacaine 0.2%,
fentanyl 2.5 μg/ml and adrenaline 2 μg/ml in a dose of 6 ml/h. In the second
group, we performed an intermittent epidural regimen consisting of 3 mg mor-
phine and 6 mg ropivacaine twice daily. All patients received parecoxib iv, 40
mg daily. We assessed postoperative pain at rest and after movement with VRS
scale, systolic and diastolic blood pressure, and also Spo2, pruritus, nausea and
vomiting every 6 hours for the next 72 hours after surgery.

Methods and Discussion: The following results prove statistically significant
better VRS pain scores at rest and after movement and a significant reduction of
the incidence of nausea and vomiting in the continuous epidural analgesia

Conclusion(s): Continuous epidural analgesia with the previous regimen seems
to provide a most effective analgesia at rest and after movement, than intermit-
tent epidural analgesia, in elders. It also produces fewer side effects such as
respiratory depression, pruritus, nausea and vomiting at the same population.

14AP9-2
Does peroperative low-dose lidocaine reduce perioperative opioid requirements after major abdominal gynaecologic surgery?
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Background and Goal of Study: Recent studies [1,2] demonstrated that i.v.
lidocaine may be indicated as adjuvant to systemic opioids for treatment of surgical pain when other multimodal approaches such as epidural analgesia are
not sufficient. However the dose of lidocaine to obtain maximal efficacy while
minimizing side effects has not yet been defined. We studied if a lower dose of
lidocaine, as those reported in literature, would also reduce peri-operative opioid requirements and pain intensity.

Materials and Methods: After institutional protocol approval, sixteen pa-
tients (ASA I-II undergoing elective abdominal hysterectomy under remifentanil-
propofol base anaesthesia were enrolled in this randomized placebo-controlled
study. Patients in the lidocaine group (L) received before incision a bolus of 1
mg kg⁻¹ lidocaine followed by a continuous infusion of 1 mg kg⁻¹ h⁻¹ until the
end of surgery. Patients in the placebo (P) group received saline solution in the
same sequence. All patients in the L and P groups received paracetamol 40 mg
intravenously BID during 72 h, with the first dose given just before incision, 15
μg fentanyl 20 min before anticipated end of surgery and PCA-piritramidé (2
dose/dose, 10 min lockout) afterwards. Pain scores (VAS) and opioid consump-
tion were recorded until 72 h postoperatively.

Results and Discussion: The total peroperative remifentanil consumption (μ g
kg⁻¹) was higher in the P group compared with the L group (50.2±6.9 vs
35.6±5.6 μ g kg⁻¹). The first PCA trigger times were respectively 18.5±11.7 min
in L group vs 13.9±12.4 min in P group. The cumulative piritramidé consump-
tion over 72 h was 43.8±15.0 mg in L group vs 97.4±62.0 mg in P group.
Mean Piritramidé consumption was lower in L group at all time intervals. The
mean pain scores (VAS) were lower in L group until 8 h postoperatively. Af-
fterwards mean VAS scores were comparable or even a bit higher in L group,
e specially during movement, but always beneath a mean value of 3.

Conclusion(s): Our study shows that even lower doses of lidocaine will have
an opioid sparing effect peripherically. The fact that the opioid sparing effect
persists after discontinuation of lidocaine administration may be attributed to
the suppression of development of hyperalgesia by low-doses lidocaine. The
analgesic effect of lidocaine persist however only in the first hours as reflected
in pain scores.

References:

14AP9-3
Femoral nerve block – A choice in postoperative multimodal analgesia for knee surgery
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Background and Goal of Study: Multimodal analgesia plays a lead role in
the postoperative rehabilitation concept. Femoral nerve block is a simple and
sure basic technique, easy to use in knee surgery. The questions are: Is femoral
nerve block – non-opioid analgetic association more efficient than the classic
analgetic regimen? Does it reduce the pain score at rest and at mobilisation
and extraanalgietic need?

Materials and Methods: 164 patients ASA I or II, aged 16 – 48 years scheduled
for knee surgery (arthroscopy, ligamentoplasty) were enrolled in this
prospective, randomized study, divided in two groups. Exclusion criteria: local
sepsis, coagulopathies, lack of cooperation. The operations were performed un-
der hemiserial analgesia using 10 mg of 0.5% marcarene sp. heavy. All patients
were given 2g of i.v. paracetamol 15 minutes prior to surgery. Postoperative
analgesia was performed in group A by femoral nerve block (trichocaine 0.5%,

Acute and chronic pain management 215
20 ml using Dalens technique) and in group B using 1g paracetamol and 100mg tramadol i.v. at the end of the operation. Extraanalgesia in the first 12 hours postoperatively was performed using a standard protocol (moderate pain – VAS 30–60 mm; mild pain – VAS 10–30 mm; 1g paracetamol each 4 hrs; severe pain – VAS>60 mm – 100 mg tramadol added each 8 hrs). Primary end points: pain score at rest and at mobilisation – assessed by VAS each 2 hours in the first 12 hrs - and the analgetic requirements in the first 12 postoperative hours. Secondary end points: immobilisation duration and side effects.

Results and Discussion: Patient data were analyzed using t-test pair and mean analysis. The pain score at rest and at mobilisation was significantly lower in the femoral nerve block (without pain-82.92% group A vs 14.63% group B; moderate and severe pain-17.07% group A vs 85.36% group B. The non-opioid analgetic need was 3.76 times higher in group B (158g vs 42g paracetamol) and the opioid need was 8.25 times higher in group B. The immobilisation duration was significantly lower in group A (10.5 h vs 18.7 h). Postoperative incidence of nausea and vomimissions:3.65% group A vs 85.36% group B.

Conclusion(s): Femoral nerve block is more effective than the classic regimen and dramatically reduces the pain score at rest and at mobilisation. The analgetic requirements were significantly reduced using this technique and the side effects were minimal. The time to rehabilitation was shorter using femoral nerve block with chirocaine.

14AP9-4
Adrenaline significantly improves the quality of pain control in patients undergoing epidural analgesia after laparotomy
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Background and Goal of Study: Opioids are considered to be a valuable adjuvant to local anaesthetics and play an important role in the epidural analgesia. However, increased consumption of the preparations required for the adequate postoperative analgesia after abdominal surgery may lead to adverse effects. Adrenaline has been shown to reduce the risk of side effects during EA with bupivacaine-fentanyl mixture (1). Thus, the main goal of our study was to assess efficacy and safety of the EA combining ropivacaine and fentanyl mixture and adrenaline administered after abdominal surgery.

Materials and Methods: We enrolled 42 adult patients after major abdominal surgery in a prospective, randomized study. All patients were given PCEA using 0.1% ropivacaine and fentanyl(2 mcg/ml) either without (RF group, n=22; 51.2±1.9 yrs; 12 males/10 females) or with adrenaline (2 mcg/ml) (ARF group, n=20; 53.6±1.7 yrs; 9 males/11 females). Pain scores were assessed in rest and coughing by 100-point visual analog scale (VAS) at 1, 3, 6, 12, 18, and 24 h after ICU admission. In addition, the consumption of drugs and the incidence of adverse effects (sedation, pruritis, urine retention, and nausea/vomiting) were recorded. Data were compared using Student’s t-test and χ2 test. p<0.05 was regarded as statistically significant.

Results and Discussion: VAS in coughing was significantly lower in the ARF group comparing with the RF group at 6, 12, 18, and 24 h after ICU admission. The consumption of ropivacaine and fentanyl required for the adequate analgesia (VAS < 3 in coughing) decreased significantly in the ARF group as compared to the RF group and was 144±6 vs. 168±2 mg/24 hours and 288±8 and 336±4 mcg/24 hours for ropivacaine and fentanyl, respectively. In the RF group, we registered pruritis, nausea, and vomiting in 27%, 23%, and 14% of the patients, respectively. No aforementioned adverse effects were found in ARF group.

Conclusion(s): After major abdominal surgery, EA using the combination of adrenaline with ropivacaine-fentanyl mixture reduces the consumption of both ropivacaine and fentanyl and declines the incidence of the adverse effects, therefore improving the quality of analgesia.


14AP9-6
Continuous paravertebral block in a patient with multiple rib fractures: A diagnostic conundrum?
S. Mannion, M. Murphy, F. Desmond
Department of Anaesthesiology and Radiology, South Infirmary-Victoria University Hospital, Cork, Ireland

Background and Goal of Study: Paravertebral block (PVB) is usually performed in the operating room or pain clinic setting and therefore may be unfamiliar to other healthcare providers. Continuous PVB has been described in the pain management of multiple rib fractures. A loss-of-resistance technique (LORT) is commonly employed to locate the paravertebral space. The use of air for this technique will result in air entering the paravertebral space. We descript a case report of continuous PVB in a patient with multiple rib fractures presenting as a radiological diagnostic conundrum.

Materials and Methods: A 65 year old man presented with left sided rib fractures of the 6th – 8th ribs, following a fall. He had a background history of Chronic Obstructive Pulmonary Disease. The pain team were asked to review him because he had developed a left basal consolidation and was unable to cough or expectorate sputum because of thoracic pain. A left sided continuous paravertebral block was performed using a LORT with air and an 18 G Tuohy needle and epidural catheter set. The block was performed at the T7 level, 2.5 cm from the midline. Needle entry into the paravertebral space was confirmed by loss of resistance with 3 - 5 mLs of air. 15 mLs of 0.25% bupivacaine with adrenaline (1:200,000) was administered and the catheter inserted.

Results and Discussion: After 15 minutes the patient had very good pain relief and was able to cough vigorously. 30 minutes after block performance the patient underwent a thoracic computer tomograph (CT) to delineate the left basal consolidation. The radiologist reviewing the CT scan was unaware a PVB had been performed and reported evidence of air (2 –3 mLs) outside the parietal pleura and suggestive of pneumomediastium (arrow). Subsequent communication with the pain team resolved the cause of this diagnosis.
Acute and chronic pain management

We classified the type of hepatectomies according to categories, there were no differences between groups.

Table 2. Glycemia and lactate during surgery

<table>
<thead>
<tr>
<th></th>
<th>Intrathecal morphine (n=25)</th>
<th>Endovenous morphine (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal glycemia</td>
<td>109.2±13</td>
<td>106±15</td>
</tr>
<tr>
<td>End-surgery glycemia</td>
<td>136.2±30</td>
<td>152.3±40</td>
</tr>
<tr>
<td>Basal lactate</td>
<td>0.79±0.43</td>
<td>0.78±0.38</td>
</tr>
<tr>
<td>End-surgery lactate</td>
<td>2.16±4.1</td>
<td>3.02±4.7</td>
</tr>
</tbody>
</table>

In relation to the serum glycemia, in both groups the values at the end of the surgery were significantly higher in comparison to the basal ones, but although the value of glycemia at the end of surgery was higher in the endovenous group, this difference was not statistically significant. There were no complications related to the techniques after surgery.

Conclusion(s): There is a tendency of glycemia to be higher in patients with endovenous than in those with intrathecal morphine, at the end of the surgery. As glycemia is one of the parameters related to stress response to pain, it is useful to start a prospective randomized study evaluating glycemia and cortisol during different steps of the surgery and in the following 48 hours.

Acknowledgements: Anesthesiologists, nurses and technical staff.

References:

14AP10-4

Analgesia during physiotherapy in burns patients – Is it underutilised?
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Background and Goal of Study: To assess the severity of pain experienced by patients with burn injuries on conventional analgesia while undergoing physiotherapy (PT). The study of pharmacogenetics in anesthetic & analgesic drugs might provide satisfied analgesic effect and might be widely applied for postoperative pain. The data analyzed were: demographic data, time of surgery and complications related to the technique. Statistical analyses were performed with t-test.

Materials and Methods: We collected the blood samples from those pregnant women who use spinal or epidural morphine for their post cesarean section pain control. According to the clinical phenotype, patients could be divided as the following three groups: Group 1 (using morphine for post C/S analgesia without central type itching sensation), Group 2 (using morphine for post C/S analgesia with mild central type itching sensation), and Group 3 (using morphine for post C/S analgesia with severe central type itching sensation and treatment should be indicated). We compare the genotypic polymorphisms of A118G in opioid μ receptor.

Results and Discussion: Adequate data analysis: 75 cases. Medication for pruritus: 7/75. The genotype with A/G and G/G has obvious central pruritus side effect, p<0.05. The inherited variation of genetic polymorphisms in drug metabolism, distribution and therapeutic target could significantly affect the metabolism efficiency and toxicity for that drug.

References:

14AP10-3

Variation in glycemia during liver resection in patients with intrathecal morphine for postoperative pain relief
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Background and Goal of Study: It is accepted the use of endovenous or intrathecal morphine for analgesia in patients with liver surgery. The pain is related to stress response which produces variations of serum glycemia levels, among other parameters. The aim was to describe variations in glycemia during liver surgery (hepatectomy), in patients with intrathecal morphine or endovenous morphine for pain relief, analyzing retrospective clinical data from January to November, 2007.

Materials and Methods: We evaluated retrospective clinical records of patients undergoing liver resection from January to November 2007. We analyzed the data from patients that received a single-shot of intrathecal morphine or endovenous doses of morphine for postoperative pain. The data analyzed were: demographic data, time of surgery, glycemia and lactato at beginning and end of surgery and complications related to the technique. Statistical analyses were performed with t-test.

Results and Discussion: The results in the tables are presented as X±SD.

Table 1. Demographic data and time of surgery

<table>
<thead>
<tr>
<th></th>
<th>Intrathecal morphine (n=25)</th>
<th>Endovenous morphine (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>51±17</td>
<td>60±11</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>67±13</td>
<td>73±12</td>
</tr>
<tr>
<td>Gender (F/M)</td>
<td>13/12</td>
<td>13/18</td>
</tr>
<tr>
<td>ASA I/II/III</td>
<td>8/9/50</td>
<td>9/11/16/3</td>
</tr>
<tr>
<td>Duration of surgery</td>
<td>211±68</td>
<td>255±90</td>
</tr>
</tbody>
</table>

In in relation to the serum glycemia, in both groups the values at the end of the surgery were significantly higher compared to the basal ones, although the value of glycemia at the end of surgery was higher in the endovenous group, this difference was not statistical significant. There were no complications related to the techniques after surgery.

Conclusion(s): There is a tendency of glycemia to be higher in patients with endovenous than in those with intrathecal morphine, at the end of the surgery. As glycemia is one of the parameters related to stress response to pain, it is useful to start a prospective randomized study evaluating glycemia and cortisol during different steps of the surgery and in the following 48 hours.

Acknowledgements: Anesthesiologists, nurses and technical staff.

References:

14AP10-2

The study of pharmacogenetics in anesthetic & analgesic drugs – The genetic association study for the central type pruritus induced by intrathecal or epidural morphine
F. Tsai, L. Chen, S. Fan
Anesthesiology, National Taiwan University Hospital, Taipei, Taiwan

Background and Goal of Study: Intrathecal or epidural morphine injection could provide satisfied analgesic effect and might be widely applied for post cesarean section analgesia. However, intrathecal or epidural morphine might often induce special side effect as central type pruritus. The single-nucleotide polymorphism may be one of the factors.

Materials and Methods: We collect the blood samples from those pregnant women who use spinal or epidural morphine for their post cesarean section pain control. According to the clinical phenotype, patients could be divided as the following three groups: Group 1 (using morphine for post C/S analgesia without central type itching sensation), Group 2 (using morphine for post C/S analgesia with mild central type itching sensation), and Group 3 (using morphine for post C/S analgesia with severe central type itching sensation and treatment should be indicated). We compare the genotypic polymorphisms of A118G in opioid μ receptor.

Results and Discussion: Adequate data analysis: 75 cases. Medication for pruritus: 7/75. The genotype with A/G and G/G has obvious central pruritus side effect, p<0.05. The inherited variation of genetic polymorphisms in drug metabolism, distribution and therapeutic target could significantly affect the metabolism efficiency and toxicity for that drug.

References:
Postoperative pain management following colorectal resection: Quality evaluation of two protocols

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Background and Goal of Study: Postoperative pain management has a humanitarian role, but medical and economic benefits are also important. The objective of this study was to evaluate the quality of two protocols used in our institution during the year 2007 for the management of postoperative pain following Appendectomy (AP).

Materials and Methods: We conducted a retrospective analysis of the protocols assessing the effectiveness [incidence of severe pain (Numerical Rating Scale >7/10)], safety [incidence of hypotension (systolic/diastolic arterial pressure < 90/60 mmHg)] and tolerability [incidence of vomiting, excessive sedation, pruritis, and urinary retention]. The values considered were the worst ones found during the 0-6 Hours (6H), 6-12H (12H), 12-24H (24H) and 24-48H (48H) time intervals after the AP. We conducted a statistical analysis using non-parametric test (Chi-Square Test) to compare the 2 protocols evaluated considering p<0.05 statistically significant and compared our results with some standards of care suggested by the bibliography consulted.

Results and Discussion: 60 patients were analysed, their age was 29.0±10.9 years and the gender distribution was: 60% female and 40% male. 51.7% of them formed a group of patients treated with protocol A [Paracetamol 1g iv 6/6 H + Ketorolac 20mg iv 6/6 H] and 48.3% formed a group of patients treated with protocol B [Tramadol 100mg iv 6/6 H + Metadonapiramide 10mg iv 6/6 H + Ketorolac 30mg iv 6/6 H]. The results are shown in the Table 1.

Conclusion(s): The effectiveness, safety and tolerability of the protocols used are satisfactory. Nevertheless some concerns remain about the incidence of hypotension and excessive sedation using both the protocol A and the protocol B.

References:

14AP10-9
Intraoperative infusion of dexmedetomidine: Recovery and postoperative analgesia

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Background and Goal of Study: Dexmedetomidine (Dex) infusion during anaesthesia maintenance has only been used in a few studies up to now. Knowledge on recovery and postoperative analgesia induced by dexmedetomidine is lacking. We aimed to investigate the recovery profile and postoperative analgesic effects of three different infusion doses of dexmedetomidine in women undergoing lower abdominal surgery.

Materials and Methods: After ethical approval and informed consent, 85 women (ASA I-II) were premedicated with atropine. Following dex loading (1μg/kg), dex infusion was started for group I (n=29) 0.2 μg/kg h⁻¹; group II (n=28) 0.4 μg/kg h⁻¹ and group III (n=28) 0.7 μg/kg h⁻¹. Anaesthesia was induced by propofol, fentanyl and atracurium in all groups and maintenance was provided by BIS guided desflurane anaesthesia (50% air+O₂). Dexmedetomidine infusion was ended at closure of the abdominal fascia and desflurane was discontinued with the last suture. Postanaesthesia Adreter Scoring (PAS) was used for evaluating recovery after extubation and 15 min. In addition, Ramsay sedation score (RSS) was used at 30 minutes after extubation and 1 hour. Time to eye opening, time to verbal response (saying name), time to obey the

References:

14AP10-8
Postoperative analgesia including oral morphine in a neurosurgical department

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Background and Goal of Study: Oral morphine is an alternative to parental morphine in postoperative pain treatment; For neurosurgical patients don’t exist data. We evaluated the efficacy, patients satisfaction and the rate of undesirable side effects of a postoperative pain treatment including oral morphine. (actiskenan®).

Materials and Methods: We sampled the data of all patients operated in our neurosurgical theater during 2 months. Patients for major spine surgery treated by patient controlled analgesia were evaluated in an other study. Patients with need os postoperative respirator treatment were not evaluated. Pain score was evaluated by using the numeric rating scale with 0 = no pain and 10 = worst pain.

Results and Discussion: We revealed data from 55 patients. Spine surgery (SP) 34 and Craniotomy for brain surgery (BR) 21. The results for pain score showed a mean NRS of 1,1±1,6 at rest and 3,4±2,3 at movement for the craniotherapy and 1,7±2,5 and 4,1±2,7 for the spine surgery respectively over the entire period. 10% of the patients had side effects (nausae/vomiting; 8%; constipation; 6% and urine retention 2%). The patients satisfaction was 8,1 in a score from 0 (worst) and 10 (best). 95% of all patients would like to get the same treatment again.

Conclusion(s): We could show a good patients satisfaction using oral morphine after spine surgery and after craniotomy for brain surgery. The data show also that some patients had no sufficient pain relief at mobilisation; the question if a better information of the patient and the medical and paramedical staff can improve this (by anticipated pain treatment before mobilisation), has to be investigated.

References:
1. Zastanay R et al. Early administration of oral morphine to orthopedic patients after surgery.
orders were recorded. Pain score was evaluated with Visual Analogic Scale (VAS) at extubation, postoperative 30 min, 2 hr, 6, 12 and 24 hr. Meperidine i.v. was used by patient controlled analgesia device and meperidine consumption, adverse effects were noted at 24 hr after the surgery. Kruscal Wallis, Mann Whitney-U, One way ANOVA, t tests were used (p<0.05).

Results and Discussion: Patient demographics were similar. PAS values were less in group III at extubation and 15 min than the other groups (p<0.05). RSS was increased in group III at 30 min when compared to the other groups. (p<0.05) VAS scores at all measurement times and total meperidine consumption were less in group III when compared to the other groups (p<0.05). The consumption of meperidine and the scores of VAS were significantly low in group III (p<0.05). Time to eye opening, time to verbal response and time to obey the orders were longer in group III than the others (p<0.05).

Conclusion(s): We concluded that, when given as a concomitant anesthetic, Dex in dose 0.7 μg/kg/min provided longer and more qualified postoperative analgesia but increased sedation with delayed early recovery.

14AP11-1
Comparative study of awake conditions and analgesia between continuous remifentanil and discontinuous fentanyl in thoracic surgery
E. Vila, R. Garcia-Guasch, S. Muñoz, G. Fitó, M. Jimenez
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Background and Goal of Study: To compare continuous perfusion remifentanil and discontinuous doses of fentanyl in terms of post-operative analgesia, arousal quality and anaesthesiologist’s level of satisfaction.

Materials and Methods: 53 patients scheduled for lobectomies were included in this randomized, prospective clinical study. Patients were allocated into two groups: Group REM: remifentanil (n=27) and Group FENT: fentanyl (n=26). Anesthesia induction was performed with propofol, cisatracurium and, depending on the group, fentanyl or remifentanil. Perflaxed propofol and cisatracurium and either fentanyl or remifentanil were used for maintenance purposes. Once wounds were closed, epidural thoracic analgesia was initiated in both groups with a single dose of 0.375% bupivacaine followed by continuous epidural perfusion: bupivacaine (0.125%) and fentanyl (3mcg/ml) at 5 mL/h. Post-operative analgesia was achieved with the epidural perfusion (PCA) and intravenous dexketoprofen. The variables recorded were: timing and arousal quality variables, orientation test response capacity, visual analogue scale (VAS) during the first 12 hours and anaesthesiologist’s satisfaction. Statistical analyses were performed with ANOVA and chi square (χ2) tests with a significance (Sig) of 0.05.

Results and Discussion: Both groups were similar with regard to demographic variables. Data are shown as mean ± SD.

Epidemiological data and arousal times

<table>
<thead>
<tr>
<th>Patients</th>
<th>26</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>61±16.7</td>
<td>59±19.9</td>
</tr>
<tr>
<td>Time from intubation to extubation (h/min)</td>
<td>3.47±0.52</td>
<td>3.9±1.19</td>
</tr>
<tr>
<td>Time from end of surgery to spontaneous ventilation (min)</td>
<td>13±14</td>
<td>8±8</td>
</tr>
<tr>
<td>Time from end of surgery to eye opening (min)</td>
<td>15±220</td>
<td>10±8</td>
</tr>
<tr>
<td>Time from end of surgery to extubation (min)</td>
<td>22±17</td>
<td>13±8</td>
</tr>
</tbody>
</table>

*p<0.05.

Three minutes after the extubation, a significantly number of patients of REM group answered to orientated question (p=0.001). The consumption of the i.v. morphine was also significantly lower in the DPI group. No differences in the incidence of nausea and vomiting, urine retention, and pruritus were registered between the groups. The plateau activity also did not differ significantly.

Conclusion(s): First double dose of intravenous paracetamol combined with thoracic epidural analgesia provides better postoperative analgesia and reduces morphine consumption after lower abdominal surgery as compared to standard dose.

References:

14AP11-3
Tapentadol immediate release for the relief of acute pain following orthopedic surgery of the forefoot: Efficacy and tolerability results from a randomized, double-blind, phase II study
H. Weber, J. Stegmann, D. Ubrmann
Research and Development, Grunenthal GmbH, Aachen, Germany

Background and Goal of Study: Tapentadol is a novel, centrally-acting analgesic with a combined mode of action: mu-opioid receptor agonism and norepinephrine reuptake inhibition. This study assessed the efficacy and tolerability of tapentadol immediate release (IR) for relief of moderate-to-severe pain following orthopedic surgery of the forefoot.

Materials and Methods: This was a phase II, randomized, double-blind, placebo-controlled, multi-dose study. Patients (N = 269) were randomly assigned (1:1:1:1) to receive tapentadol IR 50 mg, tapentadol IR 100 mg, oxycodone HCl IR 10 mg, or placebo every 4 to 6 hours as needed over 3 days. The primary endpoint was the summed pain intensity over 24 hours (SPI-24) on the second day after surgery (Day 3); secondary endpoints included SPI-24 on Days 2 and 4, and patient’s global assessment of study drug on Days 3, 4, and 5 and post-treatment follow-up.

Results and Discussion: The mean SPI-24 values for both doses of tapentadol IR were significantly lower on Day 3 (p<0.0013) compared with placebo.

In a separate analysis, oxycodone HCl IR 10 mg demonstrated a significant difference from placebo on Day 3 (P = 0.0365), confirming the sensitivity of the model. The mean (standard deviation) SPI-24 values on Day 3 showed comparable efficacy of oxycodone HCl IR 10 mg (33.6 [19.7]) and tapentadol IR 50 mg (35.7 [17.2]). On Day 2, all active-treatment groups had SPI-24 values significantly lower than placebo (p<0.0001). Patient’s global assessment was higher (based on percentage of patients providing an assessment of excellent, very good, or good) for all active-treatment groups compared with placebo on all days. Tapentadol IR 100 mg was consistently associated with the highest percentage of patients reporting excellent, very good, or good. The most commonly reported treatment-emergent adverse events for all active treatment groups were characteristic for drugs with mu-opioid activity and included nausea, vomiting, dizziness, and somnolence. The overall incidence of gastrointestinal disorders was numerically lower for both groups of tapentadol IR, 50 mg and 100 mg, compared to the oxycodone HCl IR 10-mg group.

Conclusion(s): These results demonstrate tapentadol IR 50 and 100 mg effectively relieve moderate-to-severe pain following orthopedic surgery. Tapentadol appears to have improved gastrointestinal tolerability profile compared with oxycodone IR.

Disclosure: Horst Weber is an employee of Grunenthal GmbH.

14AP11-2
Efficacy of double first dose of intravenous paracetamol at lower abdominal surgery
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Background and Goal of Study: Paracetamol as a central non-opioid agent combined with epidural analgesia (EA) can reduce the postoperative pain after major surgery (1). The main goal of our study was to assess and compare the efficacy of standard and double first doses of intravenous paracetamol combined with epidural analgesia after colonic surgery.

Materials and Methods: We enrolled 48 adult patients undergoing colonic surgery in a prospective study. Intraoperatively, all patients have received epidural analgesia at T8, level. At the end of surgery, all patients received intravenous paracetamol and were randomized in to two groups. In the SPI (Standard Paracetamol Infusion) group (n=25), we used paracetamol 1000 mg. In the DPI (Double Paracetamol Infusion) group (n=23), paracetamol was given first in a dose of 2000 mg. After operation, all patients have received EA with fentanyl 2 mcg/ml in 0.2% ropivacaine solution. Pain scores, consumption of i.v. morphine necessary for the adequate analgesia, the incidence of the adverse effects and platelet aggregation were assessed during first 24 hours after surgery. Data were compared using Student’s t-test. p<0.05 was regarded as statistically significant.

Results and Discussion: The VAS (Visual Analog Scale) scores in coughing were significantly lower in the DPI group compared with the SPI group at 1, 3 and 6 hours after the surgery (p<0.01). The consumption of the i.v. morphine was also significantly lower in the DPI group. No differences in the incidence of nausea and vomiting, urine retention, and pruritus were registered between the groups. The platelet activity also did not differ significantly.

Conclusion(s): First double dose of intravenous paracetamol combined with thoracic epidural analgesia provides better postoperative analgesia and reduces morphine consumption after lower abdominal surgery as compared to standard dose.

References:
1. Horst Weber is an employee of Grunenthal GmbH.

Acute and chronic pain management 219
14AP11-4
Use of fentanyl versus remifentanil during laparoscopic gastric bypass: Postoperative morphine required during first 24 hours after the procedure, pain and outcome
C. Martí-Valer, A. Sabate Pes, A. Dalmau Lliljos
Anesthesiology, Hospital Universitari de Bellvitge, Barcelona, Catalunya, Spain

Background and Goal of Study: The goal of our study was to know the influence of the intraoperative morphic used (fentanyl versus remifentanil) in the doses of postoperative intravenous morphine required and in the outcome on morbid obesity patients scheduled for laparoscopic gastric bypass.

Materials and Methods: Patients scheduled for laparoscopic gastric bypass were randomized to two intraoperative management: fentanyl group received fentanyl as opioid during the surgery although remifentanil group received perfusion of remifentanil during the proceeding (in these group, 10mg morphine/v was administered 40 minutes before finish). Perioperative pain management was the same in both groups: a first pain stage was assessed just after surgery and 2 mg morphine/v were administered every 5 minutes until obtain a pain stage 3 (VAS); during 24 hours balanced analgesia with PCA-morphine,1 gr of acetaminophen/s8/8h and 50 mg of dextropropofen/4h was administered; main variables were VAS values, morphine administered during first 24 hours, postoperative arterial blood gases and main complications.

Results and Discussion: Main results are on the table.

<table>
<thead>
<tr>
<th></th>
<th>Fentanyl (n=89)</th>
<th>Remifentanil (n=82)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man/woman (%)</td>
<td>21/79</td>
<td>22.5/77.5</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>42.9/4.68</td>
<td>47.6/8.59</td>
</tr>
<tr>
<td>Body mass index</td>
<td>42.9/6.82</td>
<td>46.4/6.21</td>
</tr>
<tr>
<td>Respiratory comorbidity (%)</td>
<td>63</td>
<td>61.3</td>
</tr>
<tr>
<td>Basal arterial pCO2 (mmHg)</td>
<td>90.65/10.17</td>
<td>88±14.72</td>
</tr>
<tr>
<td>Basal arterial pCO2 (mmHg)</td>
<td>39.74/3.67</td>
<td>39.6/3.04</td>
</tr>
<tr>
<td>FEV1</td>
<td>282±813</td>
<td>251±4.31</td>
</tr>
<tr>
<td>FVC</td>
<td>334±310</td>
<td>306±517</td>
</tr>
<tr>
<td>FEV1/FVC (%)</td>
<td>82.55±6.75</td>
<td>83.74±4.27</td>
</tr>
<tr>
<td>Postoperative mechanical ventilation (%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Immediate postoperative VAS</td>
<td>4.5/2.49</td>
<td>4.8±2.42</td>
</tr>
<tr>
<td>Morphine until VAS=3 (mg)</td>
<td>7.34±6.19</td>
<td>6.78±6.39</td>
</tr>
<tr>
<td>Morphine during first 24 h PCA (mg)</td>
<td>21.9±112.18</td>
<td>21.3±12.36</td>
</tr>
<tr>
<td>24 h posttreatment arterial pCO2 (mmHg)</td>
<td>117.2±29.7</td>
<td>112.8±10.49</td>
</tr>
<tr>
<td>24 h posttreatment arterial pCO2 (mmHg)</td>
<td>45.2±16.74</td>
<td>45.1±16.01</td>
</tr>
<tr>
<td>Postoperative atelectasis (%)</td>
<td>3.3</td>
<td>16*</td>
</tr>
<tr>
<td>Days in hospital</td>
<td>4.8±2.84</td>
<td>5.2±4.42</td>
</tr>
</tbody>
</table>

Conclusion(s): Although hospital stay was not affected, remifentanil (group patients required more total doses of morphine during first 24 h than fentanyl group and immediate postoperative atelectasis was more common; more studies will be necessary in order to know other complications as nausea and patient satisfaction.

14AP11-5
Relief of acute pain following orthopedic surgery: Efficacy and tolerability of tapentadol immediate release in a randomized, double-blind, phase III study
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Background and Goal of Study: Tapentadol is a novel, centrally-acting analgesic with a combined mode of action: mu opioid receptor agonism and norepinephrine reuptake inhibition. This trial studied the efficacy and tolerability of tapentadol immediate release (IR) for the relief of moderate-to-severe pain in an established model of acute postsurgical pain after orthopedic surgery of the foot/ankle (bunionectomy).

Materials and Methods: This was a phase III, randomized, double-blind, placebo and active-controlled study. Patients (N = 603) were randomly assigned to receive doses of placebo; tapentadol IR 50, 75, or 100 mg; or oxycodone HCl 15 mg every 4 to 6 hours. The primary endpoint was the sum of pain intensity differences over 48 hours (SPID48); other evaluations included the patient’s global impression of change measured at the end of the double-blind period and tolerability and safety assessments.

Results and Discussion: All tapentadol IR treatment groups showed significantly higher SPID48 values (better pain relief) compared with placebo (all adjusted P values <.001) with an increase in the analgesic effects from tapentadol IR 50 to 100 mg. Oxycodone HCl 15 mg group showed a significant difference from placebo (nominal P <.001), validating the model. Based on patient rated improvement status, the patient’s global assessment of change was in favor of all active-treatment groups compared with placebo. Sixty-seven percent, seventy-seven percent, and eighty-nine percent of the patients treated with tapentadol IR 50, 75, and 100 mg, respectively, rated their status as being “much improved” or “very much improved” at the end of the study period, compared with forty-one percent of placebo and eighty-eight percent of the oxycodone HCl IR 15 mg patients. The most commonly reported treatment emergent adverse events for all active treatment groups were characterized as opioid treatment and included nausea, vomiting, constipation, dizziness, and somnolence. The overall incidence of gastrointestinal disorders was lower for the tapentadol IR 50, 75, and 100 mg groups (46%, 46%, and 59%, respectively) compared with the oxycodone HCl IR 15 mg group (73%).

Conclusion(s): These results demonstrate that 50, 75, and 100 mg doses of tapentadol IR are effective for the relief of moderate-to-severe pain following bunionectomy. Tapentadol appears to have an improved gastrointestinal tolerance profile compared with oxycodone IR.

Disclosure: Claudia Lange is an employee of Grunenthal GmbH.

14AP11-6
Dosing requirements for patients receiving the fentanyl iontophoretic transdermal system versus intravenous patient-controlled analgesia with morphine after major surgery
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Background and Goal of Study: The fentanyl iontophoretic transdermal system (ITS) is a new analgesic modality approved for the treatment of postoperative pain in hospitalized adults. Four clinical trials have demonstrated that fentanyl ITS and intravenous (IV) patient-controlled analgesia (PCA) with morphine provide comparable analgesia after surgery. This analysis assessed the number of analgesic doses delivered by each modality in each of the 4 studies.

Materials and Methods: Data were from 4 randomized, multicenter trials comparing the efficacy and safety of fentanyl ITS and morphine IV PCA for pain management in adults after major surgery. In each trial, patients were randomized to receive fentanyl ITS or morphine IV PCA for up to 72 hours. Fentanyl ITS was self-administered in programmed 40-µg doses, each over 10 minutes (maximum, 6 doses/hour). Morphine was self-administered in 1-mg bolus doses, with a 5- to 6-minute lockout period (maximum, 10 doses/hour) in all but 1 study, which allowed each participating center to set the bolus dose and lockout period while maintaining a maximum dose of 20 mg/hour. To ensure uniformity for this analysis, a delivered morphine dose of 1 mg was equivalent to 1 dose. Pain intensity was measured using a numerical rating scale (NRS; 0=no pain, 10=worst possible pain) in all but 1 study, which used a 100-mm visual analog scale (VAS) with the same anchors.

Results and Discussion: During the first 24 hours in each of the 4 studies, the mean total number of self-administered doses was numerically lower for patients who received fentanyl ITS versus morphine IV PCA (33.4 vs 45.9, 32.6 vs 39.6, 37.3 vs 42.7, and 24.5 vs 34.5). The mean number of doses/hour in the first 24 hours was also numerically lower in the fentanyl ITS versus IV PCA group in each study (1.39 vs 1.91, 1.36 vs 1.85, 1.58 vs 1.78, and 1.02 vs 1.44). The last-measured pain intensity scores were similar between fentanyl ITS and morphine IV PCA at 24 hours (32.7 vs 31.1 [VAS], 3.0 vs 3.0, 3.0 vs 2.9, and 2.5 vs 2.4). Similar to results from the first 24 hours of each study, the cumulative mean total number of doses and mean number of doses/hour were numerically lower for patients receiving fentanyl ITS versus morphine IV PCA over the entirety of all 4 studies.

Conclusion(s): Results suggest that fewer doses were required to achieve comparable pain control for patients who received fentanyl ITS versus morphine IV PCA in each trial. These findings may also indicate a relative dose equivalency between fentanyl ITS and morphine IV PCA.

Disclosure: Karin Bornhoevd is an employee of Janssen-Cilag NV.

14AP11-7
Post operative analgesia undergoing laparoscopic cholecystectomy (LC): Parecoxib vs lornoxicam
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Anaesthesiology, Asklepion Voulas, Athens, Attiki, Greece

Background and Goal of Study: Laparoscopic approach to cholecystectomy may cause less pain and fatigue. Recent development includes the use of cox-2 inhibitors for treatment of post operative pain. The presence study evaluated the pain control, after LC using IV 40mg Parecoxib bolus or IV 8mg Lornoxicam bolus.

Materials and Methods: 60 patients male and female undergoing elective LC were assigned randomly to the group: P (Parecoxib) 30pts, L (Lornoxicam)
cancer; 30pts, ASA I – II, age varied between 25-65 years and average weight 75kg. Surgery treated with T.I.V.A. 20 min before final operation a bolus of Parecoxib or Loxomax was administered. In all patients, the surgical section was infiltrated with ropivacaine 10mg/ml+10HD. The same doses were administered after 12h. Pain management was assessed using a Visual Analogue Scale [VAS (0-10)] at rest and during mobilization at 12 and 24h after surgery. Post operative complications were estimated: emetemesis, epigastralgia, blood loss from the surgical trauma; CNS strokes; myocardial ischaemia, hyperthermia and headaches during the 1st 24h.

Results and Discussion: In time zero (T0) both groups at rest and during mobilization did not feel any pain. After 4 hours, 12% of group P and 16% of group L suffered of mean pain in movement (3.9±1/3.5±1.8) and were treated with IM administration of paracetamol. In 15% of group L epigastralgia was observed, 12% had headaches, 18% hypertension and medcal increase of blood loss from the wound.

Conclusion(s): Laparoscopic approach of cholecystectomy creates a significant painful stimuli and continuous post operative pain. T.I.V.A. immediately helped in neuroanalgic equilibration of pain in all phases of the operation. Administration of Parecoxib as a pain relief helped in successful management of post operative pain with reliability and without the defaults of Loxomax.

14AP11-8
Ketorolac for acute postoperative pain following elective thyroid surgery
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Background and Goal of Study: Preventive analgesia using NSAIDS to relieve postoperative pain has widely been tried. However, its efficacy is very different among related studies. This double-blind, placebo-controlled and randomized study was designed to investigate the efficacy of NSAIDS for preventing post-operative pain following thyroid surgery using Ketorolac.

Materials and Methods: After IRB approval, 41 adults patients (aged over 25 and ASA class 1-2) scheduled for elective thyroid surgery were randomized to one of the two groups (Ketorolac =21) or Placebo (n=20). Ketorolac patients received 30 mg iv in the recovery area and Placebo patients same volume of normal saline 20 and 60 minutes after surgical incision. Patients were evaluated at 30 minutes, and 1, 6, 12, 24 hours after surgery and given the same PCA containing fentanyl/morphine after transferring to the ward. For additional analgesia in the recovery area patients were given fentanyl 1.5 mcg/kg if requested, and this was repeated 15 minutes if needed. Statistical tests were performed using Students’ t-test and chi-square test.

Results and Discussion: There were no significant difference in the demographic data. 6/21 (29%) patients in the Ketorolac group and 11/20 (55%) patients in the Placebo group required fentanyl in the recovery area. Patients in the Placebo group reported significantly higher VAS scores in all phases of the operation (t7 = 6.8*; t30 = 2.1; t60 = 2.7; t90 = 2.5). The incidence of pain and nausea/emesis were not significantly different between the groups in the ward.

Conclusion(s): Ketorolac was a useful agent preventing postoperative pain in the recovery area but the addition of Ketorolac during surgery did not influence analgesia and nausea/emesis in the ward.

14AP12-1
Interaction of physostigmine and alfentanil in a human pain model
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Background and Goal of Study: The cholinergic system plays a central role in the modulation of pain [1]. Preclinical studies indicate an antihyperalgesic effect of nicotinic and muscarinic agonists, as well as cholinesterase inhibitors [2]. Aim of this study was to examine the analgesic and antihyperalgesic properties of the cholinesterase inhibitor physostigmine (P) and the opioid alfentanil (A), alone and in combination, in an experimental pain model in humans [3].

Materials and Methods: After IRB approval, 20 healthy volunteers were enrolled in this double-blind and placebo-controlled cross-over study. Transcutaneous electrical stimulation at high current densities (44.3±22.3 mA) induced spontaneous acute pain (NRS=8 of 10) and stable areas of hyperalgesia for painful mechanical stimuli (pinprick hyperalgesia). Pain intensities as well as the extent of the hyperalgesic area were assessed before, during and 145 min after a 15 minutes lasting i.v. infusion of P (20 μg/kg), A (20 μg/kg), a combination of P and A in equal concentrations, or saline 0.9% as a control. The type of interaction was determined by fitting an interaction model to the data.

Results and Discussion: The maximum pain reduction was 50% after A, 35% after P and 60% after the combination. The hyperalgesic areas were reduced by 65%, 50% and 55%, respectively. The data were best described by a model assuming an anti-additive interaction for both analgesic (figure 1) and antihyperalgesic (figure 2) effect.

Conclusion(s): Our study provides first results on the interaction of physostigmine and alfentanil on pain and hyperalgesia. Although anti-additive effects were determined with the dosing investigated in this study, the results may be used as a rationale for combining both drugs in pain therapy.

References:

14AP12-2
Lamotrigine efficacy compared to other antiepileptic drugs in the treatment of migraine without aura
D. Pinto, P. Bonaccia, B. Battista, N. Lombardo, R. Palomba
Department of Anaesthesia and Intensive Care, Unit of Pain Therapy, University Federico II, Naples, Italy

Background and Goal of Study: Growing recognition of the similarities in the pathophysiology of epilepsy and migraine has further heightened interest in exploring the newer AEDs in the treatment of migraine [1]. This blind randomized double was undertaken to evaluate the efficacy of Lamotrigine compared to Pregabalin or Levetiracetam in patients whose migraine was inadequately controlled.

Materials and Methods: We assessed 28 patients, 18 females 10 males, with migraine without aura. Inclusion criteria: serious hepatic and renal failure, psychiatric disorders, allergy. Under ethical committee approved and informed consent, patients were randomized in 3 groups (La, P, Le) to receive a flexible dose of (La) Lamotrigine 25 mg/die to 150 mg/die; (P) Pregabalin 75mg/die to 300 mg/die; (Le) Levetiracetam 500 mg/die to 1000 mg/die. In each group we assessed: pain intensity mean value using VAS, and strokes mean weekly frequency using a diary in which patient wrote down each stroke date and its intensity. The follow-ups were effected at T7, T30, T60, T90. Statistical analyses was performed by T Test.

Results and Discussion: Patients resulted homogeneus for: age (mean 44±6), height (mean 167±6), weight (mean 75±9). Mean vas and mean strokes frequency are shown in Table 1; their trends are shown in Figures 1 and 2, mean ± standard deviation; t test result,

<table>
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<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
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<tbody>
<tr>
<td>VAS</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>T1</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>T30</td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Figure 1

Figure 2

Acute and chronic pain management 221
14AP12-4

Subanaesthetic concentrations of propofol decrease amplitudes of contact heat evoked potentials (CHEPs)

G. Unterberger, A. Hock, B. Horn, E. Kochs, G. Schneider
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Background and Goal of Study: In this study thermal stimulation of skin by a contact heat evoked potential stimulator (CHEPS) was used to generate sharp pain. Contact heat evoked potentials (CHEPs) were analysed under subanaesthetic concentrations of propofol. Auditory evoked potentials (AEP) were used to quantify the sedative component of anaesthesia.

Materials and Methods: The study protocol was approved by the ethics committee. 15 healthy male volunteers participated in this study. Standard monitoring parameters and 32 channel electroencephalogram (EEG) with a sampling rate of 5 kHz were recorded. Subjects received propofol via target controlled infusion at two subanaesthetic effect site concentrations; 0.5 μg/ml at level II and 1.0 μg/ml at level III. At level I, no drug was administered. At each of these three levels AEP (generated by binaural clicks, 70 dB above hearing threshold, repetition rate 8.3 Hz, ±10% interstimulus variability) and CHEP (generated by CHEPS Medoc, Israel) were recorded. 40x5 contact heat stimuli were applied at the individual pain threshold (45-55°C; mean 53.1°C) and at 50°C. For AEP grand average analysis 4000 sweeps were averaged after filtering (26-400Hz) from TP10 (reference Fcz). Peaks and troughs were identified and AEP wave Nb was analysed with respect to latency. For CHEP grand average analysis, 200 sweeps were averaged from TP9 (reference Fcz) after filtering (0.5-30Hz). CHEP wave N2 was identified, amplitude was analysed.

Results and Discussion: Under subanaesthetic concentrations of propofol the absolute values of CHEP amplitudes decrease while AEP latencies remain nearly unchanged.

Table 1. Latencies of AEP and amplitudes of CHEP at different concentrations of propofol

<table>
<thead>
<tr>
<th>Propofol conc. [μg/ml]</th>
<th>0 μg/ml</th>
<th>0.5 μg/ml</th>
<th>1.0 μg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEP Nb latency</td>
<td>45</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>CHEP N2 amplitude (mean 53.1°C)</td>
<td>-1.808</td>
<td>-0.568</td>
<td>-0.522</td>
</tr>
<tr>
<td>CHEP N2 amplitude (50°C)</td>
<td>-0.508</td>
<td>-0.403</td>
<td>-0.394</td>
</tr>
</tbody>
</table>

Conclusion(s): Subanaesthetic concentrations of propofol decrease CHEP amplitudes, indicating anaesthesia. At the same time, AEP latencies remain unchanged and volunteers were drowsy but responsive, indicating sedation [1]. This supports the view that subanaesthetic concentrations of propofol have analgesic effects [2]. This is consistent with results obtained by analysis of visceral pain evoked potentials (VPEP) from the same study [3].

References:

14AP12-5

Genetics and pain perception?

O. Hrazdilová, O. Šejp, P. Ševák, R. Pitešlová
CKTCH, University Hospital, Brno, Czech Republic

Background and Goal of Study: The goal of the study was to analyze the association among the acute pain perception and some gene polymorphisms (A/G of monoamine oxidase B (MAO B) gene, AlaVal and Asp40Asn of opioid receptor gene).

Materials and Methods: The tonsillectomy and tourniquet test were taken as acute pain perception models. The study set of patients was divided into groups according to pain intensity based on visual analogue scale (VAS) and according to sex. Three levels (0-10 cm) were used for statistical analysis.

Results and Discussion: We examined 300 Czech subjects. The association of the A/G MAO-B gene polymorphism with pain intensity in male subjects was found (p<0.02). Similarly, it was found that the Asn 40Asp gene polymorphism for m opioid receptor tended to affect the pain intensity in male subjects (p = 0.04).

Conclusion(s): It follows from our results that the A/G MAO-B gene polymorphism and Asn 40Asp gene polymorphism for m opioid receptor affect variations in perception of acute pain individually in Czech population.


References:
2 Eli I, Bar-Tal Y, Fuss Z, Korff E: Effect of biological sex differences on the perception of operative clinical scenarios using a medium fidelity simulator (SimMan®; Laerdal airway management and common peri-operative scenarios. This was followed
Background and Goal of Study: Department of Anaesthesiology and Intensive Care Medicine, Helsinki University L. Niemi-Murola, P. Rosenberg simulation
Medical undergraduate students’ approaches to learning by
Materials and Methods: 400 patients; ASA I to III randomized in four demographically equivalent groups of 100 patients each: A - propofol (Lipuro), B - propofol (Lipuro) with 30 mg lidocaine, C - propofol (Lipuro) with 0,30
µg/kg remifentanil (30 seconds before the injection of propofol) and D - propofol (Lipuro) with 30 mg tramadol (30 seconds before the injection of propofol). Propofol was administered at a constant rate of 480 m/s (150 mg) in 2.5 min-
utes) via a 20G cannula into a dorsal hand vein. Pain was assessed during the injection until losing consciousness and after emergence using a verbal scale with 4 points (1-none, 2-mild, 3-moderate, 4-severe). To test the statistic signif-
icance of the differences found in the temporal evolution of these variables, we have used the f Student test. The significant p was accepted as less than 0.05 for quantitative parameters: central tendency (average) and dispersion indices (standard deviation, dispersion quotient).
Results and Discussion: Propofol with lidocaine, propofol with remifentanil and propofol with tramadol produced significant decreases in the incidence and severity of the pain (no pain 11% propofol alone, 2% for lidocaine, 3% remifen-
tanil, respectively 6% for tramadol), statistically significant for lidocaine, remifentanil - p<0,05 and statistically insignificant for tramadol - p>0,05. No differ-
ence was found between lidocaine and remifentanil - p>0,05. Our data found an incidence of pain on injection of propofol smaller than the one published in specialized papers (11% versus 28%-90%).
Conclusion(s): Lidocaine or remifentanil associated with propofol reduce the incidence of pain on injection of propofol more efficiently than tramadol.

References:
1 K. Kval et al., Reduction of pain on injection of propofol – combination of pretreatment of remifentanil and premixture of lidocaine with propofol. EJA 2007; 24: 746-750. 2.A. Matic et al., Lidocaine is more efficient than the choice of propofol formulations to reduce incidence of pain on induction. EJA 2007; 24: 403-407.

Education, Research and Presentation

15AP1-1
Evaluation of simulator based anaesthesia teaching for medical students
P. Kothare, S. Sreevatsa, C. Hillermann, C. Mondonca Department of Anaesthesia, University Hospitals Coventry and Warwickshire NHS Trust, Coventry, West Midlands, United Kingdom Background and Goal of Study: Simulators are increasingly being used in medical education, especially in the management of medical emergencies, and have received student acclaim [1]. A medium fidelity simulator was used to teach airway skills and introduce medical students to the management of common peri-operative scenarios. This study assessed the views and attitudes of medi-
cal students towards simulator based teaching.
Materials and Methods: Third year medical students from Warwick University undertaking their eight week anaesthetic training module attended a three hour training session during the first week of their anaesthesia module. Each ses-
sion was restricted to eight students and included an interactive discussion on airway management and common peri-operative scenarios. This was followed by airway-management training and the management of four common intra-operative clinical scenarios using a medium fidelity simulator (SimMan®; Laerdal Medical). Students were given the opportunity to manage the scenarios in pairs, whilst being observed. At the end of session they completed a questionnaire us-
ing a five-point Likert scale.

Results and Discussion: 118 students attended the training session and all completed the questionnaire. 89% rated the simulator-based teaching to be of good or excellent value with a median score (inter-quartile range) of 5 (4–5) and similar scores were given to the content of the session. However, only 42% of the students strongly agreed that the simulator should be used as an assess-
ment tool.

Conclusion(s): Our study shows that medical students value the simulator-based anaesthetic teaching highly. However they are divided in their opinion about its use as an assessment tool. Simulator-based teaching enables stu-
dents to attain new skills in a ‘safe’ environment at the start of their module, and thus equips them for managing real life scenarios.

References:

15AP1-2
Medical undergraduate students’ approaches to learning by simulation
L. Niemi-Murola, P. Rosenberg Department of Anaesthesiology and Intensive Care Medicine, Helsinki University Hospital, HUS, Helsinki, Finland
Background and Goal of Study: The volume of practical skills training is often considered inadequate [1]. Simulation is a popular training method in anaesthesi-
siology [2]. The purpose of this survey was to study students’ approaches to learning by simulation [3].

Materials and Methods: A questionnaire was distributed to the 3rd, 4th, 5th and 6th year medical undergraduate students in the University of Helsinki (N = 480). The students were asked to answer the questions using Likert scale (1 = totally disagree, 7 = totally disagree). Factor loading of the questionnaire con-
sisting of 24 items was made using maximum likelihood analysis and varimax rotation. Five scales were constructed (Replication, Simulation, Relating, Desire, Learning) Statistics: Pearson Correlation, Student’s t-test, ANOVA.

Results and Discussion: The questionnaire was returned by 287 students (59.8%), 65.2% of them female. Of the participants, 35.5% had worked as a locum tenens and 23.0% as a physician-on-call. The students hav-
ing experience as a physician-on-call were significantly more positive towards scalesReplication (scale mean 5.00 vs. 4.70; 95% CI 0.49 – 0.54, p < 0.05), Sim-
ulation (scale mean 6.50 vs. 5.98, 95% CI 0.19 – 0.83, p<0.001), Relating (scale mean 5.94 vs. 5.37, 95% CI 0.32 – 0.62, p<0.001) and Desire (scale mean 5.80 vs. 5.50, 95% CI 0.02 – 0.36, p<0.05) compared with the other students. The students were dissatisfied with the volume of practical skills training (mean 2.61, SD 1.38) but not with its quality (mean 4.80, SD 1.54). The elder students were more positive towards simulations compared with the younger ones [F(8,277) = 2.26, p<0.05].

Conclusion(s): Students having experience as a physician-on-call valued learn-
ing by simulation due to memorising as rehearsal and relating ideas. Dissatis-
faction with the volume of practical skills teaching correlated strongly with the scale Negative towards simulation.

References:

15AP1-3
What do medical undergraduate students learn about intubation during one week practice?
L. Niemi-Murola, J. Hallikainen, P. Rosenberg Department of Anaesthesiology and Intensive Care Medicine, Helsinki University Hospital, HUS, Helsinki, Finland
Background and Goal of Study: It is a challenge for medical students to learn complex skill such as intubation [1] and alternative airway tools have been recommended for novices [2]. In our university, students practice CPR-D and intubation with manikins during a 3-hour small group session. Insertion of LMA is demonstrated to them. The purpose of this survey was to study if a practical week in OR under supervision of a personal tutor affects the students’ percep-
tions concerning intubation.

Materials and Methods: A questionnaire was distributed to 116 students in

Education, research and presentation 223
context of a written examination. There were 12 items about perceptions concerning LMA and difficulties with intubation procedure. The students were asked to answer the questions using Likert scale (1 = totally disagree, 7 = totally disagree). There were also open questions concerning a procedure after two failed intubation attempts. Factor loading of the questionnaire consisting of 12 items was made using maximum likelihood analysis and varimax rotation. Four scales were constructed (Entirely, Lifting up, LMA, Preparation). Statistics: Student’s t-test, Pearson Correlation.

Results and Discussion: Fifty-nine percent (57/116) of the students had completed their practical week (PW) and 41% were awaiting it (NPW). They had performed 5.44 (mean) (SD 2.21) intubations and ventilated 7 patients (mean) (SD 2.81). PW students were more confident concerning scale Preparation (mean 5.3 vs. 4.9, CI 0.73 -0.17, p<0.05) than NPW. After two failed attempts, 84.2% of PW students would continue bag-valve ventilation (vs. 76.3% of NPW), 77.8% vs. 70.3% would call for help, 50.9% vs. 44.9% would insert LMA and 38.2% vs. 29.7% would attempt fiberoptic intubation.

Conclusion(s): Completion of the practical week did not affect the students’ perceptions concerning intubation or insertion of LMA. The students were confident concerning their ability to insert LMA, if needed. There should be more training concerning alternative airway devices.

References:

15AP1-4
Retention and assimilation after one year of problem-based learning of an anesthesia
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Background and Goal of Study: Problem based learning (PBL) involves the medical student in a process through which problem-solving skills are developed and self-education gained, in preparation for a successful professional life. We began to use PBL in 2001 with the aim of adapting our curriculum to the educational innovations planned for 2010 (Bologna Process). However, long term effects of PBL in anesthesiology have not been rigorously evaluated in the literature to date. The aim of the study was to evaluate the retention and assimilation of knowledge of anesthesia by undergraduate medical students one year after a PBL course.

Materials and Methods: Educational objectives included in 12 PBL sessions were preoperative assessment, informed consent, general anesthesia, regional anesthesia, obstetric anesthesia, acute pain treatment, chronic pain treatment, monitoring, cardiopulmonary resuscitation, trauma patient management, airway management, ventilation/intubation, and postoperative care. During each PBL session the tutor evaluated content, oral presentation and development of PBL related competencies such as ability to work in a team, interpersonal skills, problem solving, self-directed learning, information gathering, and tasks supporting competencies. At the end of the teaching program the students were asked to take an anonymous, voluntary test (100 true/false items). The same test was repeated with the same students one year later.

Results and Discussion: Immediately after the course all students (19 women, 5 men; average age of 23.5 years) took the test. One year later 14 women and 4 men from the same group re-took the test. The average score was 7.2 out of 10 after the course and 7.96 one year later. That result represented a score increase of 0.76 after one year.

Conclusion(s): Through PBL we emphasized concept understanding instead of memorizing theoretical knowledge. This could be the main reason why PBL may contribute to better retention and assimilation of knowledge as a long term effect. PBL can be used to teach medicine in a coherent and integrated way.

References:

15AP1-5
Change in Kohlberg’s levels of moral development over the course of the final medical school year
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Background and Goal of Study: In light of growing concern about professionalism in medical education, this study aimed to evaluate the level of moral development of medical students over the course of their final year.

Materials and Methods: A class of 110 final year medical students were invited to respond to 4 case scenarios depicting various professional dilemmas at the beginning and end of the academic year. The moral reasoning in each scenario was evaluated as preconventional, conventional or postconventional according to Kohlberg’s levels of moral development. Two independent raters graded the responses. A coded rating was then assigned to every student for each time point, using their dominant level of reasoning in the case scenarios. Where two levels occurred equally in response to the four scenarios at one time point, an intermediate rating was attributed.

Results and Discussion: The interrater reliability kappa coefficient ranged 0.45 to 0.87 for different scenarios.

Table 1. Change in coded rating for Kohlberg’s levels over time for each student

<table>
<thead>
<tr>
<th>Coded rating for levels of moral reasoning*</th>
<th>Students at beginning of year (n=56)</th>
<th>Students with increased rating at end of year (n)</th>
<th>Students with no change in rating at end of year (n)</th>
<th>Students with decreased rating at end of year (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.5</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
<td>2</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>2.5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Cumulative (n (%))</td>
<td>56 (100%)</td>
<td>8 (14.3%)</td>
<td>36 (64.3%)</td>
<td>12 (21.4%)</td>
</tr>
</tbody>
</table>

* 1 = preconventional, 2 = conventional, 3 = postconventional, 1.5, 2.5 = intermediate levels.

Of 56 students who completed at least one scenario at the beginning and end of the year, 43(76.8%) were classified as conventional initially. Over the course of the year, 8(14.3%), 36(64.3%), and 12(21.4%) students demonstrated an increase, no change and a decrease in their dominant level and assigned rating. The results also indicate that individual student responses are specific to case scenario context. These results are consistent with other studies which have linked moral regression to the medical school environment.

Conclusion(s): Our findings indicate that, amongst final year medical students, moral reasoning is predominantly conventional and that regression can occur. The determinants of change in moral reasoning require further definition. The inclusion of case-oriented ethics courses and dilemma discussions may be warranted for medical students.

References:

15AP1-6
Vascular anaesthesia training survey in Wales
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Background and Goal of Study: Vascular anaesthesia is a challenging subspecialty in that most patients are elderly with severe cardio-respiratory co-morbidities and associated peroperative acute haemodynamic changes. Trainees need adequate case exposure to enable them to be competent to manage vascular cases during both elective and emergency periods.[1,2]. As a Junior trainee, trainees are not exposed to many vascular cases and as a senior trainee not many unsupervised list to manage cases independently. Recently, vascular anaesthesia has been removed from the core training (key module). Aim of our survey is to assess the number of cases and case mix in the vascular module in SPR training and to get feedback from the trainees regarding their satisfaction with number of cases exposed.

Materials and Methods: Survey in the form of a questionnaire was sent to trainees in all Wales rotation. 57 (67%) trainees responded.

Results and Discussion: 83% of trainees had exposure to vascular module. Most of the vascular lists are supervised by a consultant. Among trainees, unsupervised lists are mainly done by senior trainees/SpRs (45% by year 5 trainees). Trainee satisfaction with case exposure is very low (25%).

Not all hospitals in the rotation provide vascular service and even in some teaching hospitals vascular is combined with other modules. European working time directive has some impact on trainee working hours with reduced exposure to
vascular cases. HDU/ITU bed crisis leading to cancellation of major vascular cases may also reduce the number of vascular cases trainees are exposed to. Vascular anaesthesia being removed from the core training/key module may have a negative impact on training.

Conclusion(s): For various reasons discussed above, trainee exposure to vascular anaesthesia cases and their satisfaction is declining. Can never teaching techniques like simulator based teaching or blended learning be of any help in future?

References:

15AP1-7
Haptic palpation for regional anesthesia simulation in virtual environments
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Background and Goal of Study: Performing regional anesthesia, like any medical procedure, requires skills that involve good hand-eye coordination. Focusing on regional anesthesia simulation, one of the most important and until now missing step is the identification of anatomical landmarks by palpation.

Materials and Methods: The developed system is shown in Figure 1 and revolves around the deformable model. The preprocessing deals with the generation of input for the model’s data structure. The physics-deformation engine simulates the physical-based behavior of the objects involved. Other components in the system include collision-detection and force-rendering as output for the haptic device. The former determines if the haptic interface point intersects in 3D space with another virtual object. Visualization handles the graphics component.

Results and Discussion: The model is a tetrahedra-based particle system, and can be processed and extracted from available medical imaging datasets together with biomechanical-based material attributes. The haptic interaction is based on the PHANTOM Omni device. A thimble contraption attached to the device enables intuitive haptic skin palpation (Figure 2). A two-tiered haptic model makes the system capable of modeling touch feedback with layered, inhomogeneous structures. Pulse palpation is also implemented and incorporated into the particle-based system.

Conclusion(s): A VR-based haptic palpation simulation system has been developed. It features the modeling of a palpable, deformable human body with in-homogeneous properties. A medical validation of the system will be conducted as soon as an anatomically-plausible dataset has been created. In vivo comparison of applied forces and measured stress versus model-based predicted values will be compared.

Acknowledgements: Developed under the auspice of the German Research Foundation (KU 1132, LE 1108, RO 2003).

15AP1-8
Reorganisation of the curriculum interdisciplinary emergency medicine: A student-centered approach
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Background and Goal of Study: The shift from teaching to learning implies a paradigm change from lecturer-centered knowledge transfer to student-oriented facilitation and support of learning. Instead of transporting knowledge, a learning environment is created. At the Technische Universität München, Germany, the curriculum “interdisciplinary emergency medicine” was reorganized according to these principles.

Materials and Methods: At the beginning of the clinical sciences phase (third year), student peer-to-peer lectures about basic principles of emergency medicine are offered on a voluntary basis. The lecture “fundamentals of emergency medicine” was reduced to five one-hour lessons and integrated into the interdisciplinary lecture “fundamentals of emergency medicine”. The simulation-based training emergency medicine with the focus on CPR according to guidelines of the ERC is scheduled concomitantly. In addition, an emergency medicine room was established in the students’ learning and training center (LUZ2), where students can practice with manikins. The interdisciplinary seminar advanced emergency medicine takes place in the fifth year. Contents are compiled exclusively as seminars with a maximum of 20 students per group.

Results and Discussion: Already in the first year after implementation of the new structure, the practical course emergency medicine was evaluated as best medical activity of our faculty. Only short duration and lack of space were criticized. Therefore, the course was extended by 1/3 of the time and more space provided. After these changes had been made, the course was distinguished with the prize for best teaching of the medical faculty. The curriculum emergency medicine is based on a evidence-based model of cooperative learning. Despite the resulting additional expenditure in teaching, the concept is conducted and actively supported by all subjects involved. In this model, the teacher assumes a role as facilitator, who creates basic conditions enabling in-depth and social learning.

Conclusion(s): The curriculum interdisciplinary emergency medicine at the Technische Universität München was successfully restructured using a learning-based approach. Student satisfaction was confirmed by evaluation of the course as the best educational activity of our medical school.

15AP1-9
Residency training and anaesthetists’ professional career: The problem of selection
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Background and Goal of Study: Professional aptitude testing and selection in medical education and anaesthesiology in particular remains not established [1] and controversial [2]. To evaluate the final results of traditional selection process we analyzed professional career of our residency graduates for 47 years (1960–2007).

Materials and Methods: Professional follow-up of 356 graduates was reviewed. Data has been permanently collected during residency training, meetings with graduates at refresh courses and by personal non-formal contacts and correspondence.

Results and Discussion: Results are presented in the table. Of all included into study 30 (8.4%) graduates didn’t work as anaesthetists at all. It should be noted, that the most part of the latter (24 graduates) had successfully completed their residency. The reasons for leaving anaesthesiology were, however, mostly not related to training process – economic, social, familial, health status, etc. Moreover, no interlinks between residency training success and global professional achievements were observed.

Conclusion(s): The data suggest that single-point selection decision, based even on quite extended questionnaire or interview could not be a sufficient reason to accept or reject candidates: while predicting training success as an intermediate goal, it couldn’t estimate long-run professional involvement. After-
15AP1-10
Development and validation of a questionnaire to evaluate competent practice in anaesthesiology residents
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Anaesthesia, Hospital del Mar-Esperança (IMAS), Barcelona, Spain

Background and Goal of Study: Assessing and assuring the clinical competence of trainees is crucial in the process of medical education. Competent practice in anaesthesia has been defined by the presence of sixteen attributes [1]. Observation of daily practice seems a reasonable method to evaluate it. Our goal was to design and validate a questionnaire with those 16 attributes as a tool to assess competence in our department trainees.

Materials and Methods: We designed a survey that included 16 attributes: knowability (1), sob (2), perceptiveness (3), confidence (4), prudence (5), vigilance (6), anticipation (7), flexibility (8), responsivity (9), fluency (10), decisiveness (11), communicativeness (12), organization (13), manner (14), assertiveness (15), management skills (16). A visual analog scale was used to score each variable. As previously suggested [1], items 1, 2 and 14 ranged from absence to optimum and the rest of them ranged from absence in one end to maximum over-expression at the other end. A total of 12 anaesthesiology trainees were evaluated (4 per year of training: 2nd, 3rd, 4th year). 13 staff anaesthetists evaluated each one. We asked the participants to mark the point they considered that better fitted the trainee for each attribute based on their observation of daily practice. Reliability was assessed using the single (Sng) and average (Ave) intraclass correlation coefficient (ICC) (two way mixed model).

Results and Discussion: Results are expressed in the tables.

15AP1-11
Simulation-based medical education fails to improve clinical skills and theoretical knowledge over problem-based discussion and induces misjudgement in self-assessment
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Background and Goal of Study: Simulation-based teaching (SBT) is increasingly used in medical education. As an alternative to other teaching methods there is a lack of evidence concerning its efficacy. The aim of this study was to evaluate the potency of SBT in anaesthesia in comparison to problem-based discussion (PBD) with students in a randomised controlled setting.

Materials and Methods: 33 fourth-year medical students attending a curricular anaesthesiology course were randomly allocated to either a session of SBT or a session of PBD on an emergency induction method. 10 days later all students underwent examination in the simulator. Performance of each student was evaluated by weighted tasks, established according to a modified Delphi process. Confidence and a multiple-choice questionnaire were additionally performed pre- and post intervention.

Results and Discussion: A total of 32 students completed the study. Participants in the SBT group presented with significantly higher self-assessment scores after the intervention than students in the PBD group (P < 0.05). However, students in the SBT group achieved only slightly and statistically not significant higher scores in the theoretical and the simulator examination (P > 0.05) with only a moderate effect size of d=0.52.

Conclusion(s): The current study demonstrates that both PBD and SBT lead to comparable short-term outcomes in theoretical knowledge and clinical skills. However, undesirably, SBT students overrated their anticipated clinical abilities and knowledge improvement.
was set as the level at which students should be able to take care of patients independently for 15 minutes if they are in a life-threatening situation and 45 minutes for other patients.

Results and Discussion: Means and SDs of self- and expert assessments are illustrated in the figure. None of the skills reached the targeted value of 8.

Conclusion(s): At the beginning of postgraduate training, residents have not achieved the learning objectives of undergraduate medical training for emergency skills judged by self- and expert assessments. Before taking over duties in emergency departments, residents need structured training in emergency skills and this can be offered by anaesthesiologists.

References:

15AP2-2
The anaesthetist: A “burning” profession
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Background and Goal of Study: The BURNOUT is an individual suffering and also a score of an organization and social-economic inefficiency (JOB BURNOUT) (1). Are our anaesthetists risking burnout? Is the hospital organization or specific personality traits the cause of this?

Materials and Methods: In this explorative study the job burnout and the work organization have been evaluated by the “Organizational Checkup System” (OCS) test (2) that measures the work relationship and the work life areas. The individual and personologic dimensions have been evaluated by the “Big Five Questionnaire” (BFQ) test (3) that analyzes personality aspects. The “Defense Mechanism Inventory” (DMI) test (4) has been utilized to investigate the defence mechanisms.

Conclusion(s): Our study shows that anaesthesia related articles represent only 0.49% of the total articles published by these four journals. Although specific anaesthetic specialty journals are numerous, this study highlights the point that anaesthesia remains under-represented in general medical journals.

References:

15AP2-6
The impact of intensification of airway management training on the ability to ventilate a manekin through the laryngeal tube or the combitube
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Background and Goal of Study: Gold standard in the area of airway management is the endotracheal intubation. However, intubation skills are not easily acquired and hard to maintain. Therefore every medical student in our university has to be trained in the use of one alternative airway device at least. In this study we compared the impact of intensified training (180min) compared with basic training (30min) on the performance of airway management with the combitube (CT) or the laryngeal tube (LT).

Materials and Methods: 216 students got in groups of 8 students each a basic training (BT) in the use of the LT and the CT, consisting of 10min theory and 20min practical training. 42 students, divided in groups of 8 students, got 3 hours intensified training (IT), consisting of a lecture of 30 min regarding supraglottic airway devices, followed by 120min practical training. Six weeks after this training the test of the acquired skills took place: Each student had to secure the airway of a manikin (Fa. Laerdal) with the LT and the CT. Time from start of ventilation was measured and the number of intubation attempts was recorded.

Results and Discussion: All students could use the LT with success. The CT-students (43±24sec) versus 24±14sec, p<0,05. In contrast, 5.8% of all students (all of them with BT) could not ventilate the manikin using the CT. Both the IT-students (54±38sec vs. 26±14sec) and the BT-students (104±38sec vs. 43±24sec) needed significantly more time for airway management with the CT than the LT. IT reduced both the average time and the number of attempts for the use of both devices: Successful LT-placement in the first attempt achieved 90% of the IT-students, and 73% of the BT-students. The corresponding numbers for CT-placement are 67% of the IT-students, and 45% of the BT-students.

Conclusion(s): Due to the results of our study we give preference to the LT compared with the CT for student airway management training with supraglottic devices. With a minimal training of 30min only the students had a good prospect of success with the LT.

15AP2-7
Does reflective practice influence reflective ability and identity among final year medical students?
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Dept of Anaesthetics and Intensive Care Medicine, Cork University Hospital, Cork, Ireland

Background and Goal of Study: Medical education necessitates a process of transition in identity from student to professional. This study aimed to investigate the identity status among final year medical students over the academic year and its association with reflective practice.
Materials and Methods: A class of 110 final year medical students were invited to take part at the beginning and end of the academic year. Reflective ability was assessed using a validated reflection-in-learning (RIL) score [1]. Identity status was assessed using Marcia’s paradigm [2,3]. Statistical analysis was done by Students’ t test.

Results and Discussion: 103 students at the beginning (t0) and 72 students at the end (t1) of the year responded. The mean RIL score for the whole class was 59.2 (SD 12.8) and 62.9 (SD 11.7) at t0 and t1 (p value = 0.03). The mean RIL score in the groups ranged from 52.9 (SD 12) to 66.3 (SD 7.8) at t0 and from 56 (SD 2.8) to 68.8 (SD 5.9) at t1. Students with an achieved/identity status, the endpoint of the identity continuum, demonstrated a high RIL score of 62.5 (SD 14.6) at t0 and 69.8 (SD 5.9) at t1. Montessori, the status of most active reflection is prevalent all year increasing from 30 to 36%. The least developed diffuse identity status decreased from 31 to 23%. Our study indicates that reflective practice exerts a positive influence on students’ reflective ability. As expected, the final year continues to be a time of active exploration and reflection for most students. Further, a higher reflective ability appears to support the formation of achieved identity status.

Background and Goal of Study: Precision of postoperative outcome prediction is no more than 75%. The goal of the study was to compare the accuracy of prognoses made by the ASA and 5 predictive models (SAPS 2, Portsmouth-POSSUM, LODS, ODIN, MPM 2, MPM for cancer patients and TRIOS).

Materials and Methods: Data from 187 patients who died, and 100 patients who survived the postoperative period were collected and the risk calculated in each score was transformed into a PDR (probability of death rate) number, then compared with the ASA system. To find out discrimination precision and probability of death rate in each score was transformed into a PDR (Mean(SD) 0.833 (0.12) curves and logistic regression analysis with physiological values as explanatory variables were used (p<0.001).

Results and Discussion: ASA, 5 scores (SAPS 2, MPM 2, Portsmouth-POSSUM, LODS, ODIN) and mean PDR values calculated on the 1st and 3rd postoperative days are able to discriminate between those who survived and those who died (p<0.001).

Predictive characteristics of mean PDR (probability of death rate) and 7 scoring systems

<table>
<thead>
<tr>
<th>Score (PDR)</th>
<th>Area under ROC</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Positive predictive value (%)</th>
<th>Negative predictive value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean PDR 1st day</td>
<td>0.859 &gt;39.7</td>
<td>68.3</td>
<td>90.8</td>
<td>92.7</td>
<td>62.7</td>
</tr>
<tr>
<td>ODIN</td>
<td>0.847 &gt;33.1</td>
<td>68.3</td>
<td>91.8</td>
<td>93.2</td>
<td>63.6</td>
</tr>
<tr>
<td>MPM 2</td>
<td>0.833 &gt;36.7</td>
<td>78.8</td>
<td>77.3</td>
<td>85.5</td>
<td>68.3</td>
</tr>
<tr>
<td>Portsmouth-POSSUM</td>
<td>0.830 &gt;47.2</td>
<td>70.7</td>
<td>84.5</td>
<td>88.5</td>
<td>63.1</td>
</tr>
<tr>
<td>mean PDR 3rd day</td>
<td>0.827 &gt;38.6</td>
<td>79.4</td>
<td>75.5</td>
<td>84.5</td>
<td>68.5</td>
</tr>
<tr>
<td>LODS</td>
<td>0.757 &gt;38.2</td>
<td>65.6</td>
<td>82.1</td>
<td>85.8</td>
<td>59.1</td>
</tr>
<tr>
<td>TRIOS</td>
<td>0.684 &gt;56.1</td>
<td>70.9</td>
<td>55.6</td>
<td>90.3</td>
<td>24.6</td>
</tr>
<tr>
<td>MPM cancer patients</td>
<td>0.529 &gt;74.7</td>
<td>64.6</td>
<td>93.8</td>
<td>96.8</td>
<td>22.1</td>
</tr>
</tbody>
</table>

Comparison of the ASA group and mean PDR values from the 1st and 3rd day were respectively: for ASA 2 (17.7; 26.8), ASA 3 (30.2; 40.6), ASA 4 (53.5; 63.4), and ASA 5 (both 75.2). Risk of death was influenced mainly by co-morbidities (OR 5.47; 95% CI 0.68 – 19.9), thromboembolism (OR 2.06; 95% CI 0.23 – 16.32), haemorrhage and multorgan failure.

Conclusion(s): Commonly used prognostic scoring systems lack precision. Arteriously achieving improvements by the management.

Background and Goal of Study: To improve patient safety, the implementation of a safety culture in a department is necessary. A non-punitive culture is itself required for a safety culture which is characterized by preventing errors, proactively seeking and identifying latent threats for safety. To transform an organisational culture, it is necessary to know how safety and its relevance for care are perceived by the members of a department such physicians and nurses. Therefore a standardized questionnaire was used to assess the department for safety.

Materials and Methods: In the summer 2006 a questionnaire was developed and made accessible on the intranet for the employees of the department of anaesthesiology. Questions were designed to elicit the stage of culture in patient safety. A side from 4 general and 3 questions to the person, questions to collect ideas (8), communication (11), information (6), responsibility (5), continuous learning (4), team (8), organisation (5), personal stress (8). Every question could answer by 5 categories ranging from “I agree absolutely” to “I disagree absolutely.”

Results and Discussion: 71 Employees answered, 35 men and 36 women, 17 medical doctors, 39 nursing, 15 other professions. The following results content the answers with “I agree absolutely” and “I agree absolutely.” 82% of the answering persons believe that everyone is responsible for all aspects of patient safety improvement efforts, but 77% argue that the team members are expecting improvements by the management.

Conclusion(s): Not all professions groups in a department perceive the same level of a safety culture. Physicians are nearer to the safety culture than the nursing staff. This questionnaire is a useful tool to assess the perception of a safety culture among different groups in a given department. It may also support a benchmark and development process. Probably more evidence is needed about the validity of questionnaires to assess safety culture. We need to learn
how to use assessment data to initiate and sustain safety culture change. Culture assessment data must be combined with other patient safety information in making decisions about ways to improve patient safety.

17AP1-3

Risk factors for postoperative pulmonary complications in general surgical population in Catalonia, Spain

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Background and Goal of Study: Postoperative pulmonary complications (PPCs) are among the most frequent causes of death after surgery. The relative contribution of potential risk factors (RF) is subject to debate. Goal: Assessment of associations between PPCs and preoperative comorbidity, anaesthetic technique and surgical procedure.

Materials and Methods: A sample of 2469 randomly selected surgical patients from 59 Catalanian hospitals was studied. Patient were excluded if they were undergoing obstetric or ambulatory surgery, had preoperative respiratory failure or were under de age of 18 years. Demographics characteristics, smoking habits, preoperative morbidity, and features of anaesthesia and surgery were considered. PPCs ascertainment were respiratory infection, bronchospasm, atelectasis, pleural effusion, pneumothorax, pulmonary aspiration and respiratory failure. Descriptive statistics were compiled and bivariate and logisic regression were performed. Standards of inclusion as potential independent factors were prevalence of factor > 1%, p < 0.10 on bivariate tests and clinical judgement. ASA was excluded in order to identify specific preoperative comorbilites as potential RF.

Results and Discussion: In our study, 123 patients (5.0%) developed PPCs. Multivariate analyses (table 1) revealed that 12 variables were independently associated with increased risk of PPCs. The characteristics of surgical procedure (location, duration and emergency) were the factors which showed the most powerful and significant association to PPCs.

Table 1. COPD: Chronic obstructive pulmonary disease

<table>
<thead>
<tr>
<th>RF</th>
<th>OR</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrathoracic-cardiac surgery</td>
<td>8.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Duration of surgery &gt;2.5 h</td>
<td>4.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td>4.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>COPD</td>
<td>3.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Upper abdominal surgery</td>
<td>3.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Upper respiratory tract infection last month</td>
<td>3.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>2.4</td>
<td>0.042</td>
</tr>
<tr>
<td>Positive cough fast</td>
<td>1.7</td>
<td>0.034</td>
</tr>
<tr>
<td>Oncologic diagnostic</td>
<td>1.7</td>
<td>0.048</td>
</tr>
<tr>
<td>Male gender</td>
<td>1.7</td>
<td>0.023</td>
</tr>
<tr>
<td>Surgical aggressiveness scale</td>
<td>1.4</td>
<td>0.020</td>
</tr>
<tr>
<td>Age</td>
<td>1.02</td>
<td>0.010</td>
</tr>
</tbody>
</table>

The predictive capacity stated by ROC curve was of 91.2%.

Conclusion(s): 1) The first step in reducing PPCs is to identify which patients are at increased risk. 2) The RF revealed in this study can help to screen for the at-risk population during the preoperative visit. 3) Frequently, it is not possible to eliminate RF but preventive measures should be undertaken in the patients at high risk of PPCs.

Acknowledgements: Supported by "Fundació La Marató TV3" grant 041610-2003.

17AP1-4

An approach of the risk of postoperative anemia using hospital’s electronic databases

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Background and Goal of Study: Several ways can be used for quality assessment in health care. Nowadays, the measure of the incidence of adverse events relies mainly on incident reporting systems. We propose an alternative approach that we have tested on the measurement of a risk frequently associated with anaesthetic related deaths, ie: postoperative anemia.[sup1]. Monitoring of database allows to know both the incidence and the timing of this phenomenon.

Materials and Methods: In a multidisciplinary hospital, electronic databases of biological and surgical wards were compared. The procedure consisted in extracting the electronic sheet generated by the biological analyser and merging it with the anaesthesia data base with a filter based on patient’s identity.

Results and Discussion: Full blood count (FBC) of 687 orthopaedic surgery patients and 681 abdominal and thoracic surgery patients were analysed. Low haemoglobin levels (Hb) were frequently observed in elderly patients (figure 1). Hb < 8 g/dl on two consecutive days were found in 77 patients (5.6%).

In each cell the number of patients is indicated according to the class age (row) and the Hb value (column).

<table>
<thead>
<tr>
<th>Age</th>
<th>50-59</th>
<th>60-69</th>
<th>70-80</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb &lt; 8 g/dl</td>
<td>2</td>
<td>2</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Hb &lt; 8 g/dl</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Hb &lt; 8 g/dl</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Hb &lt; 8 g/dl</td>
<td>4</td>
<td>4</td>
<td>26</td>
<td>32</td>
</tr>
</tbody>
</table>

Conclusion(s): A population based follow-up of postoperative haemorrhage can be drawn by monitoring electronic databases. This allows a global approach to the risk of postoperative anemia but also a of systemic failures like the frequency of anaemia detected or corrected with delay.

References:

17AP1-5

Consent and mental incapacity: A Scottish perspective

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Background and Goal of Study: The ability to give consent depends on the patient’s mental capacity. The Adults with Incapacity (Scotland) Act 2000 changed the way medical professionals manage patients who do not possess the capacity to consent. Though capacity is assumed, incapacity is understimated in the geriatric population and small studies have demonstrated a poor understanding and implementation of this Act [1,2]. We aimed to answer two questions: What debate concerning anaesthetic procedures is documented in patients who gave written consent for surgical procedures? Where a patient is declared mentally incapacitated what documentation is used to justify this?

Materials and Methods: We conducted a retrospective audit over 5 months of trauma patients presenting for repair of fractured neck of femur. Information collected included: Patient demographics; Initial examination and assessment of mental state; Consent; Certificate of Incapacity (CoI); Anaesthesia document; Surgery.

Results and Discussion: We evaluated case notes for 75 patients. 53/75 (71%) of patients gave written consent. Anaesthetic technique was discussed
17AP1-6
Burn out syndrome among Greek anaesthesiologists: Preliminary results
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Background and Goal of Study: Anaesthesiology is considered by the scientific community a stressful occupation with important consequences in the personal and professional life of the anaesthesiologist. This study, the first one attempted in the Greek medical society, had one and only purpose: Do Greek anaesthesiologists experience stress and “Burn out” Syndrome?

Materials and Methods: A cross-sectional survey was carried out based on an anonymous questionnaire that was sent by post in each anaesthesiologist registered in the Hellenic Society of Anaesthesiology. A post-free reply envelope was included. Fifteen days later a reminder letter was sent to all the recipients. The questionnaire consisted of 3 parts: Part I: Personal characteristics and professional variables; Part II: Maslach Burnout inventory; Part III: SF-36 Health survey. The anaesthesiologists that accepted to reply were 223 out of 670 (participation rate: 33%). Descriptive statistics were calculated. Statistical analysis was performed with STATA 8.0 statistical software.

Results and Discussion: Half the sample experienced emotional exhaustion and lack of personal accomplishment; while the prevalence of depersonalization reached 9 out of 10 anaesthesiologists. Emotional exhaustion was more obvious in anaesthesiologists working in provincial hospitals as well as in young trainees. Lack of personal accomplishment was the main feeling of anaesthesiologists working for more than 20 years in the field and especially of those having executive responsibilities. Depersonalization seems to be more frequent in females than in males and in those ones with more than one child in the family.

Conclusion(s): Burn out syndrome is a reality among Greek anaesthesiologists. The extremely high percentage of depersonalization is probably due to low satisfaction and long-time working program.

References:

17AP1-7
Adult pre-operative sickle cell testing: Local variation among anaesthetists of different grades
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Background and Goal of Study: Sickle cell disease (SCD) is caused by a homozygous mutation of the β-globin haemoglobin gene. It is an important cause of morbidity and mortality, though sickle cell trait (SCT) is the heterozygous condition and is rarely symptomatic. Effected individual present in childhood with recurrent vaso-occlusive episodes associated with pain and pulmonary complications. SCD is an anaesthesiologist traditionally preoperatively test at risk populations. However, a positive test rarely affects anaesthetic technique, because anaesthetic methods used to reduce the incidence of sickle crises are also part of standard good anaesthetic practice for all patients. Consequently, the validity of pre-operative testing for sickle cell trait in at risk, but otherwise well individuals is questioned. We therefore investigated anaesthetists views on preoperative sickle cell testing in healthy adult patients.

Materials and Methods: A census of junior and consultant anaesthetist views on pre-operative sickle cell testing in healthy adult patients at St George’s Hospital was conducted on 30th October 2007. We asked: 1. Which ethnic groups do you routinely test? 2. How often do you routinely test otherwise healthy at risk patients? 3. How often have you delayed surgery for an ‘at risk’ patient waiting for the test result, if otherwise healthy? 4. How often has a positive sickle test altered your management changed your anaesthetic management of an otherwise healthy patient? S-Plus was used to analyse Poisson log-linear regression models of the contingency table of the data on numbers of doctors by grade, question and answer.

Results and Discussion: Forty two anaesthetists, 17 juniors and 25 consultants, took part in the census. There was no significant difference between junior and consultant anaesthetists in any of their responses. More than three quarters routinely tested for SCD and SCT only in Afro-Caribbeans. The frequency of surgical delay awaiting the test result and the frequency of anaesthetic modification in light of a positive test were inconsistent with the frequency of testing.

Conclusion(s): Sickle cell testing is inconsistent at SGH. Ethnicities are screened unequally and too many adult surgical patients are unnecessarily tested and delayed awaiting a test that rarely effects their anaesthetic management. Potentially considerable financial and time savings could be made, and patient satisfaction increased if a revised preoperative sickle cell testing protocol is introduced.

17AP1-8
Patient safety in anaesthesia: What information from health authorities
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Background and Goal of Study: Safety of patients and anaesthetists in anaesthesia and intensive care as well as Quality all through the process of care are profoundly dependent on equipments, medical devices and drugs. All of them are under strict control by health authorities. Reliable, relevant and easy timely access to information by professionals are key tools for patient and professional safety alike. What information is available regarding safety through the official health authorities’ sites of the two major health care economies, Europe and the United States.

Materials and Methods: Review and analysis of the safety and quality information available to anaesthetists through American and European health authorities (Food and Drug Administration -FDA and European Medicines Agency -EMEA). Data from the official web sites were analyzed ( FDA, Feb 2002 to Dec 2007, n=564; EMEA, June 1998 to March 2007, n=45). Data from the official health authorities' sites of the two major health care economies, Europe and the United States.

Results and Discussion: FDA available patient safety data addresses Anaesthesia data in 1.8% of the reports, Emergency in 3.9%, drugs in 24.11% devices in 23.8% and surgical issues in 8.5%. Emea data are only addressing drugs, focusing only on reword and restrictions to use. FDA information is available in video and text format and includes advice to professionals on drugs, devices, and available techniques as well as risky settings and ways to reduce risk (e.g. Containers mix up, More on preventing fatal gas Mix-ups). FDA approach information on safety is easier to find, user friendly, more comprehensive and didactic than the European approach. For better patient and professional’s safety, information to the professionals is critical and should address skills professionals must manage when confronted with unexpected events.

References:
1 To Err is Human: Building A Safer Health System (1999), Institute of Medicine (IOM).
2 Crossing the Quality Chasm: A New Health System for the 21st Century (2001), IOM.

17AP1-9
An anaesthetic alert database “ forewarned, forearmed; to be prepared is half the victory ”
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Background and Goal of Study: We report the setting up of an online alert database as a consultation tool. Critical incidents involving anaesthesia are often avoidable if the anaesthetist is fully informed of previous problems or anticipates potential problems. Due to little anaesthetic history in emergency cases, lack of patient awareness of previous problems or unobtainable and frequently conflicting clinical notes, such prior knowledge is often not available.

Materials and Methods: A telephone survey of all 16 anaesthetic departments in Wales revealed that only 67% had an alert system in place of which 85% were purely obstetric. The remainder were patients with a history of malignant hyperthermia. All were paper based systems. For the database to be effective it needs to be computer based and accessible to only authorised personnel 24-
hours-a-day. Following a meeting with the IT department, it was decided that by using the existing CWS service, an alert warning could easily be added at no extra cost. There would be 3 warnings: a difficult airway, an anaphylactic reaction, and malignant hyperthermia. Following an incident, a report is forwarded to a nominated consultant anaesthetist. On review, an entry into the database is made and an alert placed on the CWS system. A copy of the incident report is given to the patient, one sent to the General Practitioner and another placed in the medical notes. On future hospital admissions, the alert is flagged-up on the CWS and further details can be sought. These details are web-based and accessed via a secure online database.

Results and Discussion: There is a lag time between the setting-up of such a database and its usefulness. Our system has been in place for 6 months and now has 28 entries. With time and increasing numbers, it will prove to be a useful audit, research and teaching tool. Incident reporting is subjective and this is an unavoidable problem. All relevant health care professionals should be made aware of the system and how it operates. Although there will be incidents that cannot be anticipated, this database should help to avoid those that can.

Conclusion(s): By using existing information systems, simple ideas which aim at reducing the need for an accurate objective measurement of the inflation pressure of ETT cuff; otherwise this pressure will be beyond the recommended limit.

Materials and Methods: The cuff inflation pressure was measured in 30 adult patients admitted to ICU postoperatively and post cardiac resuscitation using a Malinckrodt Medical hand pressure gauge. The measurements were taken on admission to ICU and on days 1 and 2 post admission; a total of 90 measurements were recorded over a period of several months. The attending staff were not aware of this audit till it was completed, minimising the chance of a change in the current practice.

Results and Discussion: Cuff pressure was measured in 30 patients on admission to ICU from theatre or resuscitation area where subjective techniques are used to assess the cuff inflation. The pressure recorded in 26 of them exceeded the recommended limit with 5 measurements above 100 cmH2O. On day one and two-post admission, the measurements ranged between 15 and 20 cmH2O. The tracheal capillary pressure is about 30 cmH2O; hence a pressure less than 25 cmH2O has been advised to prevent tracheal damage. Evidence exists that the high volume-low pressure cuffs used nowadays may still cause some epithelial damage even after a few hours. It has been suggested that cuff pressures should be kept above 15 cmH2O to reduce the risk of aspiration and subsequent infection. In our theatre, the current practice is employing MOT: inflate the cuff with a volume of air, which varies from one patient to another, till no leak could be heard while manually ventilating the lungs. This technique is claimed to provide adequate seal for sufficient ventilation and minimise the risk of aspiration, however the pressures used can be unacceptable high; 5 patients in this audit initially had pressures 4 times the recommended. In contrast, objective assessment of cuff inflation in ICU keeps the pressure within the desired limits; above 15 cmH2O-recommended with minimal costs. Such systems should be universally accessible, easy to understand, flexible and most importantly, well used in order to gain maximal benefit. In today’s multidisciplinary environment, integrated systems used by all healthcare professionals can provide valuable warning systems to avoid harm.

17AP2-3

Renal function in laparoscopic nephrectomy

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Background and Goal of Study: Pneumonectomy of laparoscopic surgery is a complex physiologic event associated with neuroendocrine, respiratory, cardiovascular and renal disturbances, as well as compromised organ blood flow. The changes in renal function of laparoscopic surgery was performed to compare the outcome of laparoscopic versus open surgery in terms of glomerular filtration rate (GFR).

Materials and Methods: The study group comprised all patients undergoing laparoscopic nephrectomy from January 2003 to December 2006 at our institution. These patients were compared with patients undergoing lumbar nephrectomy. We evaluated renal function estimating GFR by MDRD-4 (means of Modification of Diet in Renal Disease formulae) standardized IDMS before Surgery and hospital discharge. Associated variables were studied: age, BMI, ASA status, duration of procedure and blood loss.

Results and Discussion: 519 patients were scheduled for radical nephrectomy.

Patients characteristics

<table>
<thead>
<tr>
<th></th>
<th>Laparoscopic</th>
<th>Lumbotomy</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>269 (55.7%)</td>
<td>230 (44.3%)</td>
<td></td>
</tr>
<tr>
<td>Age*</td>
<td>62 (35-77)</td>
<td>61 (36-77)</td>
<td>0.777</td>
</tr>
<tr>
<td>BMI**</td>
<td>28.7 (27-28.7)</td>
<td>27.7 (27-28.2)</td>
<td>0.131</td>
</tr>
<tr>
<td>ASA physical status</td>
<td>12.4% (36.6%-13.1%)</td>
<td>10.4% (24.4%-13.1%)</td>
<td>0.191</td>
</tr>
<tr>
<td>GFR before surgery**</td>
<td>71.3 (66.5-76)</td>
<td>64.5 (58.7-71)</td>
<td>0.094</td>
</tr>
<tr>
<td>GFR hospital discharge**</td>
<td>46.9 (43-49.7)</td>
<td>49.7 (46.1-53.3)</td>
<td>0.232</td>
</tr>
<tr>
<td>GFR 48 h after surgery**</td>
<td>52.7 (49.6-56.2)</td>
<td>55.1 (51-59.1)</td>
<td>0.245</td>
</tr>
<tr>
<td>Haemoglobin before surgery**</td>
<td>138.9 (136.5-141.5)</td>
<td>124.4 (120-127.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Haemoglobin hospital discharge**</td>
<td>112 (116.6-123.4)</td>
<td>105.7 (105.3-107.9)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Duration of procedure* 267.7 (258.7-276.6) 259.7 (249.9-269.5) 0.237

Conclusion(s): The glomerular filtration rate decrease significantly both in laparoscopic nephrectomy and in open surgery and it recovers lightly without coming to the values before surgery. The renal function alteration is higher in patients and OR personnel. To date, literature review provides neither reports of OR fires during routine surgery under general anesthesia in the labor and delivery (L&D) suite nor OR fires caused by anesthesia machine malfunction. I herein describe the first reported case of fire in the L&D suite and the first case of a fire caused by malfunctioning anesthesia machine.

Materials and Methods: Report of case: A 36-year-old woman was scheduled for a routine post-partum tubal ligation. Her past medical history was significant for a long term poly-substance abuse (intravenous opioids and methamphetamine). She was positive for hepatitis C virus. A single dose spinal anesthesia with 10mg of 0.75% hyperbaric bupivacaine and 10mg of fentanyl produced a 74 sensory dermatome level however; the patient described her block as “patchy” and was frightened to be awake for the surgery. General anesthesia was induced in a standard manner (rapid sequence induction with cricoid pressure) and the patient’s trachea was easily intubated. Within five minutes of induction of anesthesia, smoke was noted arising from the anesthesia machine with a “patchy” anesthesia machine screen. The patient continued to have normal vital signs, but there was a sudden loss of ventilator monitors. Upon detailed inspection of anesthesia machine it was determined that its circuit board was found to have caught on fire. The fire seemed to have been transient and self-limiting and it never posed a danger to the patient or the OR personnel. The surgery was completed without complications.

Results and Discussion: Most surgical fires involve the airway but they can also occur in the surgical field. The three sides of the classic OR “fire triangle” include oxidizers, fuels, and ignition sources (1). Several unusual causes (e.g., DuraPrep solution, ophthalmic lubricant, gastric trichobezoar) of intraoperative surgical fires have been recently reported. The anesthesia machine check up is an integral part of the anaesthesiologist’s daily routine.

Conclusion(s): Many new anesthesia machines offer a self-testing capability, but older ones with fewer electronic boards are still widely used. Whether the machines self test or not, each machine contains many components that may be prone to problems. The rate of equipment problems is low, and most often of low severity.

References:
Therefore it’s advisable to adopt strategies for prevention of secondary renal damage to the surgery. Haemoglobin decreased similarly in open and laparoscopic surgery although the blood transfusion rate was higher in open than laparoscopic surgery.

17AP2-4
Rhabdomyolysis after a prolonged surgical procedure
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Background and Goal of Study: Rhabdomyolysis is the rapid breakdown of skeletal muscle tissue due to traumatic injury, either mechanical, physical or chemical. The principal result is a large release of the CPK enzymes and other coenzymes into the bloodstream. We present a case of rhabdomyolysis after a prolonged surgery.

Materials and Methods: A 42 year-old male chronic smoker, ASA physical status II, affected of tongue carcinoma was scheduled for left hemiglossectomy, a prolonged surgery. He had no previous history of muscle dystrophy. Rhabdomyolysis was confirmed. The patient remained hemodynamically stable during surgery and on the postanaesthesia care unit (PACU). The patient’s vital signs remained stable all the time but urine colour became dark two hours later. Suspecting rhabdomyolysis syndrome blood chemistry was checked. The blood test revealed serum increased of CK (20.618 UI) whereas renal function was normal. The patient was managed with fluid expansion using 500 ml/h of lactated Ringer solution. The urine colour returned back normal after four hours. 24 hours later serum CK level started to decline.

Results and Discussion: Rhabdomyolysis can be caused by tissue compression as a result of extended periods of immobilization. We believe that direct and prolonged compression of muscles against the operating table during 12 hours was the cause of rhabdomyolysis developed in our patient. An early diagnosis is necessary. Treatment mainly consists of prompt volume replacement and diuretics. Additional adjunctive therapies include forced alkaline diuresis with bicarbonate, mannitol and loop diuretics. In rare occasion renal dialysis is required.

Conclusion(s): Prophylactic measures, early diagnosis and treatment of rhabdomyolysis is imperative to prevent the potential fatal complications. If a diagnosis of rhabdomyolysis is confirmed, aggressive treatment of the disturbances produced by rhabdomyolysis should be initiated.

17AP2-5
The status of malignant hyperthermia in the UK
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Background and Goal of Study: Malignant hyperthermia (MH) is a pharmacogenetic disorder of skeletal muscle that, at least in the great majority of cases (>70%), follows an autosomal dominant pattern of inheritance and is caused by mutations in the gene encoding the skeletal muscle ryanodine receptor, RYR1.

Materials and Methods: Here we present summary data from ongoing genetic research into malignant hyperthermia in UK patients, the largest standardised database of MH patients worldwide. We present up-to-date RYR1 mutation data for all patients in the UK cohort. Furthermore we have ascertained the RYR1 SNP profile in UK patients at risk of MH in order to assess whether it is possible to predict a patient’s susceptibility status on the basis of a particular SNP profile in UK patients. We also present summary data for analysis into the relationship between the IVCT phenotype and clinical presentation of MH, and further data regarding the nature of and diagnostic sensitivity was also determined. The strains grown from blood cultures were identified using standard microbiological methods. The antibiotic sensitivity was also determined. The strains grown from blood cultures were compared to that of grown from the syringes belonging to the same patient.

Results and Discussion: The overall contamination rate was 15%. There was no growth from the cordarone, potassium chloride and morphine syringes. Sol-

17AP2-6
Nine years of experience of a patient safety reporting system in a postsurgical reanimation
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Background and Goal of Study: The system analysis of the Critical Incidents (CI), focuses less on the individual than on the pre-existing Contributory Factors (CF) [1]. The aim was to study the incidence, characteristics and utility of the CI in a surgical Reanimation (short postanaesthesia recovery and intensive care beds).

Materials and Methods: We have performed a retrospective analysis of our departmental Patient Safety Reporting System (PSRS) during a nine-year period (1999–December 2007). PSRS is based on a confidential and anonymous computerised questionnaire form. Patient Safety Reports (PSR) was defined as any occurrence that causes or may cause patient injury. CI was any PSR that may have been evilful. CF were classified in Patient, Individual, Task, Team, Environment and Organisational factors [1]. Measures implemented were recorded.

Results and Discussion: The PSRS accumulated 790 PSR out of 97,028 anaesthesia procedures and 76,887 patients admitted in the Reanimation during the study period. One hundred and four PSR occurred in Reanimation. Forty-one (39%) of the reported PSR resulted in no harm while seven resulted in patient harm and three in patient death. Of these, nine of three of these were considered non evitable complications, sixty six CI and five other type of communications. Most of the first group were clinical complications (30 of 33 PSR). Half of the CI were classified as clinical, whereas 40% were medication errors and 10% were equipment related CI. CF detected are summarised in table.

Data displayed as % (%)

<table>
<thead>
<tr>
<th>Contributory Factors</th>
<th>Complication</th>
<th>Critical incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>28 (94%)</td>
<td>27 (81%)</td>
</tr>
<tr>
<td>Task</td>
<td>5 (15%)</td>
<td>23 (45%)</td>
</tr>
<tr>
<td>Individual</td>
<td>4 (12%)</td>
<td>36 (63%)</td>
</tr>
<tr>
<td>Team</td>
<td>5 (15%)</td>
<td>34 (62%)</td>
</tr>
<tr>
<td>Environment</td>
<td>4 (12%)</td>
<td>35 (63%)</td>
</tr>
<tr>
<td>Organisation</td>
<td>0 (0%)</td>
<td>19 (35%)</td>
</tr>
</tbody>
</table>

Apart from patient complex previous condition (32 PSR), the most frequent CI detected were protocol or task design problems (23 PSR), lack of skills or experience (26 PSR), Communication error (22 PSR) and equipment misuse (24 PSR). The analysis of these PSR allowed the evaluation committee to develop new four clinical protocols, modify different task design, equipment modification and purchase and other alerts and departmental clinical sessions to inform and change practises.

Conclusion(s): In our voluntary PSRS, one PSR is reported every 739 patients admitted in reanimation. CF analysis is an opportunity to improve patient care in a surgical reanimation. Two thirds of the PSR had an opportunity to reduce its impact.

References:

17AP2-7
The impact of drugs in syringes on bacterial growth if contaminated on ICU
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Background and Goal of Study: The in-use contamination of syringes has been studied for a long time. The contamination rate was between 0.7 - 11% (1). Drugs used in anaesthesia and intensive care may support or inhibit bacterial growth (2), so syringes may pose a serious infection risk if contaminated. In this study we cultured 155 syringes that were used to be used in the ICU for 24 and 36 hours at 37°C. The cultures were identified using standard microbiological methods. The antibiotic sensitivity was also determined. The strains grown from blood cultures were compared to that of grown from the syringes belonging to the same patient.

Results and Discussion: The overall contamination rate was 15%. There was no growth from the cordarone, potassium chloride and morphine syringes. Sol-
Results and Discussion: Our findings are presented in figures 1 and 2 below.

Figure 1: Position of UV relative to CA (CA = left carotid artery, RCA = right carotid artery).

Figure 2: Skin-vessel depth and horizontal distance between CA and UV (cm, mean ± SEM).

Conclusion(s): In situations where the landmark technique is necessary, this information will aid the anaesthetist gaining central access, reducing the risk of arterial or pleural puncture.

References:

17AP3-4
Simple check-list for routine intubation conditions declaration: Launching phase and follow-up
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Background and Goal of Study: Post-operative laryngeal morbidity is partly linked to intubation conditions quality [1]. Every quality improvement initiative needs systematic documentation, therefore our aim was to introduce a declarative instrument related to the intubation conditions in a cluster of clinicians providing anaesthesia for scheduled visceral surgery in a tertiary university hospital.

Materials and Methods: Based on existing literature 2, a documentation instrument was locally elaborated and introduced. This instrument included five parameters to code within a 3 levels scale. The five parameters considered are: laryngoscopy feasibility, position of the vocal cords (VC), VC movements, cough and patient’s movements. The 3 levels scale was expressed by the help of a colour coding: Green for Excellent, Orange for Medium and Red for Poor. The final form of this mini-check-list was defined by the clinicians and printed on labels to stick on the anesthesia record. An investigator not involved in the data production was in charge to encode the parameters recorded. A quality control was organized on 200 consecutive anaesthesia records.

Results and Discussion: In this preliminary quality control, the label utilisation ratio was 61% (122 labels/200 records). Absences of mentions regarding the VC were observed for Mc Cormack III and IV stages. The frequencies of the scores annotated for describing the quality of the conditions of intubation are expressed in %, of Table 1.

Table 1. Intubation conditions

<table>
<thead>
<tr>
<th></th>
<th>G</th>
<th>O</th>
<th>R</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laryngoscopy</td>
<td>97</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VC position</td>
<td>93</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>VC movements</td>
<td>90</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Cough</td>
<td>89</td>
<td>7</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Patient’s movements</td>
<td>97</td>
<td>12</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

With the colour coding proposed, declaring intubation conditions quality did not appear as a problem for the clinicians even in their pure routine practice perspective. The use of these informations permits to control the quality of the present unstandardized induction/intubation method used presently. A global excellent score—all five parameters coded with G—was present on 85% of the labels.

Conclusion(s): The use of a simple instrument documenting the quality of the techniques used for induction and intubation would enhance the declarative aspects of our local systemic safety culture. A formal program for increasing the adherence level to more than 80% has to be introduced to facilitate further quality control assessment in the domain studied.

References:
1 Anesthesiology 2003; 98: 1049-56.
Patients were randomly assigned to two groups to receive 2 ml/kg/h of 10% amino acid solution and 5 ml/kg/h of acetate Ringer’s solution with 1% glucose during GA. Those in group A received AA with 3-5% glucose and were allowed to take orally protein-free fluid until next morning. Urinary output in these patients often falls well below the generally accepted 0.5 ml/kg/hr. We wished to demonstrate that with adequate fluid loading and protein intake these considerably reduced urine outputs are not associated with significant renal dysfunction.

Materials and Methods: 62 hyper-obese patients undergoing Roux-en-Y Gastric Bypass surgery were studied. Patients received a standard intraoperative regimen of 15 mg/kg Hartmann’s solution and then 2 ml/kg of 10% Mannitol, with further crystalloid or colloidal fluid inputs as required. Post-operative analgesia included regular paracetamol and diclofenac, and PCA morphine. Urinary and drainage outputs were recorded during the perioperative period (theatre and recovery), and then for each 12 hour period during the first 3 days post-operatively. Daily Full Blood Count, Urea and Creatinine measurements were taken pre-operatively and on Day 1 and 2 post-operatively.

Results and Discussion: The median BMI of these patients was 66 (range 60-95) kg/m2, the median weight 185 (range 137-295) kg, the average age 40 yrs. Patients received a median Diclofenac dose of 250 mg (0-700 mg). The effect of perioperative amino acid infusion on lipid metabolism

Amino acid (AA) infused during general anaesthesia (GA) to prevent intraoperative protein catabolism showing no additional protein sparing effect for 24 hrs from the beginning of GA.

Conclusions: Intraperioperative AA infused with glucose did not decrease protein catabolism showing no additional protein sparing effect for 24 hrs from the beginning of GA.

Disclosure: This research is subsidized by Otsuka Pharmaceutical Co., Ltd, Japan.

References:

Impact of trunk positioning and leg flexion on the abdominal elastance during bariatric surgery

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Background and Goal of Study: Having a sufficient abdominal inflation volume at the lowest possible abdominal pressure is important to obtain patients to improve the surgical working space. We calculated the ideal abdominal pressure to achieve a working space of 3 L. It is not clear whether changes in the patient’s position change the volume of the working space. The goal of this study was to measure the change in abdominal elastance (E) or pressure at zero volume (PV0), indicators of abdominal volume, associated with a change in the patient’s position.

Materials and Methods: The abdominal pressure volume relation was measured in 10 patients undergoing laparoscopic surgery as previously described (1) and approved by the hospital ethical committee. This measurement was taken with the thorax horizontal and the legs horizontal or flexed, the thorax in the reverse trendelenburg position and the legs horizontal or flexed, or the thorax in the trendelenburg position. E and PV0 were calculated for each position and an analysis of variance was performed on repeated measurements.

Results and Discussion: Flexing the legs lowered E significantly from 3.6 to 2.6 mmHg/L without affecting the PV0. Reverse trendelenburg increased PV0 significantly by 0.7 mmHg and trendelenburg decreased PV0 by 0.3 mmHg without affecting E. The ideal position, the trunk horizontal and the legs flexed, increased the abdominal volume by 1000 ml at 15 mmHg in comparison with the horizontal position without leg flexion; reverse trendelenburg without leg flexion, the worst position, decreased the volume by 200 ml.

Conclusion(s): When reverse trendelenburg is needed to give the surgeon access to the upper abdomen it should be minimal and the legs should be flexed as much as possible to maximize the surgical working space.

References:

The effect of perioperative amino acid infusion on lipid metabolism

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Background and Goal of Study: Intravenous amino acid infused during anaesthesia to prevent perioperative hyperglycaemia has been shown to increase serum insulin level [1,2]. We hypothesized that increased serum insulin associ-
ated with perioperative amino acid infusion prevent intraoperative lipoysis. This study was conducted to examine the effect of amino acid during anaesthesia on fat catabolism.

Materials and Methods: Seventeen patients undergoing spinal surgery under general anaesthesia were recruited in this study. All patients were administered acetate finger solution with 1% glucose during study period. The patients were randomly allocated into one of the two groups: amino acid infusion group (group A) and saline group (group S). From the beginning of anaesthetic induction, patients in group A were given 0.4g/kg amino acid infusion (Amiparen®, Otsuka Pharmaceutical Co., Ltd, Japan), and patients in group S were given 2ml/kg of saline for two hours. Serum concentration of free fatty acid and insulin glucagon ratio to estimate the metabolic balances were measured at the induction of general anaesthesia, the end of amino acid or saline infusion (2 hr after induction), and two hrs after end of the study infusions (4 hr after induction). Repeated measures ANOVA followed by scheffe’s test was used for statistical analysis. P value less than 0.05 was considered as significant.

Results and Discussion: There were no significant differences between the groups in demographic data. Blood concentrations of free fatty acid were significantly lower and insulin glucagon ratio were significantly higher in group A than those of group S.

Conclusion(s): Amino acid infusion under general anaesthesia induces fatty acid metabolism to relatively anabolic state.

Disclosure: This research is subsidized by Otsuka Pharmaceutical Co., Ltd, Japan.

References:

17AP3-9
Target controlled infusion intravenous anaesthesia (TCIA) versus target controlled infusion sedation (TCIS) during radiofrequency ablation (RFA) of renal tumors

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Background and Goal of Study: RFA of renal tumors is a radio interventional therapy that could be performed under either general anaesthesia or conscious sedation with local anaesthesia [1]. Wecompared TCIA versus TCIS for hemodynamic stability and complications during RFA procedures.

Materials and Methods: This retrospective clinical study analyzed procedures of patients requiring RFA. From the beginning of the procedure, patients were randomized to receive propofol in target controlled infusion (TCIA) or remifentanil and propofol infusions (TCIS). Amino acid infusion (0.4g/kg Amiparen®, Otsuka Pharmaceutical Co., Ltd, Japan) was administered at induction of general anaesthesia. Blood concentrations of free fatty acid were measured repeatedly until the end of the anaesthetic intervention and anesthetist cooperation.

Results and Discussion: There were no significant differences between the groups in demographic data. Blood concentrations of free fatty acid were significantly lower and insulin glucagon ratio were significantly higher in group A than those of group S.

Conclusion(s): TCIS seems to be a safe alternative technique to TCIA for RFA procedures, allowing better haemodynamic stability than TCIA, and moreover cooperation of the patient. Moreover, minor respiratory complications observed in the TCIS group were easily reversed.

Disclosure: There were no conflicts of interest.

Acknowledgements: We thank all our patients for their cooperation.

References:

17AP3-10
The waste anaesthetic gas levels in the operations with differential lung ventilation

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Background and Goal of Study: Numerous studies have suggested the possibility of waste anaesthetic gases being health hazard to the operating room staff, and various devices and techniques have been introduced to minimize the pollution. Kyushu University has a unique monitoring system for the continuous measurement of anaesthetic gas level in the operating rooms with an efficient waste gas scavenging system. The system continuously monitors trends in the waste gas level over time, allowing the anesthesiologist to adjust the anaesthetic gases for each patient, while minimizing the amount of waste gas produced.

Materials and Methods: The anaesthetic charts and gas monitoring records for the oesophagectomy with reconstruction carried out in the year 2006 were reviewed to find any specific cause of the increase in the waste gas level.

Results and Discussion: A considerable increase in the waste anaesthetic gas level in the operating room was seen with certain anaesthetic procedures. The first increase was during the intubation of a double lumen tube. The second increase was during the fibroscopy after positioning the patient in a lateral position. The third increase was with the exchange tube from a double lumen tube to an endotracheal tube. Of 44 reviewed cases, the waste gas level exceeded 0.5 ppm at one or more point during the operation in 31 cases. Twenty six cases showed an increase associated with the anaesthetic procedures stated above. We therefore started giving ‘tips’ to the anaesthesiologists in advance, such as using intravenous anaesthetics instead of volatile anaesthetics, shortening the time for fibroscopy, and turning off the gas flow while exchanging the tubes. Out of 21 oesophagectomy cases from February to July 2007, the waste gas level was kept below 0.5ppm throughout the operation in 13 cases.

Conclusion(s): Our results demonstrate that the appropriate warnings in advance and good techniques help minimizing the waste anaesthetic gas levels during the operations with the differential lung ventilation.

Disclosure: This study was supported by Fukuoka University Hospital.

References:

17AP3-11
Neuromuscular function monitoring: An equal concern among anaesthesiologists professional associations?

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Background and Goal of Study: For any anaesthesiologist, administration of muscle relaxants for managing goal-oriented neuromuscular blockade is a specific task. This fine-tuning process required precise skills for reducing the extent of residual paralysis and its evidenced co-morbidities [1]. Evidencing how the monitoring of neuromuscular function is described in the recommendations edited by some prominent anaesthesiologists’ associations was the aim of this short review.

Materials and Methods: Standard recommendations issued from various neuromuscular national societies –AAGBI (GB), ASA (US), BVAI/SBAR (Bel-
Airway Management

19AP1-1
The effect of continuous remifentanil infusion on airway reactivity during desflurane inhalation
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Background and Goal of Study: Because desflurane can cause airway reactivity, opioids are used to reduce this. This study was designed to evaluate the effect of continuous remifentanil infusion on airway reactivity during desflurane inhalation.

Materials and Methods: 108 adult patients with ASA physical status class I were enrolled in this study. It was divided into four groups. The breathing circuit was primed with 8 vol% of desflurane in 3 L/min of N2O and 3 L/min of O2. The anesthesia was induced with 0.2 mg/kg of etomidate intravenously. After 2 minutes, saline 20 ml/hr (group S), remifentanil 0.15 μg/kg/min (group R1), 0.25 μg/kg/min (group R2), or 0.35 μg/kg/min (group R3) was infused. And each patient breathed the gas mixture through a tight-fitting facemask. During this period, cough, secretion, breathing hold, laryngospasm, excitatory movement and hemodynamics were measured. The results were analyzed using Fisher's exact test.

Results and Discussion: Cough, secretion, breathing hold, laryngospasm, excitatory movement and hemodynamics were measured. The results were analyzed using Fisher's exact test.

<table>
<thead>
<tr>
<th></th>
<th>Group S</th>
<th>Group R1</th>
<th>Group R2</th>
<th>Group R3</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough</td>
<td>9 (33.3)</td>
<td>2 (7.4)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Secretion</td>
<td>6 (22.2)</td>
<td>1 (3.7)</td>
<td>1 (3.7)</td>
<td>0 (0)</td>
<td>0.01</td>
</tr>
<tr>
<td>Breathing hold</td>
<td>7 (25.9)</td>
<td>4 (14.8)</td>
<td>3 (11.1)</td>
<td>16 (59.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Laryngospaṃm</td>
<td>9 (33.3)</td>
<td>2 (7.4)</td>
<td>2 (7.4)</td>
<td>1 (3.7)</td>
<td>0.008</td>
</tr>
<tr>
<td>Arm withdrawal</td>
<td>8 (29.6)</td>
<td>2 (7.4)</td>
<td>1 (3.7)</td>
<td>0 (0)</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Values are number of patients (%). Group S: normal saline 20 ml/hr, Group R1: remifentanil 0.15 μg/kg/min, Group R2: remifentanil 0.25 μg/kg/min, Group R3: remifentanil 0.35 μg/kg/min.

Conclusion(s): These results demonstrate that group R1 and R2 significantly reduce airway reactivity and stabilize hemodynamics during desflurane inhalation.

19AP1-2
Use of L-lysini aescinatis for the prevention of postintubation laryngospasm after thyreoidectomy
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Background and Goal of Study: The procedure of thyreoidectomy has a very high incidence of post-operative edema of the soft tissues of the vocal cords. This facilitates an increase in the risk of acute respiratory insufficiency after the extubation of the trachea postoperatively. To evaluate the effect of administering 0.1% 10 ml solutio L-lysini aescinatis intravenously for the prophyllaxis against acute respiratory insufficiency resulting from the post-operative laryngospasm of the vocal cords.

Materials and Methods: After informed consent, 52 ASA III physical status patients, ages 40–62 years, undergoing total thyreoidectomy, were randomly divided into two groups. A group (n = 26) received 0.1% 10 ml sol. L-lysini aescinatis intravenously, 20 minutes before the onset of anesthesia while B group (n = 26) received 0.9% 10 ml NaCl (placebo) intravenously. The anesthesia was induced with fentanyl, propofol, and vecuronium. The duration of anesthesia was 120±15 min. SAP, DAP, HRP, SpO2, sedation and pain degree were recorded before and after surgical procedure. Analysis of variance and t tests were used for statistical comparisons. The pain level was assessed and evaluated using visual analogue pain scores.

Results and Discussion: The two groups were similar in regard to demographic variables, ASA physical status, surgical procedure, anesthesia and duration of surgery. After extubation, 2 patients in group A developed symptoms of I degree acute respiratory insufficiency which resolved in 10±3 min. In group B, 6 patients developed the symptoms of II degree acute respiratory insufficiency which resolved in 35±5 min and 2 patients developed the symptoms of III degree acute respiratory insufficiency demanding reintubation for lung ventilation.

Conclusion(s): Use of 0.1% 10 ml sol. L-lysini aescinatis before thyreoidectomy effectively allows for decrease in the incidence of acute respiratory insufficiency as an outcome of post operative laryngospasm of the vocal cords.

References:
Background and Goal of Study: We have made the hypothesis that Cerebral State Monitoring could improve intubation conditions of patients intubated without muscle relaxants. Aim of the study was to compare intubation conditions of patients intubated without muscle relaxants under or without Cerebral State Monitoring (CSM).

Materials and Methods: After informed consent 60 patients (30 patients per group) aged 19-82, ASA I-II undergoing elective ear, nose or throat surgery were randomized into two groups: CSM group and Non CSM group. Patients of both groups received midazolam 1.25 – 2.5mg, lidocaine 1mg/kg, remifentanil 2µg/kg and propofol for induction to general anesthesia. Patients of CSM group received propofol till the CSI (Cerebral State Index) was ≤ 45. The dose of propofol given to Non CSM group patients was based on clinical criteria (no response to commands, no eyelash reflex, jaw relaxation). Record parameters were SAP, DAP, HR, CSI (only for CSM group patients), administered amount of propofol and time from induction to intubation. Recordings were performed prior to induction, after remifentanil and propofol administration, right after intubation and 1 and 5 minutes after intubation. Reactions to laryngoscopy and intubation (none, inspiration, cough, movement) and number of attempts to intubate were also recorded. Intubation conditions were classified as excellent, acceptable and unacceptable. Statistical analysis was done by One-Way ANOVA, t-test and Mann-Whitney U test as appropriate (a p value <0.05 was considered as significant).

Results and Discussion: Patients demographics were similar for both groups. Group CSM technique was found to be superior to group Non CSM technique in terms of better intubation conditions (p<0.001), less intubation time (233.4±67.7 versus 306.2±76.5 seconds, p=0.0001), reaction to intubation (p=0.002), less intubation attempts (1.2±0.5 versus 1.5±0.6, p=0.039) and less propofol used (2.03±1.1gh/mg versus 2.6±0.68mg/kg p=0.002). Blood pressure and heart rate changes throughout the study were similar for both groups (p>0.05).

Conclusion(s): Cerebral State Monitoring improves intubation conditions for patients needed to be intubated without muscle relaxants. A possible explanation is better intubation timing.

References:

19AP1-5
Topical airway anaesthesia using an ultrasonic nebulizer in patients undergoing awake fiberoptic intubation
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Background and Goal of Study: Awake fiberoptic intubation is the safest approach to airway management in patients with known difficult airway. With the patient cooperative, intubation is much easier. Upper airway anaesthesia should be administered to a level sufficient to suppress the gag, swallow and cough reflexes. There are many ways of administering anaesthesia for fiberoptic intubation via the oral or nasal route. Systemic and regional anaesthesia, as well as combinations thereof are used. Nerve blocks are often difficult to perform and may involve damage to nerves, whereas high doses up to the maximum dose of topical anaesthetics may be needed if the agents are administered in the form of gargles or sprays. None of these two approaches effectuates an anaesthetized trachea distal to the glottis. Laryngeal anaesthesia may be provided by transtracheal injection, via the working channel of the flexi-ible bronchoscope. Both methods are likely to induce cough in the patient. A solution to the problem is to nebulize the locally applied anesthetic. Customary compressed-air driven jet nebulizers only atomize highly concentrated anaesthetics (e.g. lidocaine 4-10%), so that the maximum dose of local anaesthetic is achieved within a short period of time.

Materials and Methods: We describe the use of an ultrasonic nebulizer. An adapter that is to be fit to the nebulizer enables its easy integration into the breathing circuit including a customary breathing mask which the patient himself holds over mouth and nose provides the delivery of a sufficient dose of local anaesthetic only during inspiration as well as optimum pre-oxygenation.

Results and Discussion: In two applications of the ultrasonic nebulizer sufficient suppression of gag and cough reflexes was obtained by using only 100 mg of lidocaine. Thanks to the active cooperation of the patients, intubation could be performed easily.

Conclusion(s): We believe that the above procedure involving the use of an ultrasonic nebulizer offers two important advantages: Considerably smaller doses of local anaesthetics are required, adequate pre-oxygenation and anaesthesia of the airway are achieved rapidly and easily. The ultrasonic nebulizer can be integrated into all systems without any problems, it is easy to clean and to sterilize. Ultrasonic nebulizers are tailored to meet the patients needs and enable them to cooperate with the anaesthesiologist. These findings may influence clinical practice in the management of the difficult airway during anaesthesia.

19AP1-6
Optimal effect concentration of remifentanil in awake fiberoptic orotracheal intubation
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Background and Goal of Study: Awake tracheal fiberoptic intubation is an established method of securing a difficult airway. This technique requires an anaesthetic management that provides blunting of airway reflexes, maintenance of oxygenation and ventilation, patient comfort, adequate intubating conditions and stable haemodynamics in a patient able to collaborate. Our aim was to determine an appropriate effect concentration (Ce) of remifentanil administered by target controlled infusion (TCI) for AFO.

Materials and Methods: Randomized control trial. 36 patients, ASA I-II, scheduled for elective surgery, were randomly assigned to receive remifentanil Ce 2 ng/ml (n=14, Group A), Ce 3mg/ml (n=10, Group B), Ce 3,5mg/ml (n=12, Group C). All patients were premedicated with midazolam 0.03 mg/kg IV. Data collected: demographic, haemodynamic and respiratory parameters, atripine requirement to maintain HR >50, coughing, sedation (Ramsay), comfort and patient recall of the procedure. Time required to intubate. We collected data in three moments (baseline, at effect concentration and intubation). Statistical Analysis: No statistics significant differences were recorded in demographics, respiratory data and time required to intubate. Haemodynamic stability and oxygenation was maintained in three groups during the whole procedure. Intubating conditions were adequate in all groups. Group A had 10% of discomfort recall while B and C had only 8,3% recall. Group C had higher atripine requirement and less cough although it is not significant.

Results and Discussion: No statistics significant differences were recorded in demographics, respiratory data and time required to intubate. Haemodynamic stability and oxygenation was maintained in three groups during the whole procedure. Intubating conditions were adequate in all groups. Group A had 10% of discomfort recall while B and C had only 8,3% of comfort recall. Group C had higher atripine requirement and less cough although it is not significant.

References:
19AP1-7
The effects of endotracheal intubation with and without laryngoscopy on hemodynamic response and intracranial pressure
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Background and Goal of Study: Intubation with laryngoscopy causes hemodynamic responses and increases intracranial pressure. In this study, we aimed to compare newer perilyngeal airway devices: intubating laryngeal mask airway (ILMA), perilyngeal airway (PLA), and the standard laryngoscopic intubation technique, with respect to hemodynamic responses and intracranial pressure.

Materials and Methods: After the approval of the ethics committee, sixty ASA I-II patients without any ophthalmic disorders were studied. Sixty patients were randomly allocated to PLA, ILMA and standard laryngoscopic endotracheal intubation groups. Following a lidocaine infusion of 0.5 mg/kg iv. to prevent injection pain, 1.5-2.5 mg/kg propofol and 0.6 mg/kg rocuronium were administered intravenously to achieve muscle relaxation. 2-4 mg/kg/h propofol infusion was continued for 10 minutes after intubation, in order to keep the bispectral index between 40 and 60. In the PLA and ILMA groups, appropriate endotracheal tubes were inserted through the airway device after the placements of PLA and ILMA respectively. The patients were intubated using a laryngoscopic intubation group. Anesthesia was continued with an infusion of 0.05-0.25 μg/kg/min remifentanil and inhalation of 4-7% desflurane. Heart rate, systolic, diastolic and mean arterial blood pressures and intracranial pressure were monitored for a few minutes before and ten minutes after the intubation.

Results and Discussion: Heart rate was most affected in the standard intubation group with laryngoscopy and the least response was in the PLA group. Arterial blood pressures were comparable within all groups but they were significantly high after intubation in the standard laryngoscopic intubation group. There were no significant differences among and within the groups in terms of SpO2 and ETCO2. IOP was found to be higher in the standard laryngoscopic intubation group but there were also significant increases in all groups after intubation.

Conclusion(s): In conclusion, PLA was found to be superior in comparison with ILMA in terms of ease of placement. PLA and ILMA can both be reasonable substitutes for the standard laryngoscopic intubation technique, as they provide minimal hemodynamic response and less IOP changes.

19AP2-1
Evaluation of postoperative sore throat complaints using the i-gel supraglottic airway compared to a standard disposable laryngeal mask airway: Significant less postoperative sore throat complaints in the i-gel study arm
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Background and Goal of Study: Recently, a novel supraglottic airway has been marketed: the i-Gel Airway (Intersurgical). This supraglottic airway device has been designed with a non-inflatable anatomically shaped cuff to match the peripharyngeal anatomy and to provide a close seal with the anatomical structures without the risk of tissue compression. Because of this lack of compression we hypothesized that the i-gel should have less postoperative throat complaints compared to a standard disposable laryngeal mask (La Premiere).

Primary objective: comparing the incidence of postoperative sore throat after 1, 24 and 48 hours.

Materials and Methods: After approval of the local research and ethics committee, 244 patients were included and randomized to receive either the i-gel or standard laryngeal mask for non-thoracic, non-abdominal surgery. At the end of anesthesia the supraglottic device was removed before the patient was transferred to the recovery room. Patients were asked if they had any complaints of sore throat, dysphagia, dysphonia, neck pain and numb tongue or any other complaint refered to the recovery room. Patients couldn't be reached by telephone after daysurgery (15 in the i-gel and LMA group). For the remaining 190 patients, sore throat complaints occurred in 6.5, 7.4 and 5.4% of the patients in the i-gel and laryngeal mask group after respectively 1, 24 and 48 hours. For the laryngeal mask these figures were 13 in the laryngeal mask group). For the remaining 190 patients, sore throat complaints were 13 in the laryngeal mask group). For the remaining 190 patients, sore throat complaints were 13 in the laryngeal mask group).

Results and Discussion: For the laryngeal mask these figures were 13 in the laryngeal mask group).

Conclusion(s): The use of the i-gel airway results in less postoperative throat complaints compared to this disposable laryngeal mask.

19AP2-2
The randomized comparative study between the laryngeal tube Sonda II and the laryngeal mask airway supreme
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Background and Goal of Study: The LARYNGEAL TUBE SUCTION II, LTS II is an extraglottic device which allows respiratory and alimentary tracts separation. The SUPREME LARYNGEAL MASK AIRWAY, SUPREME LMA is a new single use extraglottic device with a channel for the gastrointestinal tube. We hypothesized that the LTS II and the SUPREME LMA perform similarly as measured by oxygenation and ventilation at the prefixed peak pressure of 19 cc H2O. Secondary outcomes were: success of insertion, time to achieve an effective airway, leak pressure, ventilatory data, ease of gastric tube insertion and postoperative morbidity.

Materials and Methods: The study was approved by the Hospital Ethical Committee. Fifty patients (ASA I-II) between 50 to 70 kg body weight, undergoing general anesthesia, were randomly assigned to either the LTS II or SUPREME LMA group for airway management. Anesthesia was induced with Fentanyl and Propofol and maintained with NO2, O2 and Sevoflurane. Neuromuscular blockade was produce by Rocuronium Bromide. The patients were ventilated using PCV with 19 cc H2O inspiratory pressure. Oxygen saturation and end tidal CO2 were measured automatically using AS3 DATEX-OMHEDA monitor. Oropharyngeal leak pressure was determined. The gastric tube insertion was attempted in all the patients. Upper airway trauma was assessed following surgery by observing the presence of blood on the device used. Additionally, 24 hrs following surgery the patients were questioned for presence of soft tissue injury.

Results and Discussion: Oxygen saturation was: LTS II 98.6% and SUPREME LMA 97.5% (p=0.008). End-tidal CO2 was: LTS II 39.7mmHg. and SUPREME LMA 38.5 mmHg (p=0.38). Success of insertion: LTS II 30 patients and SUPREME LMA 29 patients (p=0.990). Time to achieve an effective airway were similar with both devices: LTS II 15±7. and SUPREME LMA 16±6 (p>0.05). Oropharyngeal leak pressure was higher with the LTS II 20±5.5 cm H2O vs. SUPREME LMA 24±7.0cm H2O (p<0.05). Inspiratory Tidal Volume: LTS II 628±42 cc vs. SUPREME LMA 598±38cc. Expiratory Tidal Volume: LTS II 562±32 cc vs SUPREME LMA 533±33 cc: (p<0.001). Gastric tube insertion was successful in all patients. The number of postoperative adverse events was similar in both groups (p>0.05).

Conclusion(s): This study suggests that clinical performance of the LTS II and SUPREME LMA is similar with regard to oxygenation and ventilation using pressure control ventilation with 19 cc H2O pressure. The LTS II has a higher leak pressure that could represent an advantage when higher pressure needs to be applied.

19AP2-3
A randomised crossover comparison between the i-gel supraglottic airway and the LMA-unique: A manikin study
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Background and Goal of Study: Supraglottic airway devices (SAD) are being used for routine airway management in anaesthesia. The i-gel is a extraglottic device which allows respiratory and alimentary tracts separation. The LMA-unique when used by novices. The aim of our study is to compare the i-gel with the LMA-unique: A manikin study

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2.1, 1.1, 1.1 and 2.1, 2.1, 1.1% compared to 3.1, 7.3 , 7.3 and 6.2, 1.0 and 2.0%. Other complaints like nausea and headache were 0.0, 1.1 and 2.1 compared to 3.1, 6.3 and 7.3%. *p statistically significant difference between the i-gel and laryngeal mask results (Mann-Whitney-U < 0.05). A high incidence of sore throat complaints is demonstrated for the laryngeal mask, the i-gel scores significantly lower. Highest incidence of most postoperative complaints is seen after 24 hours.

Conclusion(s): The use of the i-gel airway results in less postoperative throat complaints compared to this disposable laryngeal mask.
failing. Participants were asked to grade the ease of insertion on a visual ana-
logue score (VAS: 0-100, 0 being difficult and 100 being easiest). Effectiveness of
hand ventilation was assessed by the principal investigator as impossible, poor,
good or excellent. Insertion time and VAS rating were analysed using a linear mod-
elling approach. The effectiveness of ventilation and the number of attempts at
insertion were analysed using sign test.

Results and Discussion: 59 medical students took part in the study. Mean
insertion times (SD) for the i-Gel and LMA were 10 (6) and 17 (7) seconds re-
spectively (p=0.0001). The mean (range) VAS for the LMA was 72 (38-100) and
for the i-gel was 89 (63-100) with a p<0.0001. Of the 59 students, 34 were
given the same effectiveness of ventilation score for the two devices, with 25
being given different scores. Of these 25, 5 received a higher score with the
LMA device and 20 with the i-gel (p = 0.0041). Three students required a sec-
ond attempt with the i-gel and no students required a second attempt with the
LMA (p = 0.25).

Conclusion(s): In this study, novice users demonstrated a shorter insertion
time and more effective ventilation with the i-gel as compared to the LMA-
unique, which might be of clinical significance in resuscitation. However, further
clinical trials in patients comparing these devices would be useful.

References:
1. RM Levent. Initial anatomic investigations of the i-gel airway: A novel supraglottic airway

19AP2-4
Intubating laryngeal mask airway vs laryngoscopy in normotensive patients: Which path to take?
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Background and Goal of Study: Standard laryngoscopy is frequently used
regardless of its undesired haemodynamic effects and possible pharyngolaryn-
gal morbidity. We aimed to compare haemodynamic response and pharyngo-
laryngeal morbidity following intubation through the laryngeal mask airway with
intubation using laryngoscopy in normotensive patients.

Materials and Methods: After obtaining Ethics Committee approval and in-
formed consent, 60 ASA class I-II patients aged 18-40 requiring endotracheal
intubation were enrolled. All patients were given midazolam 2mg iv as premedici-
ation. Heart rate, noninvasive systolic, diastolic, mean arterial pressure, oxygen
saturation (SpO2), and neuromuscular monitoring (using TOF Guard) were
recorded. Following induction with thiopental sodium 5-7 mg kg⁻¹ + vecuro-
nonium 0.1 mg kg⁻¹ + fentanyl 1 mcg kg⁻¹, patients were intubated with laryn-
goscopy in Group L and through intubating laryngeal mask airway (Fastrach) in
Group I. When TOF was 0, cuff pressure was measured and maintained with a
manometer. Anaesthesia was maintained with %60 N2O in O2 and sevoflurane.
Blood pressure, heart rate and SpO2 values were recorded before intubation
and at t, 2, 3, 4 and 5 minutes after intubation. Presence of sore throat and
hoarseness were recorded at 18 and 24 hours following surgery. Data were
analyzed using Newman Keuls multivariate analysis, independent t test and chi-
square test.

Results and Discussion: Demographics, ASA distribution and basal haemo-
dynamic values were similar between the groups. Heart rate and blood pressure
increased following intubation in both groups; however, in Group L, the increase
in heart rate was greater and the increase in blood pressure lasted longer. Sore
throat and hoarseness were mild in both groups and resolved at 24 hours. Intu-
bating laryngeal mask airway was developed for difficult intubation cases; it has
also proved useful for uncomplicated intubation. As no pressure is applied to the
peri-laryngeal area, it has been reported to not evoke haemodynamic responses.
We have found heart rate and blood pressure to increase following intubation
in both groups, with return to basal values delayed in the laryngoscopy group.
Pharyngolaryngeal morbidity was similar in both groups.

Conclusion(s): In conclusion, orotracheal intubation using the intubating la-
rngeal mask airway does not seem to offer advantages over standard laryn-
goscopy, but may be preferable in cases with haemodynamic instability.

19AP2-5
A comparison of the I-Gel with the LMA unique in non-anesthetized adult patients
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Background and Goal of Study: Reusable supraglottic airway devices have
been established in clinical anaesthesia and were previously shown to be safe and
efficient [1]. The purpose of the present prospective, randomised, controlled
trial was to assess two disposable devices, the newly developed non-inflatable
laryngeal mask i-Gel® and the laryngeal mask Unique™ (LMA-U) in routine clinical
practice.

Materials and Methods: After IRB approval and written informed consent
was obtained, 50 patients (ASA 1-3), undergoing routine surgery were enrolled,
and randomly allocated to controlled ventilation with the I-Gel (n=25) or LMA-U
(n=25). Both devices were inserted by a single experienced anaesthesiologist.
SpO2, etCO2, tidal volume (Vt) and peak airway pressure (Paw) were recorded.
After insertion, the position of both devices was controlled using a fiberoptic
bronchoscope. Time of insertion and airway leak pressure were measured [2].
Occurrence of gastric inflation was assessed with a stethoscope placed on the
epigastrium. Patients were asked about sore-throat, dysphonia, and dysphagia
after surgery.

Results and Discussion: There were no differences with respect to demo-
ographic data between groups. Time of insertion was comparable with the I-Gel
and LMA-U (Mean: 15 vs. 17 s; Range: 10-33 vs. 11-27 s; no failures in both
devices). Mean Paw was comparable in both devices I-Gel: 13.7±3.0 cmH2O,
LMA-U: 12.1±2.1 cmH2O, whereas mean airway leak pressure was signifi-
cantly higher (<0.0001) in the I-Gel group (29.4±5.0 cmH2O) compared to the
LMA-U group (20.6±5.1 cmH2O) (Figure 1). No gastric inflation occurred
with I-Gel device, whereas we observed in the LMA-U group gastric insufflation
in one patient. Fiberoptic control of the position of the devices revealed no dif-
fences. Post-operative sore throat and dysphagia were comparable in both
deVICES.

Conclusion(s): The newly developed I-Gel® and the LMA-Unique™ were
proven in a clinical trial to effectively ventilate and oxygenate patients. In con-
clusion, both devices might be simple alternatives to secure the airway. Signif-
icantly higher airway leak pressure suggests that the I-Gel® may be advanta-
geous in this respect.

References:

19AP2-6
Fibroptic intubation through classic laryngeal mask airway: Effect of operator experience
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Cardiff, United Kingdom

Background and Goal of Study: The Difficult Airway Society guidelines sug-
gest the use of the classic laryngeal mask airway (cLMA) as a conduit for fi-
beroptic intubation of an unexpected difficult airway[1]. The ease of fibroptic
placement via cLMA when performed by anaesthetists with limited fibroptic
but extensive cLMA experience has not been studied. These anaesthetists are
more likely to need the skill of fibroptic intubation when expert help is unavail-
able.

Materials and Methods: After local research ethics committee approval, 21
patients and 21 trainee anaesthetists with limited fibroptic experience (less
than 5 awake fibroscopic intubations), were invited to take part in this ongoing
randomised cross over study (final sample size will be 32). Researchers with
more than 50 awake fibroscopic intubations acted as experts. The trainees and
experts placed the cLMA and fibroptic scope (FOS) and then railroaded the
tracheal tube (once per patient) over the FOS. The time and success at 1st at-
tempt for FOS tracheal placement, time for FOS guided tracheal intubation and
trainee impression of ease of use (visual analogue score (VAS): 0mm extremely
difficult, 100mm extremely easy) were recorded. Wilcoxon and Mann-Whitney
tests were used to analyse continuous data and McNemar’s was used to analy-
cateorical data.

Results and Discussion: Two patients were excluded from the study: one had an
unexpected grade 3 laryngeal view and in one patient the expert failed to
insert the cLMA. The remaining patients were eight female and 11 male patients
There was no difference in time and success at first attempt for FOS placement
and time to FOS guided tracheal intubation. Trainees found FOS placement
through LMA highly acceptable: VAS mean [interquartile range] = 83 [78-95].
I-gel supraglottic airway and classic laryngeal mask airway – A comparison study

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Background and Goal of Study: The laryngeal mask (LMA) airway is widely used as a routine airway for elective surgery and during cardiopulmonary resuscitation. In the United Kingdom the classic LMA is included in the Difficult Airway Society guidelines for the management of anticipated difficult intubations. The I-gel supraglottic airway is a novel single-use device designed to fit the perilyngeal structures without the use of an inflatable cuff (1). The object of this study is to test whether the I-gel supraglottic airway is an acceptable alternative to the classic LMA.

Materials and Methods: After local research ethics committee approval and written informed consent, 40 ASA I or II patients undergoing general anaesthesia in whom a LMA was considered suitable, were enrolled in this ongoing randomised cross over study (final sample size will be 50). The size of the airway device to be used was based on the patient's body weight according to the manufacturer's recommendation. Success at first attempt (primary outcome), overall success rate, grade of insertion (easy, moderate or difficult), leak pressure and fibre-optically determined grade of the laryngeal view were recorded. Wilcoxon test was used to analyse continuous data and McNemar's test for categorical data.

Results and Discussion: Comparison of I-gel and classic LMA. Values are median [interquartile range] and percentage.

<table>
<thead>
<tr>
<th>Success at 1st attempt</th>
<th>Overall success rate</th>
<th>Easy insertion</th>
<th>Leak pressure</th>
<th>Full view of cords</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-gel</td>
<td>58% [47-70]</td>
<td>87% [72-90]</td>
<td>75% [62-93]</td>
<td>17% [12-22]</td>
</tr>
<tr>
<td>cLMA</td>
<td>90% [66-95]</td>
<td>95% [90-97]</td>
<td>88% [74-96]</td>
<td>37% [27-47]</td>
</tr>
<tr>
<td>Prakul</td>
<td>0.032 [0.017-0.05]</td>
<td>0.38 [0.30-0.50]</td>
<td>0.237 [0.036-0.50]</td>
<td></td>
</tr>
</tbody>
</table>

There is a significant difference in success at first attempt between I-gel and cLMA. A second attempt was needed in 12 patients in the I-gel group – a larger size than the one recommended by the manufacturers was needed in this group to obtain an adequate seal. There was no difference in overall success rate, ease of insertion and laryngeal view obtained. I-gel had a significantly better seal than the cLMA.

Conclusion(s): The I-gel supraglottic airway is an acceptable alternative to cLMA. We recommend the manufacturers to review the sizing guideline of I-gel supraglottic airway.


I-gel supraglottic airway and classic laryngeal mask airway – A comparison study

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Background and Goal of Study: Although evidence suggests that the ProSeal LMA increases protection against regurgitation and aspiration of gastric contents [1], the ProSeal manual [2] states that it does not and gives advice on what to do should this occur. We set out to find how many anaesthetists in our department are aware of this advice and to what extent they follow it.

Materials and Methods: A questionnaire was sent to all anaesthetists asking how many use ProSeals, their insertion techniques, checks for placement, actions in the event of regurgitation and awareness of guidelines.

Results and Discussion: 52 of 83 (63%) responded, 47 (90%) use the ProSeal, 12 (25%) have read the manual. Insertion methods and checks made are:

Table 1

<table>
<thead>
<tr>
<th>Insertion method % (n=47)</th>
<th>Experts</th>
<th>Trainees</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>intubator</td>
<td>49 (23)</td>
<td>29 (14)</td>
<td>NS</td>
</tr>
<tr>
<td>fingers</td>
<td>13 (6)</td>
<td>24 (11)</td>
<td>NS</td>
</tr>
<tr>
<td>laryngoscope</td>
<td>13 (6)</td>
<td>13 (6)</td>
<td>NS</td>
</tr>
<tr>
<td>gum elastic bougie</td>
<td>9 (4)</td>
<td>9 (4)</td>
<td>NS</td>
</tr>
<tr>
<td>gel over drain tube</td>
<td>43 (7)</td>
<td>10 (5)</td>
<td>NS</td>
</tr>
<tr>
<td>passage of gastric tube</td>
<td>13 (5)</td>
<td>13 (5)</td>
<td>NS</td>
</tr>
<tr>
<td>tracheal movement</td>
<td>38 (8)</td>
<td>38 (8)</td>
<td>NS</td>
</tr>
<tr>
<td>suprasternal notch test</td>
<td>6 (1)</td>
<td>6 (1)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Although not in the manual as a technique, 100% first time success for correct placement has been reported with the railroading of the ProSeal over a gum elastic bougie. No significant difference in digital vs. introducer insertion success has been shown (84 vs 88% respectively) [1]. Despite only 4% using the most reliable insertion method, only 34% ensure correct placement. If regurgitation occurs, actions would be:

Table 2

<table>
<thead>
<tr>
<th>Actions taken in the event of regurgitation % (n=47)</th>
<th>Experts</th>
<th>Trainees</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place patient head down</td>
<td>60 (28)</td>
<td>60 (28)</td>
<td>NS</td>
</tr>
<tr>
<td>Disconnect circuit</td>
<td>15 (7)</td>
<td>15 (7)</td>
<td>NS</td>
</tr>
<tr>
<td>Suction airway tube</td>
<td>46 (23)</td>
<td>46 (23)</td>
<td>NS</td>
</tr>
<tr>
<td>Insert gastric tube down drain tube and aspirate</td>
<td>45 (21)</td>
<td>45 (21)</td>
<td>NS</td>
</tr>
<tr>
<td>Apply direct suction to drain tube</td>
<td>79 (37)</td>
<td>79 (37)</td>
<td>NS</td>
</tr>
<tr>
<td>Remove proxal &amp; intubate</td>
<td>60 (28)</td>
<td>60 (28)</td>
<td>NS</td>
</tr>
<tr>
<td>Fibreoptic bronchoscopy</td>
<td>2 (1)</td>
<td>2 (1)</td>
<td>NS</td>
</tr>
</tbody>
</table>

The manual recommends: if oxygen saturation remains acceptable, tilt patient head down, disconnect the circuit and ensure correct placement of the ProSeal.
Suction airway tube, consider using a fiberoptic bronchoscope. Insert a gastric tube through the drainage tube if further GI contents is suspected. If indicated, intubate. It warns against the most common practice of applying direct suction to the drain tube as it can cause oesophageal trauma and collapse the drain tube.

Conclusions: Published recommendations need to be revised, evidence based and simplified, they are often neither read nor followed. Greater awareness is required in order to increase the safety profile of the ProSeal LMA.

References:

19AP3-1
Airway management in a patient with Madelung’s disease
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Background and Goal of Study: Madelung’s disease is characterized by the symmetrical growth of fatty non encapsulated tissue, enabling it to achieve large dimensions. We present the case of a 59 years old male patient diagnosed with Madelung’s disease around the neck, proposed for elective lpectomy of the cervical region.

Materials and Methods: Our patient was a 59 years old and had antecedents of heavy alcoholism habits. He was diagnosed with Madelung disease three years earlier and since then the disease grew exponentially. He was proposed for elective lpectomy of the cervical region. He presented with exuberant cervical lipomatosis, accentuated reduced cervical extension and Mallampatti IV. As a difficult airway was anticipated, we decided to intubate with fibroscopy. We explained to the patient that we would perform an intubation with fibroscopy under light anesthesia. Propofol and fentanyl were administered and the fibroscopy initiated. We observed general lipomatosis in the oropharynx impeding the localization of reference anatomic structures. After three failed attempts to intubate, between which the patient was awaken, a successful nasotracheal intubation was made with a 6.0mm diameter tube.

Results and Discussion: After the successful nasotracheal intubation, we administered propofol, fentanyl and vecuronium. Anesthesia was maintained with sevoflurane; fentanyl and vecuronium were repeated as needed. The surgery proceeded without complications. At the end of surgery, it was decided to do a tracheostomy, to allow a better ventilation in the post operative period. Two days after surgery, the patient was fully awake and recovering well. After full recovery, tracheostomy was surgically closed.

Conclusion(s): We conclude that when a difficult airway is anticipated, care must be taken to prevent complications on induction of anesthesia. With our case, we show the importance of training in fiberoptic intubation. When a fibroscope is not available, airway management must be carefully approached.

19AP3-2
Ultrasound examination added to clinical assessment ensure safer placement of double-lumen tube and better lung isolation
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Background and Goal of Study: There are several scenarios in critically care and emergency medicine in which urgent lung isolation is life-saving procedure. Use of the left double-lumen tube (LDLT) is the preferred method for this purpose. Unfortunately, the malpositioning of the LDLT can occur and bronchoscopy has been recommended as a reliable method to avoid this complica- tion. However, in emergency situations, bronchoscopy is not always available or applicable. Recently, ultrasound (US) has been proposed as a new method for detection of proper position of the orotracheal tube. The aim of this study is to evaluate the role of US in proper positioning of the LDLT.

Materials and Methods: Fifty elective adult thoracic surgery patients who re- quired a LDLT during anesthesia were enrolled in the prospective study. The patients were divided into two groups: group A with clinical assessment of the LDLT position (25 pts; age 61±13; male 56%); and group B with clinical and US assessment (25 pts; age 56±11; male 60%). All 50 patients underwent the standard procedure of the LDLT placement. After insertion, the tracheal and endobronchial cuff were inflated and clinical assessment of the LDLT position was made by observing chest wall expansion, checking lung compliance and by auscultation of the both lungs. On the basis of clinical findings the anesthesiologist recorded his assessment of the LDLT placement in the patients from the group A. In the patients from the group B to assess LDLT position, after above described clinical assessment, brief US (15 seconds) exam was added. Ultra- sound examination included visualization of the pleural movements and motion of the diaphragm from both sides before and after selective damping of the bronchial and tracheal limb. After necessary corrections of the tube position the anesthesiologist recorded his assessment of the LDLT placement.

Results and Discussion: Sensitivity and negative predictive values of both methods were 100% (CI: 90-100%). In the clinical assessment alone (group A) specificity was 22% (17-29%); accuracy: 72% (62-79%) and positive predictive value 70% (64-76%) while in clinical and US assessment (group B) specificity was 50% (35-66%); accuracy 88% (81-96%) and positive predictive value 86% (79-95%), respectively.

Conclusion(s): Brief ultrasound examination added to clinical assessment ensure more precise placement of LDLT in the correct position than clinical assessment alone.

19AP3-3
Difficult airway in thyroid surgery – Do all roads lead to Rome!!
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Background and Goal of Study: Failed intubation is associated with serious complications. Enlargement of thyroid gland can be associated with difficult air- way due to tracheal deviation or compression or both. A meticulous pre-op evaluation and careful peri-op plan of such patient is essential to avoid patient morbidity. We present 3 cases to highlight such difficulties.

Materials and Methods: Case 1 - 52 year old female with history of large substernal goitre developed worsening dyspnoea and hoarseness in recent months. She had symptoms of hyperthyroidism and was treated with antithyroid drugs. Physical examination revealed large midline thyroid swelling, BMI of 43.6, Mallampatti class III and limited neck movements. X-ray and CT showed tracheal deviation and compression. Awake fiberoptic intubation was selected for airway management. Patient underwent total thyroidectomy and was extubated uneventfully. Case 2 - 87 year old female with a history of substernal enlargement of left lobe of thyroid causing tracheal compression. She had multiple comorbidities. Physical examination revealed BMI of 36, ASA class III, Mallampatti class II and limited neck movements. X-ray and CT showed tracheal deviation to the right and compression. Awake fiberoptic intubation was selected for airway management. Patient underwent left lobectomy and was extubated in the Intensive Care Unit. Case 3 - 73 year old female with a 3year history of neck swelling and symptoms of hyperthyroidism and worsening dyspnoea. She felt pressure on neck and early morning hoarseness. Physical examination showed a large goitre, BMI of 40, limited neck movements, Mallampatti class III. X-ray and CT showed substernal extension/tracheal deviation to the right and compression. Awake fiberoptic intubation was performed successfully.

Conclusion(s): Awake fiberoptic intubation was selected for airway management. Patient underwent thyroidectomy and was extubated in the ICU.

Results and Discussion: Tracheal intubation in a patient with tracheal devi- ation and or compression is challenging. The distorted airway anatomy makes orotracheal intubation with rigid laryngoscopy difficult. Options available to us were gas induction; iv induction or awake fiberoptic. Induction of general anesthesia may precipitate complete airway closure. Fiberoptic intubation which can safely secure the airway has been recommended.

Conclusion(s): Awake fiberoptic intubation should be considered as an early option in airway management in patients with tracheal deviation and or compression especially when there are coexisting risk factors, e.g. Obesity or GOFD.

19AP3-4
Airway management in a non ventilable patient due to giant lower lip cancer
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Background and Goal of Study: Patients suffering from head tumours have an increased risk of difficult airway management, as altered anatomical struc- tures may cause an impossible ventilation. Awake fiberoptic tracheal intubation is a safe and efficient technique to perform a general anesthesia in this kind of patients.

Materials and Methods: A 74 year old man with a severe deafness was scheduled for giant lower lip squamous cell carcinoma removal and reconstruc- tion. Due to the measures of the tumour, that did not allow mouth opening, fiberoptic intubation was required. After explaining him the procedure he was pre-medicated with midazolam 3 mgs; topical anaesthesia of the pharynx was performed with lidocaine, two standard nasal dressings soaked with lidocaine too were applied in both nares for ten minutes. An oxygen flow was adminis-
Lahane system. However, a multivariate model regarding predictors of this new classification system has not been established. We, therefore, conducted this study to determine the multivariate model of morphometric tests to predict the Cook’s new classification of difficult laryngoscopic view.

Materials and Methods: A prospective analytic study was conducted in consecutive adult surgical patients (> 18 years old) scheduled to receive general anesthesia and endotracheal intubation. The enrolled patients were preoperatively assessed with respect to mouth opening (interincisor gap), upper lip bite test, oropharyngeal (Mallampati) classification, thyromental distance and sternomental distance. After induction of anesthesia, the laryngoscopic view was graded by an experience anaesthesia personnel using a Macintosh blade laryngoscope. The Cook’s difficult laryngoscopic view was defined as inability to lift or see the epiglottis. The univariate and multivariate (logistic regression) analyses were used to identify predictors of the difficult laryngoscopic view. A composite airway risk index (derived from normalized odds ratios in the multivariate model) was calculated to determine the sensitivity, specificity, and likelihood ratios of the model.

Results and Discussion: Of the 1438 surgical patients, the Cook’s difficult laryngoscopic view was identified in 33 (2.3%) patients. From the multiple logistic regression analysis, independent predictors of the difficult laryngoscopic view were Mallampati class 3 and 4, upper lip bite test (grade 2), sternomental distance (<12.5 cm) and thyromental distance (<6 cm) with the odds ratios (95%CIs) of 5.8 (2.7,12.6), 4.2 (1.5,11.7), 4.2 (1.7,10.6) and 2.9 (1.3,5.6); respectively. The sensitivity (95%) and specificity (98%) of the composite airway risk index derived from the odd ratios of the Multivariate model test for positive test and negative test of the composite risk index (>4) were 74.2 (65.8,86.3) %, 83.9% (81.9,85.8), 4.9 (4.0,6.2) and 0.3 (0.2,0.5); respectively.

Conclusion(s): The improvement in sensitivity, specificity and likelihood ratios indicates that the composite airway risk index derived from the odd ratios of the Mallampati test, the upper lip bite test, sternomental distance and thyromental distance in the multivariate model could be useful as a screening test for predicting the Cook’s new classification of difficult laryngoscopic view.

19AP3-8
Awake intubation with the LMA Ctrach™ in 11 patients with difficult airways
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Background and Goal of Study: The LMA Ctrach™ is an intubating laryngeal mask with an integrated fiberoptic system that provides visualization of the glottis to improve the success rates of intubation while maintaining ventilation. We prospectively assessed the feasibility of awake intubation with the CTrach in patients with difficult airway (DA).

Materials and Methods: Eleven patients with known DA were included, after informed consent obtained. Exclusion criteria were oropharyngeal pathology and mouth aperture below 2.5 cm. Patients preparation included atropine 0.01 mg.kg⁻¹, midazolam 1-2 mg, remifentanil 0.1 mcg.kg⁻¹.min⁻¹ i.v. and topical anesthesia with 10% lidocaine. The CTrac was inserted, inflated and attached to the respiratory circuit. Time and ease of insertion, patient comfort and capnography were analyzed. The initial view, time and number of correcting maneuvers needed to achieve the best glottic view were recorded. When vocal cords were visualized, 2 ml of 2% lidocaine were sprayed with a thin catheter before advancing the tracheal tube under direct visualization. If the intubation was unsuccessful after 5 minutes, a fibroscope (FBS) was used to intubate.

Results and Discussion: Insertion of the CTrach was easy and well-tolerated in all patients. In six patients, oxygen saturation improved compared to preinsertion values. Vocal cords were seen immediately in 4 patients and after correcting maneuvers in 5 patients. All of them were intubated within 160±90 s. In two patients vocal cords could not be seen; in one patient the view was obscured by secretions, but was blindly intubated, and the other had a lingual tonsil hyperplasia (LTH) and was intubated with a FBS after removing the CTrach.

Conclusion(s): The CTrach is a useful tool for awake intubation in patients with DA. It is easy to insert, well tolerated, and may improve oxygenation in some patients. The quality of view is optimized with simple correction maneuvers in most patients, but it requires time. Possible limitations include LTH.
Background and Goal of Study: Cricothyrotomy is the final lifesaving option. The Netherlands method might be a promising technique despite the complications observed.

Conclusion(s): This novel technique turned out to be fast and successful in posterior tracheal wall injury.

Results and Discussion: A cuffed 6.0 mm tube was inserted into the trachea via the resulting hole. Success was achieved as felt by a sudden loss of resistance, the scissors were spread enlarging the skin, subcutaneous tissue and the cricothyroid membrane into the trachea. Once the blades of the scissors have passed into the trachea, accidental being inserted to deep and thus to minimize the risk of posterior airway access (14 medical students, 1 anesthesiology resident) as follows: The cricothyrotomy scissors. The malformations were thought to be due to high temperature during EO sterilization. The sterilization procedures can cause severe malformation of endotracheal tubes. So, single use of a reinforced endotracheal tube is recommended for patients’ safety.

19AP3-10 Cricothyrotomy scissors: A novel device for emergency airway access

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Background and Goal of Study: Cricothyrotomy is the final lifesaving option whenever neither ventilation nor endotracheal intubation is possible [1]. Various techniques have been described, however more rapid approaches would be desirable to reestablish oxygenation as quickly as possible. We therefore evaluated a novel technique for emergency cricothyrotomy using recently developed cricothyrotomy scissors.

Materials and Methods: After theoretical instruction, cricothyrotomy was performed in 15 cadavers by 15 participants with no prior experience in invasive airway access (14 medical students, 1 anesthesiology resident) as follows: The blades of the slightly curved scissors (Karl Storz, Tuttlingen, Germany, length 145 mm) are sharpened also on their lateral side allowing them to cut similar to a lancet. The tip of the scissors was punctured with closed blades through the skin, subcutaneous tissue and the cricothyroid membrane into the trachea. A metal stopper attached to one blade is intended to prevent the blades from accidentally being inserted to deep and thus to minimize the risk of posterior tracheal wall injury. Once the blades of the scissors have passed into the trachea, as felt by a sudden loss of resistance, the scissors were spread enlarging the hole to about 1.5 cm in diameter. Subsequently, the blades were closed, the scissors turned by 90° and the blades were again opened. A conventional cuffed 6.0 mm tube was inserted into the trachea via the resulting hole. Success rate, tube insertion time and complications were recorded.

Results and Discussion: All cricothyrotomies were performed successfully (accurate tracheal position of the tube) in less than 2 minutes with a mean tube insertion time of 63.2±21 sec (mean±SD). A total of 7 complications were observed in 6 out of 15 cadavers. The most frequent complication (n=5) was posterior tracheal wall injury.

Conclusion(s): This novel technique turned out to be fast and successful in the hands of first time performers. Failure of cricothyrotomy within a reasonable time results in probable death of the patient, therefore the novel scissors method might be a promising technique despite the complications observed. Complication rate may likely be lower in experienced and specially trained personnel.

As confirmed later, the RET was sterilized for reuse after the first use, and there have been several cases of similar malformations of RETs after EO sterilization. The malformations were thought to be due to high temperature during EO sterilization. The patient was discharged from the PACU 1 hour after ending of the surgery and didn’t have any complications or sequelae.

Conclusion(s): Ethylene oxide sterilization procedure can cause severe malformation of the inner wall of reinforced endotracheal tubes. So, single use of a reinforced endotracheal tube is recommended for patients’ safety.

References:

19AP3-11 Anaesthetic airway incidents: Analysis of the UK National Reporting and Learning System data from 2006

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Background and Goal of Study: Incident reporting is a key factor in improving patient safety in anaesthesia. The UK National Patient Safety Agency (NPSA) set up the National Reporting and Learning System (NRLS) to identify and learn from adverse incidents nationally. We aimed to extract and analyse the incidents relating airway problems.

Materials and Methods: The NPSA provided us with a Microsoft Excel® spreadsheet containing anonymised anaesthetic incidents from the calendar year 2006 (n=4902). Using the Excel’s “Find” function, we applied in sequence 11 key words relating to airway management until no further records were found. These reports were reviewed for relevance then categorized by type of incident, frequency and degree of harm.

Results and Discussion: We identified 371 airway-related incidents. These are shown in the Table below. 52 (21%) were categorised as having caused moderate or severe harm to the patient. Incident category Frequency. Dental damage 143. Regurgitation/vomiting aspiration 78. Airway obstruction (hypoxia) 34. Problems with airways and adjuncts 37. Injury to other airway structures 28. Accidental extubation 19. Laryngospasm 14 bronchospasm 14. Miscellaneous 18.

Conclusion(s): This initial high-level analysis has provided a framework to allow us to begin identifying and sharing the learning points for improving patient safety in airway management.

Acknowledgements: Professor Smith is supported by a National Institute for Health Research personal patient safety research development award. We would like to thank the staff of the NPSA for supplying the data.

19AP4-1 Management of airway obstruction and stridor – A survey of practice of anaesthetists in United Kingdom

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Background and Goal of Study: Despite the recent proliferation of devices and techniques designed for management of the difficult airway, the best possible strategy, in the management of patients presenting with stridor and airway obstruction continues to be debated. The aim of this study was to evaluate practice patterns of consultant anaesthetists in the United Kingdom for airway management in stridor.

Materials and Methods: A questionnaire was sent to 200 consultant anaesthetists in university and district general hospitals. The questionnaire included four clinical scenarios: deep neck infection, stab injury to the neck, laryngeal tumour and retrosternal goitre. The patient in each scenario presented with stridor. Respondents were required to choose their preferred technique for induction and intubation. Availability and access to difficult airway management equipment in an emergency situation was also assessed.

Results and Discussion: Data were entered into Microsoft Excel and analysed using Fischer’s Exact Test. Response rate was 63% response. Overall, 56% of respondents preferred inhalational induction and direct laryngoscopy whereas 33% preferred awake fibreoptic intubation and 4% chose preoperative cricothyrotomy or surgical tracheostomy under local anaesthesia for management of deep neck infection, laryngeal tumour and retrosternal goitre. Anaesthetists with less than five years experience at consultant level were significantly more likely to choose awake fibreoptic intubation for retrosternal goitre and laryngeal tumour (p<0.029). Rapid sequence induction was chosen by 72% of anaesthetists for stab injury. None of the respondents chose video laryngoscopy or blind nasal technique. 78% of responders had access to difficult airway management equipment. However 29% had no access to intubating or Proseal LMA. There was no significant difference in the intended practice amongst anaesthetists in university and district general hospitals.

Conclusion(s): Most anaesthetists in the United Kingdom rely on inhalational induction and direct laryngoscopy for managing patients with an obstructed airway. Junior consultant anaesthetists were more likely to prefer awake fibreoptic intubation in glottic and subglottic obstruction. Access to intubating and Proseal LMA needs to be improved.

References:
19AP4-2
Factors affecting the difficulty of tracheal intubation with a lightwand
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Background and Goal of Study: The success of intubation with direct laryngoscopy depends largely on the experience of the clinician and the patient’s upper airway anatomy. Lighwand is one of the alternate intubation techniques for difficult cases. But there has been no study about clinical parameters to predict difficulty of intubation with lighwand. The purpose of this study is to evaluate the correlation between clinical parameters predicting difficult intubation and ease of intubation with a lighwand.

Materials and Methods: ASA physical status I-II, 73 patients requiring tracheal intubation for elective surgery was enrolled in this prospective study. Patient demographics, Mallampati class, mouth opening, thyromental distance, neck around size and neck extension ability were all measured and the values recorded. Body mass index was calculated for each patient. After receiving a standardized anesthetic induction, patients first underwent direct laryngoscopy to define the Cormack laryngoscopy grade, then tracheal intubation was performed using lighwand. Times to intubation (from insertion of lighwand into the oropharynx to its removal) were measured by a chronometer and frequency of intubation attempts was recorded. The relationship of difficulty of tracheal intubation with lighwand and the clinical parameters was analyzed with multiple linear regression with stepwise selection method. The difficulty of intubation with lighwand for response variable was defined as the time to intubation multiplied by intubation attempts frequency. The Mallampati class, Cormack grade, mouth opening, thyromental distance, neck around size, neck extension ability, and body mass index were regarded as independent variables.

Results and Discussion: Other variables except for Mallampati class were less associated with difficulty of tracheal intubation with lighwand. Product of lighwand for response variable was defined as the time to intubation multiplied by intubation attempts frequency. The Mallampati class, Cormack grade, mouth opening, thyromental distance, neck around size, neck extension ability, and body mass index were regarded as independent variables.

19AP4-3
Impact of manual in-line stabilisation (MIS) on views obtained on the LMA CTrach: A randomised crossover trial
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Background and Goal of Study: Manual in-line stabilisation (MIS) is the recommended technique for immobilising an unstable cervical spine during airway instrumentation. MIS can make face mask ventilation, laryngeal mask airway (LMA) insertion and tracheal intubation more difficult. We evaluated the impact of MIS on the quality of views obtained on the LMA CTrach.

Materials and Methods: We obtained IRB approval and informed consent from 50 patients (ASA I – II) with no known cervical pathology, undergoing elective surgery requiring tracheal intubation as part of the anaesthetic technique. Each patient had CTrach insertion twice in this crossover trial, once with and once without MIS. We randomised the patients to have insertions in either MIS/no-MIS or no-MIS/MIS sequence. After induction of general anaesthesia and neuromuscular blockade, an independent colleague assessed the Cormack and Lehane grading by direct laryngoscopy. With MIS, cervical spines of the patients were immobilised during the whole CTrach procedure. We noted during each insertion, the ease of CTrach insertion, time to achieve ventilation, ease and time to obtain a view, and quality of view.

Results and Discussion: There were 24 male and 26 female patients, with mean age 43.1 (SD 14.6) and mean BMI of 24.7 (SD 4.5). The laryngoscopic grades were 1 and 2 for 39 patients, 3 for 10 patients and 4 for 1 patient. MIS resulted in a poorer quality view compared to no-MIS (p = 0.16). With MIS, there was no view in 1 patient and poor views in 3 patients, whereas good views were obtained without MIS in these same 4 patients. MIS resulted in longer time to ventilation (30.2 (SD 12.1) vs 24.1 (SD 10.3) sec (p = 0.03)), longer time to laryngeal view (92.5 (SD 35.9) vs 42.3 (SD 20.1) sec (p = 0.019)), increased difficulty of obtaining laryngeal view (p = 0.01), increased number of manoeuvres to achieve ventilation (p = 0.005) and laryngeal view (p = 0.007).

Conclusion(s): MIS may increase the difficulty and time required for CTrach use and affect the quality of views obtained. The CTrach fibreoptic enable optimisation of its placement and alignment with the larynx. Provided the larynx can be fully seen with the CTrach, the first attempt success rate of intubation is nearly 100%. This advantage may be lost in patients with unstable spines who require MIS. The need for manoeuvres to achieve ventilation and a laryngeal view may also result in unwanted movement of the cervical spine.

References:

19AP4-4
Variation of the Mallampati and intubation scores between two anaesthesia airway managements in 13,236 patients from the Danish Anaesthesia Database
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Background and Goal of Study: Only a few studies have evaluated the interobserver agreement of different predictors of difficult intubation where the tests were performed on a highly selected patient population, by a limited number of observers. Previous research may have overestimated the agreement in daily practice. We investigated the agreement between successive Mallampati and intubation scores in the same patients scheduled twice for tracheal intubation with direct laryngoscopy registered in DAD.

Materials and Methods: 13,236 patients with at least two anaesthesia registered in DAD between January 2005 and October 2007 were included. Assessments of modified Mallampati score (I-IV) and intubation score:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
<th>Difficult intubation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;3 attempts, one intubator</td>
<td>Failed intubation</td>
</tr>
<tr>
<td>2</td>
<td>&gt;2 attempts, or two intubators</td>
<td>direct laryngoscopy</td>
</tr>
<tr>
<td>3</td>
<td>Other method than direct laryngoscopy</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results:

- 1% of records had no Mallampati score.
- 1% of records had no intubation score.
- Mallampati score agreement was fair (kappa = 0.33 - 0.36). Intubation score agreement was lower but precisely the same (0.20 - 0.23).

Conclusion(s): The agreement between successive Mallampati and intubation scores was low but much more precisely estimated than previously. This is probably due to data originating from daily anaesthesia practice and the large amount of evaluators and patients in this cohort. The low agreement values may contribute to the limited value of Mallampati score and previous assessment of intubation score as stand-alone predictors for difficult intubation.

Acknowledgements: We thank the Danish anaesthesia departments contributing to the DAD.

19AP4-5
The diagnostic accuracy of previously difficult intubation and modified Mallampati score in predicting the difficult tracheal intubation of 91,322 consecutive patients from the Danish Anaesthesia Database
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Background and Goal of Study: A history of a previous difficult tracheal intubation (PDI) is a risk for a subsequent difficult tracheal intubation (DTI). But the knowledge of PDI as a risk has been based primarily on information from the patient. Because numerous patients was anaesthetised and registered more
than once in the Danish Anaesthesia Database, it was possible to evaluate the risk of PDI based on confirmed information. Furthermore, on a large cohort in an everyday clinical setup, the Mallampati score was evaluated as a risk factor for DTI.

Materials and Methods: 91,332 consecutive patients scheduled for intubation with direct laryngoscopy recorded from January 2005 to October 2007 were included. Of these, 13,236 patients was anaesthetised more than once. Based on the last and the penultimate intubation, PDI was categorised as [No] or [Yes]. The remaining patients, anaesthetised once with absent information of a possible PDI was categorised as [Unknown]. Multiple logistic regression analysis was performed with PDI = [No] as the reference.

Results and Discussion: The prevalence of DTI was 5.2% (5.0 - 5.3%). In univariate analyses, age, sex, priority, PDI, Mallampati > II, and BMI were all statistically significant risks for DTI. The odds ratios (OR) for DTI was 7.8 (6.3 - 9.6, P < 0.0001) in patients with PDI = [Yes] and 1.3 (1.1 - 1.4, P < 0.0001) for patients with PDI = [No]. Corrected for the other covariates PDI remained a significant risk factor with an OR of 6.5 (5.1 - 8.2, P < 0.0001). The OR for significant covariates in the multivariate model are:

Multivariate Model

<table>
<thead>
<tr>
<th>PDI</th>
<th>BMi &gt;35</th>
<th>25≤BMI&lt;35</th>
<th>Age</th>
<th>Male</th>
<th>Priorit</th>
<th>Mallampati &gt; II</th>
</tr>
</thead>
<tbody>
<tr>
<td>[No]</td>
<td>OR 6.69</td>
<td>1.36</td>
<td>1.30</td>
<td>1.12</td>
<td>1.01</td>
<td>1.35</td>
</tr>
<tr>
<td>[Yes]</td>
<td>2.33</td>
<td>9.93</td>
<td>15.15</td>
<td>15.02</td>
<td>15.2</td>
<td>3.73</td>
</tr>
</tbody>
</table>

Dichotomised PDI and BMI, combining [No] and [Unknown], revealed the following accuracies:

Diagnostic tests (%)

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PVPPOS</th>
<th>PVPNEG</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDI [Yes]</td>
<td>3</td>
<td>3</td>
<td>25</td>
<td>59</td>
</tr>
<tr>
<td>Mallampati &gt; II</td>
<td>23</td>
<td>93</td>
<td>15</td>
<td>96</td>
</tr>
</tbody>
</table>

PVP/NEG: predictive values positive/negative test.

Confirmed PDI and Mallampati score were highly significant risks for DTI with high OR which were precisely estimated. An unknown history of PDI was shown to be an independent risk for DTI. The diagnostic accuracy revealed that confirmed PDI alone represents a 25% (22 - 29%) risk for DTI.

Conclusion(s): History of previous difficult intubation and modified Mallampati score contributes significantly to the risk evaluation of a scheduled laryngoscopic tracheal intubation.

Acknowledgement: We thank the Danish anaesthesia departments contributing to the DAD.

19AP4-6
Multicentric prospective study of preoperative assessment and anesthetic airway management in Catalonia

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Background and Goal of Study: Airway management (AWM) is the most frequent source of morbidity directly related to anesthesia. Adequate assessment and management is one of the cornerstones of anesthesia quality control. The goal of the study has been to evaluate the habits of airway preanesthesia assessment and AWM in the anesthesiologist hospital community in Catalonia. This study is part of the QUAVA collaborative project to improve patient safety in anesthesia AWM.

Materials and Methods: A prospective multicentric study was conducted in a purposeful sample of 17 hospitals in Catalonia. A comprehensive preanesthesia record’s review was performed including all patients who underwent any kind of airway manipulation through general anesthesia during a 2 weeks period. AWM procedure used, assessment of difficult laryngoscopy when done, and complications derived from AWM were prospectively recorded.

Results and Discussion: A total of 1971 patients were included in the study. Preoperative assessment demonstrated Mallampati score as the most commonly recorded item in the preanesthesia clinical record (86.4%). Other items were assessed less frequently: cervical movement range (62.4%), thyromental distance (56.6%), mouth opening (54.3%) and anterior mandibular subluxation (28%). Difficult mask ventilation assessment was recorded in 39 patients (2%). Global assessment of difficult AWM was recorded in 9.7% of the preanesthesia records. Airway management was conducted by means of direct laryngoscopy in 62.8% of the patients. Laryngeal mask was used as first choice in 12.3%. In 6.2% of the patients an unexpected difficult laryngoscopy was recorded. When a difficult AWM was predicted, the Macintosh laryngoscopy was the most commonly used technique (72.5%) followed by fibroscopic intubation (8.1%). Complications appeared in 6.1% of patients (hemodynamic complications such as hypertension or arrhythmia in 2.8%, teeth or mucosa trauma in 1.6%, low SpO2 in 0.9%). No case of bronchospasm, vomiting or regurgituation and no major complications (coma, death) due to AWM were recorded in this series.

Conclusions: Preoperative assessment of airway management using multivariate test is not completely recorded in a high percentage of patients. Laryngoscopy is the most commonly used technique for AWM even in difficult patients. Following algorithms of airway assessment and management should improve patient safety and decrease incidence of complications.

Acknowledgements: To QUAVA group researchers.

References:

19AP4-7
Management of anticipated airway difficulty in an emergency: Beyond the guidelines

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Background and Goal of Study: Most conventional methods of achieving a secure airway as suggested by the American Society of Anesthesiologists practice guidelines for difficult airway would be inappropriate for patients with anticipated difficult airway in an emergency (1). On the other hand, the difficult airway guidelines are aimed at managing an unanticipated difficult airway (2). We report a case of retro molar squamous cell carcinoma causing upper airway obstruction. In this life threatening situation we discuss the airway management options.

Materials and Methods: A 74 year old man was diagnosed with poorly differentiated squamous cell carcinoma in the retromolar triangle. He underwent right radical neck dissection followed by radiotherapy and chemotherapy. Six months later he presented with marked stridor. A diagnosis of near complete upper airway obstruction was made.

Results and Discussion: Management Options: Oxygenation was of primary importance in this case. The patient required urgent ventilatory assistance. Bag and mask ventilation was virtually impossible and we were unable to use any airway adjuncts due to the risk of causing further trauma to the tumour. Options of intravenous or inhalation induction were contraindicated in this patient. The option of primary tracheostomy was considered to be dangerous in view of previous surgery and radiotherapy. We decided to insert a Mini-Trach. Following this fibre optic scope was passed and 6.5 cuffed tracheal tube was railroaded. Once a definitive airway was established general anaesthesia was induced and a surgical tracheostomy was performed. The patient was successfully resuscitated.

Conclusion(s): Prophylactic insertion of transatracheal catheter with jet ventilation has been used successfully in patients with airway obstruction (3). The improved oxygenation provided allows the anaesthetist added time to secure the airway via fibre optic intubation. In the absence of any guidelines for anticipated difficult airway in an emergency, an experienced clinician who can interpret and adapt the guidelines is vital.

References:

19AP4-8
“Open mouth” face mask position is effective in correcting the inadequate face mask ventilation observed in edentulous patients

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Background and Goal of Study: Providing positive-pressure ventilation with a face mask is an essential part of airway management during general anesthesia. In edentulous patients, it may be difficult or impossible to ventilate the patient because of inadequate seal with air leaks. The aim of the study was to evaluate the capability of a modified face mask position to improve ventilation in this population.

Materials and Methods: During a 6 month period, 27 edentulous patients with inadequate seal and air leak during two-hand positive pressure ventilation using
Background and Goal of Study:
Anesthesiology, La Princesa Hospital, Madrid, Spain
R. Navarro-Perez, A. Gomez, M. Santos-Ampuero, F. Ramasco, A. Ruiz
Comparison of two methods for assessment of size and depth

Results and Discussion: Patients characteristics were age 68±15 yrs, body mass index 24±4 kg/m², ASA score 2 [1-3]. Among patients, 3% had a limited mouth opening (>3 cm), 4% had a limited flexion (F) and extension (E) of the neck (F>E<90°). 2% had a bend, 2% had a history of snoring and 2% presented a sleep obstructive apnoea syndrome. Face mask ventilation was performed by an experimented anaesthesiologist. The delivered and expired tidal volume was 400 [60-600] ml and 20 [0-260] ml respectively, 

Results and Discussion: The upper lip bite test is an acceptable alternative test to predict difficult ventilation and intubation and the incidence using a four points scale for DMV and cuairelative scale IDS (Cormack and number of attempts, essentially) for DIE. We investigated the incidence and the impact of four combing score on prediction difficult ventilation and intubation thyroid surgery.

Results and Discussion: During seven month period, 50 cases of different types of thyroid surgery were recorded: 5 cases of Graves (2,5%), 20 cases of GTMN (10%), 1 case of Thyroiditis (0,5%), 11 cases of Cancerous (5,5%), 11 cases of insulate nodule (5,5%) and 2 cases of simple goiter (1,0%). The overall incidence of difficult ventilation was 1,5% of grade 3 MV (inadequate, instable or requiring two providers) and 0% grade 4 MV (impossible to ventilate), and the overall incidence of DIE was 2% using IDS. The specific predictive criteries about thyroid surgery were not associated with an increased rate of DMV and DIE. And the preoperative four score were significantly in univariate analysis as risk factors for prediction and worsening the difficult airway in thyroid surgery if 

Conclusion(s): We conclude that the thyroid surgery is not associated with a more frequent difficult airway in nowadays both VM and DIE. In our study the 50 cases suggests that some degree of difficult with intubation is seen with similar frequency in thyroid surgery and the general surgical population, probably because the current surgery is early and the complications of compression are less that the past.

19AP4-10
Comparison of two methods for assessment of size and depth of left-sided double-lumen tracheal tubes
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Background and Goal of Study: The election of size of DLT is usually made according to sex and height of patients, and its depth according to the resist-

of DLT: the size depends on the measured tracheal diameter at clavicle level on chest radiograph (table 1) and depth on a formulae: height (cm) x 0.1 + 12.5.

Goal is to determine which of the two ways to choose the size and depth of DLTs generates less number of relocations and a better lung collapse.

Materials and Methods: This was a prospective clinical study with forty pa-

tients. In eighteen of them, the choice of DLT was made according to blind 

insertion and the rest of them, using the method mentioned before. The characteristics of patients in both groups were similar in sex, age, height and ASA and therefore, comparable.
The position of the tube was confirmed and evaluated from 1 to 3 by fiberoptic bronchoscopy (being 1 malposition and 3 perfect)

Conclusion(s): It seems that the DLTs chosen by the method described be-

need to be relocated in lateral decubitus less times that when they are chosen according to sex and size of the patient. Moreover, the pulmonary col-
lapse evaluated by surgeons is better in this group. Thus, this method can be satisfactory for the election of size and depth of DLT in avoiding relocations and over-pressure cuffs and therefore, damage on the trachea.
19APS-1
Awake intubation with Airtraq® laryngoscope in patients with anticipated difficult airway
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Background and Goal of Study: The Airtraq® is a novel intubation device which allows visualization of the vocal cords without alignment of the oral, pharyngeal and tracheal axis, based on indirect laryngoscopy [1,2]. We present six patients with anticipated difficult airway and awake intubation with Airtraq®.

Materials and Methods: All the patients had physical features suggesting a difficult airway. In five of the six patients, after gassing with 40% of 2% lidocaine solution and under the effect of incremental doses of intravenous midazolam and fentanyl, we have performed awake intubation with the Airtraq® Laryngoscope. In case 3 we performed awake intubation under no medication. We have used the Airtraq® Laryngoscope as the first line intubation device in four of the six cases (in case 1 and 5 direct laryngoscopy was attempted twice, with McKintosh/McCoy blade and failed). All of them kept spontaneously breathing (FiO2=1).

Results and Discussion:
Indirect laryngoscopy with Airtraq® Laryngoscope resulted in grade I Cormack and Lehane views. Oxygen saturation was maintained above 95%. All the patients were successfully intubated with the Airtraq® at first attempt.

Conclusion(s): In this case series the Airtraq® Laryngoscope proved to be an effective intubation device and can be considered as a valid option in an anticipated difficult airway situation [2]. For the patients it was safe and comfortable to use the Airtraq® device while they were awake and breathing spontaneously, using drugs reversible with antidotes to assure a procedure without complications [3].

References:

19APS-2
Comparison of stress serum to saliva amylase in intubations with the GlideScope videolaryngoscope, Macintosh laryngoscope and fibreoptic bronchoscope
Department of Anaesthesiology, Rigas 1st Hospital, University of Latvia, Riga, Latvia

Background and Goal of Study: The stress response is regulated by two primary neuroendocrine systems, the hypothalamic-pituitary-adrenal-cortical (HPA) and sympathetic-adrenomedullary (SAM) systems. Salivary alpha amylase (AA) levels can be used as index of the HPA and SAM activities (1, 2). Aim of the study was to compare patient stress response to saliva AA to different intubation techniques.

Materials and Methods: 60 adult patients, ASA I-II, scheduled for elective abdominal surgery were included in this study. Median age was 55.6±12 years. Patients were prospectively randomly divided in 3 groups: Intubation with GlideScope (GS), Macintosh laryngoscope (ML) and PENTAX fibreoptic bronchoscope (FB). After preoxygenation for 3 min anesthesia was induced with fentanyl 2mg/kg, mivacurium 0.2mg/kg and propofol 2mg/kg, injected intra-venously over 20 sec. Intubation was started 2 min after mivacurium injection. Anesthesia was maintained with sevoflurane 1-2 vol% and fentanyl 1mg/kg as needed. Intubation time (Tt) was measured and saliva samples were collected before and after intubation. AA level was determined using the AMIR Roche liquid table PNPG7.

Results and Discussion: In all three patients groups initial AA level was the same (54±20 KU/ml, p<0.05). In GS patients alpha amylase level after intubation significantly decreased (42±15 KU/ml, p<0.028), but in ML and FB patients - significantly increased (68±24 KU/ml and 72±32 KU/ml respectively, p<0.05). Intubation time was statistically significantly longer in FB group (120±65 sec) versus ML group (29±9) and GS group (26±9 sec), p<0.05. All intubations were successful, but in FB patient’s group IT was significantly longer, than in ML and GS patient group. IT in GS and FB patients groups were not statistically significantly different. In our opinion, shorter and more confident intubations with GlideScope produce less noxious stimulus and less stress to patient.

Conclusion(s): Intubations using GlideScope videolaryngoscope causes lesser stress response in comparison to intubations with Macintosh laryngoscope or fibreoptic bronchoscope.

References:

19APS-3
Video-assisted laryngoscopy provides better intubation conditions in morbidly obese patients – A comparison of three new video-laryngoscopes
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Background and Goal of Study: Video-laryngoscopes (VL) offer improved viewing of the glottic entrance with integrated optics at the tip of the blade 1-5, to facilitate easier intubations. Many manufacturers are producing scopes with differing specifications, user interfaces and geometry. Especially in extremely obese patients the new VL is of terrific assistance, and we seek to uncover the differences in intubation ease for this most difficult patient population.

Materials and Methods: 90 Patients (BMI > 35 kg/m²) were randomly selected, and placed in three groups. A single group was allocated one of the three VL investigated in the study (McGrath® Series S, Aircraft Medical, UK; Macintosh VL, Karl Storz, Germany; and GlideScope® Verathon Inc., WA, USA). A classic Macintosh blade was first used on the patient, and the anaesthesiologist continued until they were convinced that they could score their best possible view of the glottis. Subsequently, the respective VL was used and the patient intubated. Common pre-anesthesia, thymalometric, Mallampati grade and intra-procedural (Cormack-Lehane grade) metrics of intubation difficulty were measured, as well as intubation time, number of attempts, and subjective difficulty. Kruskal-Wallis was used to test for statistical significance; p<0.05 was assumed significant.

Results and Discussion: All VL tested offered significantly better view of the glottis compared to traditional intubation techniques (p<0.001). The average intubation times were: 32±17s (GlideScope®), 19±9s (Storz) and 48±33s (McGrath®). Each of the blades differed significantly from each other for intubation time (p<0.001). Thymalometric distance (p=0.003), teeth (p=0.003), and video-laryngoscopy (p<0.001) were all statistically significant influences on the satisfaction of the anaesthesiologist in performing the intubation. The VL type was also a significant influence on the number of attempts necessary to intubate the patient (mean attempts: 2.3±1.0 (GlideScope®), 1.3±0.5 (Storz), and 2.8±0.9 (McGrath®)).

Conclusion(s): Video-laryngoscopy in general offers superior viewing of the glottis, which is typically problematic in obese patients.6,9 However, the video-laryngoscopes available on the market differ significantly in their ease of use, even when the visual quality is essentially identical. The user interfaces and geometry of the devices are critical in this regard. It is not sufficient to provide a good view of the glottis, as interface and blade geometry are critical - and seem the remaining bottleneck to optimal laryngoscope design.

19APS-4
Comparison of the Airtraq® and McCoy laryngoscopes for endotracheal intubation
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Background and Goal of Study: The Airtraq® is an anatomically shaped laryngoscope with two separate channels. The optical channel contains a high definition optical system and the guiding channel holds the endotracheal tube. The remaining bottleneck to optimal laryngoscope design.
device. The aim of our study was to compare these devices with respect to laryngoscopic view and the time taken for intubation.

**Materials and Methods:** Following local institutional review board approval, patients who required tracheal intubation for their procedure were approached for inclusion in the study and informed consent was obtained. Patients with raised intracranial pressure, known airway pathology or cervical spine injury and those who required rapid sequence induction were excluded. Information was collected prospectively identifying the operator, patient demographics (age, weight, and height) and airway measurements (Mallampati class, thyromental distance, inter-incisor gap and cervical mobility). Patients were randomly assigned to two groups of 100 patients each. All the patients were connected to standard monitoring devices and they received intravenous induction agents including midazolam 0.01–0.02 mg kg⁻¹, fentanyl 2–3 μg kg⁻¹ and propofol 1–2 mg kg⁻¹. Neuromuscular blockade was achieved using suxamethonium 1–1.5 mg kg⁻¹ or rocuronium 0.6 mg kg⁻¹. The patients were placed in the ‘sniffing’ position with their head on a pillow. The laryngeal view was classified according to Cormack and Lehane. In the McCoy (MC) group the laryngoscopic view was assessed with the blade tip in neutral and elevated positions when needed. The time to intubate (TTI) was measured from the time the instrument entered the patient’s mouth until end-tidal carbon dioxide was detected. Data are expressed as mean ± SD. Statistical analysis was performed using a statistical software program SPSS 13.0 for windows (SPSS Inc.). A P value < 0.05 was considered statistically significant.

**Results and Discussion:** The two groups were similar regarding demographics and airway measurements. Laryngoscopic views obtained with the ATQ were better than with the MC laryngoscope (p = 0.007).

**Conclusion(s):** The Airtraq provided a laryngoscopic view better than that of direct laryngoscopy. It has potential advantages over standard direct laryngoscopy for difficult intubations.

**Disclosure:** The presenter agrees to acknowledge material support from commercial firm for the study related with the topic of the poster.

### 19APS-6

**Comparison of glidescope with the Macintosh laryngoscope for tracheal intubation in patients with simulated cervical spine immobilization**

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**Background and Goal of Study:** The Glidescope is a new video laryngoscope that may be a useful alternative in difficult airway management. The aim of the study was to compare the Cormack and Lehane grade obtained initially with the Glidescope and then with the Glidescope, in patients with simulated cervical spine immobilization.

**Materials and Methods:** After obtaining approval from the hospital ethics committee, 23 patients ASA 1 and 2 with suspected easy intubation, scheduled for elective operation, were included in the study. After rapid sequence induction of anaesthesia, we simulated a difficult airway by providing in-line manual stabilization of the head and neck. Experienced anaesthetists with the Glidescope were instructed in three different methods: 1: Standard malleable stylet with a 90° bend. 2: Modified distal bend Frova single-use intubation introducer (Cook (UK) Limited, Letchworth, Hertfordshire, UK). 3: EndoFlex® (Merlyn Medical, Tuscon, USA).

**Results and Discussion:** 21 patients were successfully intubated, 20 at the first attempt and 1 at the second attempt. The Cormack grading in 13 patients was reduced by one and in 5 patients was reduced by two, when using the Glidescope. 4 patients, grade 1 with Macintosh laryngoscope remained grade 1 with the Glidescope. 1 patient, grade 2 with the Macintosh laryngoscope was reduced by one and in 5 patients was reduced by two, when using the Glidescope. The median (range) time to complete intubation was 74.7±5.42 sec (30–115 sec). Direct laryngoscopy with the Macintosh laryngoscope requires alignment of the oropharyngeal and laryngeal axes to provide a laryngeal view. However, with the Glidescope, that has a 60 degree angle, this alignment isn’t necessary.

**Conclusion(s):** It seems that the Glidescope provides better laryngeal view that the Macintosh laryngoscope, when in line manual stabilization of the head and neck is applied.

### 19APS-7

**Airtraq® to facilitate tracheal intubation in patients with proven difficult laryngoscopy: Time to change our practice?**
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**Background and Goal of Study:** Airtraq® is a disposable optical-laryngoscope that was designed to facilitate intubation in case of difficult airway. In patients with history of difficult intubation, awake fiberoptic intubation (FOI) is considered the gold standard. However, Airtraq® may be a safe and effective technique in some of these patients. We describe 5 patients with proven difficult laryngoscopy who were easily intubated with this device.

**Materials and Methods:** We enrolled selected patients known for difficult intubation and scheduled for elective surgery. None of them had difficult bag-mask ventilation criteria. Tracheal intubation was achieved with the Airtraq®. In all but one patient, intubation was done after preoxygenation and standard anaesthesia induction with Propofol, Fentanyl and Suxamethonium. In case 4 the Airtraq® was inserted awake under local anaesthesia. When visibility of the vocal cords was confirmed, general anaesthesia was administered before intubation. All anaesthesiologists involved were familiar with the use of the Airtraq®.

**Results and Discussion:** Patients’ characteristics and intubation data are shown in the table. All 5 patients were intubated rapidly and safely after the first attempt using the Airtraq®. There was no complication and glottic view was excellent. According to many current airway management guidelines, these patients should have been intubated with FOI. This series illustrates the fact that the Airtraq® can be used as an alternative to FOI in patients with proven difficult airway due to poor direct laryngoscopic view. Compared to FOI, the Airtraq® is easier to use and to learn. Thus when used by trained operators, it can be a safe and effective alternative. However, we would not recommend its use in patients with criteria of difficult ventilation, limited mouth opening, high risk of aspiration or in case of gross deformities of the upper airway.

**Patients characteristics and intubation data**

<table>
<thead>
<tr>
<th>Case</th>
<th>ASA</th>
<th>BMI</th>
<th>Mallampati</th>
<th>Intersinigap</th>
<th>Distance</th>
<th>Thyro-mental</th>
<th>Cormack</th>
<th>Lehane</th>
<th>Cormack Lehane with Airtraq®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>3</td>
<td>II</td>
<td>60</td>
<td>40</td>
<td>60</td>
<td>IV</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 2</td>
<td>II</td>
<td>29.7</td>
<td>45</td>
<td>50</td>
<td>II</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 3</td>
<td>II</td>
<td>31.5</td>
<td>30</td>
<td>60</td>
<td>III</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 4</td>
<td>II</td>
<td>27.3</td>
<td>40</td>
<td>70</td>
<td>III</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 5</td>
<td>II</td>
<td>43.0</td>
<td>35</td>
<td>100</td>
<td>III</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion(s):** Airtraq® and other novel video-laryngoscopes are easy to use and to learn and will likely gain acceptance to secure airways in selected patients with anticipated difficult laryngoscopy. Their role in the various difficult airway algorithms need to be addressed and defined.

### 19APS-8

**Different techniques to improve intubation with Glidescope by novices: A manikin study**
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**Background and Goal of Study:** The Glidescope® Video Laryngoscope (Saturn Biomedical Systems, Burnaby, BC, Canada) is a laryngoscope with a high-resolution camera embedded within the blade and a light source mounted beside the camera for illumination. Its blade bends through 60° at the midline and is 18 mm wide. Many studies have concluded that the Glidescope® improves visualization of vocal cords, although sometimes it may be difficult to pass the endotracheal tube through vocal cords and into the trachea. Our purpose was to evaluate between the different choices already published to improve intubation with the glidescope, which was the better one when used by novices in a manikin.

**Materials and Methods:** A total of 10 novices (90% first year of residency; 40% second year) were recruited during a two months period to participate in the study. None of them have previously used the Glidescope. They were instructed in three different methods: 1: Standard malleable stylet with a 90° bend. 2: Modified distal bend Frova single-use intubation introducer (Cook (UK) Limited, Letchworth, Hertfordshire, UK). 3: EndoFlex® (Merlyn Medical, Tuscon, USA).
They were randomly allocated to use the three methods in different starting order. Time to compro-misation of correct endotracheal intubation (jumps movement) and subjective participants opinion of which was the best method, were collected.

Results and Discussion: Of the 10 participants 70% were females and 30% males. Mean age 28.8 years (SD 4.02; Max 36, Min 25). The mean time for compro-misation of correct intubation was: 1. Standard malleable stylet: mean 63.70 seconds (SD 35.85); Max 162, Min 42; 2. Modified Frova introducer: mean 55.80 seconds (SD 24.38); Max 115, Min 34; 3. Endoflex®: mean 62.80 seconds (SD 29.09; Max 128, Min 38). When comparing the classic standard malleable stylet technic and the others, there were statistical differences between: standard stylet/modified Frova (P 0.045); but neither between standard stylet/Endoflex® (P 0.1947) nor Frova/Endoflex® (P 0.4242). Subjective opinion: 60% of participants chose the modified Frova as the best technique and 40% the Endoflex technique.

Conclusion(s): In our study the use of alternative methods to the classical standard malleable stylet, improve time to achieve intubation with the Glidescope® in novices. The modified Frova introducer technique was the one that obtained fastest time to intubation and better subjective valuation. A large number of participants may be necessary to obtain statistical differences between Frova/Endoflex technique.

19AP5-9
A comparison of tracheal intubation using the McGrath video laryngoscope or the Macintosh laryngoscope in routine airway management: A randomised, controlled clinical trial
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Background and Goal of Study: Failure to intubate the trachea and secure the airway remains a significant cause of morbidity and mortality in anaesthesia. The curved Macintosh laryngoscope remains the gold standard device against which all other airway adjuncts are assessed. However in a limited number of instances the Macintosh laryngoscope does not provide adequate views, a problem that may be overcome by videolaryngoscopes such as the McGrath. The McGrath videolaryngoscope has in case reports assisted in difficult intubations, and has not been shown to prolong the time to intubation. We hypothesised that the McGrath videolaryngoscope would perform comparatively to the Macintosh laryngoscope in the normal airway.

Materials and Methods: Approval from the Hospital Ethics committee and informed patient consent were obtained. 100 ASA grade 1 to 3 patients scheduled for elective surgical procedures requiring tracheal intubation were randomised in a single blind controlled clinical trial. A standardised general anaesthetic was given by one of 4 anaesthetists competent in the use of the McGrath videolaryngoscope. Data was collected by an independent observer. Endpoints were the rate of successful placement of the tracheal tube in the trachea, time to tracheal intubation and the intubation difficulty score. Secondary endpoints included the number of intubation attempts, the number of optimisation manoeuvres required, the severity of dental trauma and the ease of use of each device (visual analogue scale).

Results and Discussion: 50 patients were randomised to each group. There were no significant differences in patient demographics or airway characteristics. All patients in the Macintosh group were successfully intubated at the first attempt. The number of intubation attempts, time to intubation and use of a bougie in the McGrath group. Additionally the Intubation Difficulty Score (IDS) was higher. However a superior glottic view was provided, and the differences between the groups was less marked as the Cormac Lehan grade increased. Tracheal intubation with the McGrath resulted in greater alterations in heart rate, but a lower VAS score.

Conclusion(s): The McGrath laryngoscope is a useful adjunct in the airway management of non-complex patients, and provides a superior view to the Macintosh blade. However this does not translate to improved rates of intubation, and a bougie is more frequently required. Further study is required to assess the use of the McGrath videolaryngoscope in patients with predicted difficult airways.

19AP6-10
Comparison of the airway scope, Airtraq and Macintosh laryngoscopes in simulated difficult tracheal intubation: A manikin study
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Background and Goal of Study: Tracheal intubation is difficult in 1-4% of patients who have seemingly normal airways (1). Two recently introduced laryngoscopes, the Airway Scope (AWS-100, Pentax, Japan) and the Airtraq laryngoscope (Prodol Meditec, Spain), may be beneficial in the management of difficult intubation (2,3). In addition, a camera and screen attachment have become available to use with the Airtraq laryngoscope. However, these devices have not been compared with each other with regards to ability to aid difficult intubation. We compared the performance of the Airway Scope, Airtraq, Airtraq with camera (Airtraq Cam) and Macintosh laryngoscopes in the management of simulated difficult intubation.

Materials and Methods: Forty-eight anaesthetists were invited to take part. After standardised practice (demonstration and two practice intubations), anaesthetists were asked to intubate the trachea of a manikin set to simulate a grade 3 laryngeal view using each of the four laryngoscopes presented in a randomised order. A tracheal tube introducer (Frova, Cook Ltd) was used with the Macintosh laryngoscope. We recorded time to tracheal intubation (Trach Intu), success rate (Intubation within 120 s), dental trauma as indicated by the presence of dental clicks and ease of use (visual analogue score: 0 mm extremely easy, 100 mm extremely difficult). The Cochran test was used to analyse categorical data and ANOVA to analyse interval scale data.

Results and Discussion: Anaesthetists using the Airway Scope were faster and more successful in achieving tracheal intubation, produced significantly fewer episodes of dental clicks and perceived the Airway Scope to be easier than the Airtraq or Airtraq Cam.

Performance of the four laryngoscopes in simulated difficult intubation. Values are mean (SD) and percentage

<table>
<thead>
<tr>
<th>Laryngoscope</th>
<th>Trach Intu (s)</th>
<th>Success (%)</th>
<th>Dental clicks (%)</th>
<th>Ease of use (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway Scope</td>
<td>24(15)</td>
<td>95%</td>
<td>65%</td>
<td>90(20)</td>
</tr>
<tr>
<td>Airtraq</td>
<td>33(21)</td>
<td>95%</td>
<td>70%</td>
<td>60(15)</td>
</tr>
<tr>
<td>Airtraq Cam</td>
<td>30(25)</td>
<td>90%</td>
<td>70%</td>
<td>65(20)</td>
</tr>
<tr>
<td>Airway Scope Cam</td>
<td>13(6)</td>
<td>100%</td>
<td>0%</td>
<td>50(10)</td>
</tr>
</tbody>
</table>

Conclusion(s): In a simulated grade 3 laryngeal view, the Airway Scope appears to have several advantages over the Airtraq, Airtraq Cam and Macintosh laryngoscopes as it enables faster and more successful tracheal intubation and has lower potential for dental trauma.

References:

19AP6-1
Double fiberoptic technique for intubation
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Background and Goal of Study: Fiberoptic intubation has been advocated as a safe technique for airway management because the operator has real time control under direct vision. Advancement of the endotracheal tube (ETT) is a blind maneuver frequently complicated by blockage of the ETT, laryngeal trauma, and failed intubation. The authors identified a new fiberoptic technique using a second fiberoptic scope to visualize the entire procedure. This study was designed to compare the ease of double fiberoptic technique versus classic technique with one fiberoptic.

Materials and Methods: 50 adult patients aged 20-50 years, scheduled to undergo elective surgeries under general anesthesia, were included in this study. Post induction, 25 patients were orally intubated using one-scope technique versus 25 patients intubated with double-scope technique, recording the movement and the timing of the ETT placement. Storz fiberoptic tower was used, with two fiberoptic scopes, one for adults (FO1), the other for pediatric cases (FO2). After induction, FO1 is placed with the tip above carina then disconnected from the monitor with immediate reconnection of FO2. FO2 is advanced in parallel with FO1 through a special designed side port of intubating oral airway made of cut ETT no. 4.5. Then, the ETT is slid under direct vision (figure 1).
19AP6-2

Evaluation of the Glidescope®, the McGrath® and the Airtraq® laryngoscopes in simulated difficult airways: A randomized controlled comparison

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Department of Anaesthesiology, Pharmacology and Intensive Care, University Hospitals of Geneva, Geneva, Switzerland

Background and Goal of Study: Difficult direct laryngoscopy has an incidence of 1.5 to 8.5% and is associated with intubation difficulties, mortality, and mortality [1]. Several new video and optical laryngoscopes may help in these situations. However, few studies have assessed their relative efficacy. Using a manikin, we compared the Glidescope® (GVL), the McGrath® (MGL) and the Airtraq® (AOL) laryngoscopes in 3 different airway scenarios.

Materials and Methods: After IRB approval, 52 anaesthetists (21 staff, 17 residents, and 14 nurses) participated in this randomized study. All subjects were experienced with the MI but novice with the other devices. They intubated the Laerdal SimMan® (with normal airway setting) 5 times in a row with all 4 laryngoscopes. The sequence of use of the GVL, MGL and AOL was randomized. Before using a device, a didactic presentation and a demonstration were provided. Outcome measures were: time to intubate (TTI), Modified Cormack-Lehane grades (MCL) and failure rate. Wilcoxon signed rank and McNemar tests were used as appropriate.

Results and Discussion: The Figure summarizes mean TTI. In scenario 1 and 2, MI and AOL did not differ. Both were faster than MGL and GVL (p < 0.05). MGL and GVL did not differ. In scenario 3, TTI were highly different (all p < 0.001); Intubation was the fastest with AOL and the slowest with MI. In this scenario, intubation failures occurred with the MI (29%; p < 0.001), the GVL (2%) and the AOL (2%) (p=NS).

19AP6-3

Learning curves for the Glidescope®, the McGrath® and the Airtraq® laryngoscopes in “normal airways”: A manikin study

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Department of Anaesthesiology, Pharmacology and Intensive Care, University Hospitals of Geneva, Geneva, Switzerland

Background and Goal of Study: Video and optical laryngoscopes can facilitate intubation in case of difficult direct laryngoscopy. Several devices have been developed but few have been compared in terms of their learning curves, efficacy, and usability. Using a manikin with “normal airways” we compared the Glidescope® (GVL), the McGrath® (MGL) and the Airtraq® (AOL) laryngoscopes to the Macintosh blade (MI).

Materials and Methods: After IRB approval, 52 anaesthesiologists (21 staff, 17 residents, and 14 nurses) participated in this randomized study. All subjects were experienced with the MI but novice with the other devices. They intubated the Laerdal SimMan® (with normal airway setting) 5 times in a row with all 4 laryngoscopes. The sequence of use of the GVL, MGL and AOL was randomized. Before using a device, a didactic presentation and a demonstration were provided. Outcome measures were: time to intubate (TTI), Modified Cormack-Lehane grades and difficulty of use (0 easy to 100 difficult). Data were analysed using the Friedman (overall) and the Wilcoxon signed rank (post-hoc) tests as appropriate.

Results and Discussion: Mean TTI for each device and each attempt are displayed in the Figure. The AOL had the most favourable learning curve and mirrored the MI after 2 attempts. The GVL and MGL had steep learning curves but after 5 attempts differences persisted in TTI when compared to the MI and the AOL.

19AP6-4

Heart rate variability changes during tracheal intubation are not different with the use of laryngoscope or lightwand: An analysis using time-frequency method

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Background and Goal of Study: Tracheal intubation with laryngoscope or lightwand is a common anesthetic practice. It is interesting to investigate the autonomic responses elicited by these methods. Heart rate variability (HRV) can reflect autonomic regulation better than hemodynamic parameters. We used time-frequency analysis, which is suitable for rapid changing signals, to measure HRV and compared the effect of the two intubulation methods.

Materials and Methods: ECG was recorded in patients for operations with general anesthesia and tracheal intubation. The method of intubation was chosen arbitrarily by the anesthesiologist in charge. Anesthesia was induced with routine thiopental-muscle relaxant regimen. Cases with systemic disease or diffi-
cult intubation were excluded. Power spectra of HRV were generated per 2 sec-
onds by time-frequency method. The average low frequency (LF, 0.04-0.15Hz) and high frequency (HF, 0.15-0.4Hz) power during 30 seconds before intuba-
tion (PRE) and 2 consecutive 30 seconds periods after intubation (POST1 and POST2) were calculated. Two way repeated measures ANOVA was performed using software SigmaStat 3.0.

Results and Discussion: 56 patients with 21 lightwand and 40 laryngoscopic
intubation (MF=22/34, age 20-65) were included. Table 1 showed the power data. There was no difference between the two groups, although the POST1
value of LF and HF power were higher than PRE value within both groups. The
POST2 power decreased to the same level as PRE values. The stimulation of
intubation through larynx was the most noxious in both methods, thus it was
reasonable that the autonomic responses were similar. Both sympathetic and
parasympathetic systems (measured by LF and HF power) were activated. The
response occurred within 30 seconds after intubation, and subsided rapidly.
This justified the use of time-frequency analysis.

Table 1. Power of HRV

<table>
<thead>
<tr>
<th></th>
<th>Lyangoscope</th>
<th>Lighwand</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF-PRE</td>
<td>3251.0</td>
<td>3833.0</td>
</tr>
<tr>
<td>LF-POST1</td>
<td>3072.3</td>
<td>3917.0</td>
</tr>
<tr>
<td>LF-POST2</td>
<td>641.7</td>
<td>860.9</td>
</tr>
<tr>
<td>HF-PRE</td>
<td>728.7</td>
<td>703.0</td>
</tr>
<tr>
<td>HF-POST1</td>
<td>1356.8*</td>
<td>1284.2*</td>
</tr>
<tr>
<td>HF-POST2</td>
<td>860.4</td>
<td>884.6</td>
</tr>
<tr>
<td>HF-SEM</td>
<td>148.2</td>
<td>196.8</td>
</tr>
</tbody>
</table>

The units are μz2. Differences from PRE and POST values within the same group (p<0.001). No statistical difference between two groups (p=0.9).

Conclusion(s): Both LF and HF power of HRV increased after tracheal intuba-
tion, but the response showed no difference between laryngoscope and light-
wand method.

19AP6-5

Body mass index is an independent risk factor for difficult tracheal intubation in 91,332 consecutive patients from the Danish Anaesthesia Database
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University Hospital, Copenhagen, Denmark

Background and Goal of Study: Previous studies have failed to detect or re-
ject body mass index (BMI, kg/m2) as a risk factor for difficult tracheal intubation (DTI) due to lack of power. The Danish Anaesthesia Database (DAD) have reg-
istered anaesthesia management of 380,000 patients. We investigated whether
BMI is an independent risk factor for DTI in patients scheduled for direct laryn-
goscopy.

Materials and Methods: 91,332 consecutive patients planned for intubation with direct laryngoscopy recorded in DAD between January 2005 and October
2007. Age, sex, ASA score, priority, history of previous intubation score (1-4),
Mallampati score (I-IV), and BMI were retrieved. A multiple logistic regression
analysis was performed with BMI as a categorical covariate. Reference: BMI <
25; overweight: BMI ≥ 25; obesity: BMI ≥ 35.

Results and Discussion: The prevalence of DTI was 5.2% (5.0 - 5.3%). In
univariate analyses, age, sex, priority, previous intubation score >1, Mallampati
score > II, overweight, and obesity were all statistically significant risk factors for
DTI. The odds ratios (OR) for DTI was 1.42 (1.27 - 1.60, P < 0.0001) for obese
patients and 1.25 (1.17 - 1.32, P < 0.0001) for overweight patients. Corrected
for other significant covariates obesity remained a significant risk factor with an
OR of 1.30 (1.14 - 1.47, P < 0.0001). The OR for significant covariates in the
multivariate model are:

<table>
<thead>
<tr>
<th>BMI=35</th>
<th>BMI=35</th>
<th>OR</th>
<th>1.30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Male</td>
<td>Priority</td>
<td>Previous intubation Scoro-1</td>
</tr>
<tr>
<td>1.12</td>
<td>1.01</td>
<td>1.35</td>
<td>1.52</td>
</tr>
</tbody>
</table>

However, the accuracy of stand alone BMI tests calculated as:

BMI dichotomous diagnostic tests (%)

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PVPOS</th>
<th>PVNEG</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &lt; 25</td>
<td>75</td>
<td>94.2</td>
<td>6.4</td>
<td>94.9</td>
</tr>
<tr>
<td>BMI ≥ 25</td>
<td>53.6</td>
<td>52.3</td>
<td>5.7</td>
<td>56.4</td>
</tr>
</tbody>
</table>

revealed limited clinical value due to a sensitivity of 7.5% (7.3 - 7.7%) and a
predictive value of a positive test of 6.4% (6.3 - 6.6%). These results support
that obesity contributes to the risk of DTI. Additionally, they underline the finding
of BMI as a risk factor. As a dichotomus screening test, however, BMI performs
poorly.

Conclusion(s): In a large cohort, overweight and obesity, with increasing OR,
are independent risk factors for difficult intubation. But, alone they cannot iden-
tify patients at risk. Including BMI in multifactorial risk indices may improve pre-
diction of difficult tracheal intubation in daily anaesthesia practice.

Acknowledgements: We thank the Danish anaesthesia departments con-
tributing to the DAD.

19AP6-6

Do novice intubators find video laryngoscopy helpful?
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United Kingdom

Background and Goal of Study: Training in tracheal intubation is reported
to be easier if video is used as it enables the trainer to guide the student
directly1. Video laryngoscopy has been reported to improve the view by magni-
fying anatomical structures and providing a wider angle image2,3. But how does
the video laryngoscope (VL) compare with the standard laryngoscope (SL) in
the hands of novice intubators?

Materials and Methods: We conducted a randomised crossover study of 67
volunteers with minimal prior airway experience. Volunteers were randomised to
which laryngoscope was used first. They were given a single demonstration with
each device and asked to intubate an adult airway manikin. Successful intuba-
tion was defined as correct placement of the tracheal tube within a maximum of
three attempts, each attempt lasting no more than thirty seconds. We recorded
the number of attempts to intubate, the total time from removal of face mask
to intubation of the trachea and failure to intubate after three attempts. A visual
analog scale (VAS) was used to assess volunteer’s subjective impression of
the ease of using each device.

Results and Discussion: The intubation success rate using the VL was 95% (n =
64) compared with 89% (n = 60) using the SL. The VL was regarded by the
volunteers as significantly easier to use (P = 0.003). The number of tooth “clicks”
(P = 0.168), attempts to intubate (P = 0.329) and the total time to intubation (P =
0.999) did not differ significantly (see table below).

Comparison of intubation using VL and SL

<table>
<thead>
<tr>
<th></th>
<th>No. of attempts to intubate (N=12)</th>
<th>Time to intubation in sec (median)</th>
<th>Visual analogue scale mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL</td>
<td>1 (1.1)</td>
<td>39 (12-195)</td>
<td>3.8± (1.2)</td>
</tr>
<tr>
<td>SL</td>
<td>2 (1.2)</td>
<td>35 (20-93)</td>
<td>5.0± (2.1)</td>
</tr>
</tbody>
</table>

Conclusion(s): This study shows that, even in the absence of direct instruction,
novice intubators achieved comparable outcomes when using the VL or SL.
Furthermore, the VL is reported to be a significantly easier device to use. The
VL appears to be a useful teaching tool for novice intubators in the acquisition
of intubation skills but further research is needed to assess its effectiveness within
the clinical setting.

References:
1 Shulman GB, Nordin NG, Connelly NR. Anesthesiology 2003; 98: 615-620.

19AP6-7

A survey of airway management of patients with a risk of aspiration
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Background and Goal of Study: A spectrum of patients with varying degree
of heartburn and acid reflux are commonly encountered in anaesthetic practice.
It is common knowledge that these patients are at increased risk of pulmonary
aspiration of gastric contents. However no clear guidelines with respect to their
management currently exist. It is important to consider these patients as a group
of patients who need careful anaesthetic evaluation and management.

Materials and Methods: A questionnaire was prepared describing ten clinical
situations in which patients had varying risk of aspiration and anaesthetists were

asked to choose their preferred mode of airway management from a choice of six commonly used techniques. The survey was sent online to all anaesthetic Consultants and trainees in Wales using a web based software- surveymeth- ods. Reminders were sent to non-responders after two weeks. Responses were anonymous.

Results and Discussion: The survey was sent to 245 Consultants (C) and 176 trainees (T). The numbers responding were -86 Consultants (35%) and 87 trainees (49%). The responses to three of the ten clinical situations are shown in Table 1.

<table>
<thead>
<tr>
<th>Airway Management</th>
<th>Grade</th>
<th>Heartburn</th>
<th>Acid in the mouth</th>
<th>Obese patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSI C</td>
<td>14 (17)</td>
<td>47 (57)</td>
<td>7 (9)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>22 (25)</td>
<td>71 (82)</td>
<td>4 (5)</td>
<td></td>
</tr>
<tr>
<td>mRSI C</td>
<td>20 (24)</td>
<td>25 (30)</td>
<td>5 (6)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>13 (15)</td>
<td>16 (18)</td>
<td>4 (5)</td>
<td></td>
</tr>
<tr>
<td>ETT C</td>
<td>15 (18)</td>
<td>7 (9)</td>
<td>36 (44)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>23 (26)</td>
<td>0</td>
<td>48 (57)</td>
<td></td>
</tr>
<tr>
<td>LMA C</td>
<td>14 (17)</td>
<td>2 (2)</td>
<td>8 (10)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>17 (20)</td>
<td>0</td>
<td>17 (20)</td>
<td></td>
</tr>
<tr>
<td>pLMA C</td>
<td>21 (25)</td>
<td>2 (2)</td>
<td>25 (31)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>12 (14)</td>
<td>0</td>
<td>11 (13)</td>
<td></td>
</tr>
</tbody>
</table>

Described as Number of responses (percentage).

Abbreviations- RSI- Rapid sequence induction, mRSI- modified rapid sequence induction (without suxamethonium). ETT- endotracheal intubation. LMA- classical laryngeal mask airway, pLMA- proseal LMA. These results show that there is a wide variation in practices- with trainees using RSI more liberally and consultants using proseal LMA's more often – a pointer to the fact that some decisions are based on experience and also comfort with equipment.

Conclusion(s): With the results of this survey we make a case for a guideline to be established based on evidence and common sense approach which can clearly define the problem of gastro-oesophageal reflux and the airway manage- ment of these patients.

References:

19AP6-8
Strategy for extubation of the difficult airway: A protocol and table of airway devices
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Anesthesiology and Critical Care, Hospital G.U. Marina Alta, Denia, Alicante, Spain

Background and Goal of Study: Intubation algorithms for patients with diffi- cult airways (DA) and extubation guidelines in ICU patients exist (1). Extubation of patients with difficult airways is less standardized despite many complications reported after extubation (2, 3). We created an extubation protocol in patients with a known difficult airway consisting of an airway device table used to bridge extubation. We present our experience with this protocol and table for extubat- ing patients with difficult airways.

Materials and Methods: We created a table for extubation of the difficult air- way divided into 4 quadrants according to function (see Figure 1). By mov- ing clockwise, the four quadrants are: 1) oral and nasal airways, LMA’s to im- proving oxygenation and ventilation; 2) airway exchange catheters, stylets, and guidewires to delay extubation or assist in re-intubation; 3) FBB and Bonfils to visualize glottis; 4) oroclothyrotomy kit and TTJIV for surgical access.

Results and Discussion: We used the algorithm and table for extubation in 4 patients (see Table 1). No patients experienced any complications and the mean time to extubation was 58 (range of 30, 90) minutes.

<table>
<thead>
<tr>
<th>Case Age</th>
<th>Weight (kg)</th>
<th>Sex</th>
<th>Diagnosis</th>
<th>Surgery</th>
<th>Intubation Devices</th>
<th>Extubation Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>72</td>
<td>75</td>
<td>Male</td>
<td>Prostate cancer</td>
<td>Radical prostatectomy</td>
<td>Airtraq</td>
</tr>
<tr>
<td>2</td>
<td>68</td>
<td>60</td>
<td>Female</td>
<td>Acute abdomen</td>
<td>Exploratory laparotomy</td>
<td>FBB nasal CAEC</td>
</tr>
<tr>
<td>3</td>
<td>65</td>
<td>70</td>
<td>Male</td>
<td>Dysphonia</td>
<td>Microsuspension laryngoscopy</td>
<td>FBB oral CAEC</td>
</tr>
<tr>
<td>4</td>
<td>75</td>
<td>68</td>
<td>Male</td>
<td>Vocal cord nodule</td>
<td>Microsuspension laryngoscopy</td>
<td>Airtraq CAEC</td>
</tr>
</tbody>
</table>

19AP6-9
Monitoring tracheal tube cuff pressures in the operating room: Is digital palpation enough?
O. Valencia, V. López, R. López-Vicente
Anesthesiology, Hospital 12 de Octubre, Madrid, Spain

Background and Goal of Study: An overinflated cuff (pressure cuff >30 cmH2O) may cause ischemic damage of the tracheal mucosa (stenosis and tracheo-oesophageal fistula). On the other hand, an underinflated cuff (cuff <20 cmH2O) may produce leaks, and is independent risk factor for ventilator-associated pneumonia. The goal of our study was to assess the inci- dence of endotracheal tube miss inflated in the operation room, and whether classical evaluation by digital palpation of pilot balloon was enough to secure the appropriate cuff pressure.

Materials and Methods: We performed an observational prospective study. After general anesthesia was induced, endotracheal tube achieved, patient con- nected to mechanical ventilation and stabilized, an independent observer mea- sured endotracheal tube cuff pressure with a manometer (Portex, Smith Medical Inc, London, UK) at the end of expiratory phase. At the same visit the anes- thesiologist was asked to determine by digital palpation whether a Portex 7.5 endotracheal tube was appropriate, over or underinflated in three cases: a cuff pressure of 15 cmH2O (underinflated), 25 cmH2O (appropriate) and 40 cmH2O (overinflated), on a self-made PVC trachea.

Results and Discussion: A total of 24 patients were collected during a two months period. Sex: female 66.7% (16/24), age (mean 54.45 years; Max 85, Min 22), weight (mean 72.25 kg; Max 133, Min 48), Height (mean 161 cm; Max 178, Min 137), Length of surgery was 146.66 minutes mean (Max 330, Min 65). In 37.50% (8/24) N2O was used. A Portex blue-line cuffend endotracheal tube was used in 62.50%. Endotracheal tube number 7.5 was used in 33.33% (8/24), 79.17% (19/24) of endotracheal tube cuffs were overinflated, and just 16,67%(4/24) were appropriate inflated. There were no statistical differences in endotracheal tube cuff pressures depending on factors such as: sex, weight, height, type of tube, number of tube, use of N2O or length of intubation. A total of 26 anesthesiologist were recruited to face the three simulated assump- tions: sex: female 60,71% (16/28), years of experience mean 11,64 (Max 38, Min 11), 28,57% (8/28) missed the underinflated case, 42,86% (12/28) missed the normal one, and 67,86% (19/29) missed the overinflated case. No statys- tical differences were found depending on sex or years of participants’ experi- ence.

Conclusion(s): The large proportion (79%) of overinflated endotracheal tube cuffs and the lack of success in determination of overinflated cuffs (87%) by digital palpation, makes necessary the measure of endotracheal tube cuff pressure by a manometer.

19AP6-10
Anaesthesia residents’ proficiency in difficult airway management
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Department of Anaesthesia and Intensive Care, Copenhagen University Hospital, Gentofte, Copenhagen, Denmark

Background and Goal of Study: Proficiency in Difficult Airway Management,
Airway management

19AP7-1
The Airway Scope, a new video laryngoscope: Its use in 15 patients with difficult airways

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Anaesthesia, National University of Singapore, Singapore, Singapore

Background and Goal of Study: The Airway Scope AWS-S100 (Pentax, Tokyo, Japan) is a new video laryngoscope that enables laryngoscopy without alignment of the oral, pharyngeal and laryngeal axes. We evaluated the Airway Scope specifically in patients with difficult airways.

Materials and Methods: We obtained PEB approval for this work. The Airway Scope handle has a 6 cm LCD screen, and a flexible image tube with camera and LED light source mounted at the tip. The disposable polycarbonate PBlade completely encloses and protects the image tube, and has a groove to hold and guide the insertion of the tracheal tube and a separate channel for a suction catheter. We recorded the type of airway difficulty and the success rates of laryngoscopy and tracheal intubation.

Results and Discussion: There were 13 male and 2 female patients with age 54.9 (sd 21.7) and BMI 25.2 (sd 5.4). With 8 patients, we had anticipated difficulty and planned use of the Airway Scope: 3 with cervical spine pathology, 2 with cervical spine trauma, and 2 with histories of difficult intubation. Patients with cervical spine problems all had manual inline stabilization, and two had awake intubation. With 7 patients, we had unexpected failures using Macintosh laryngoscopes and then used the Airway Scope as a rescue device, including two patients who had intubation with double lumen tubes. Full views of the larynx were achieved in all patients and intubation was successful at the first attempt within 60 seconds in all patients. We found high success rates of laryngoscopy and intubation with the Airway Scope in a variety of difficult airway situations. With the PBlade, we could easily guide the tracheal tube, or a bougie over which a double lumen tube was then railroaded under vision. This is an advantage compared to other videoscopes such as the GlideScope with which intubation is frequently difficult despite good views. The Airway Scope is also lightweight, powered by ordinary AA alkaline batteries, water resistant and completely portable.

Conclusion(s): Although our experience is limited, our results suggest that the Airway Scope is a promising device for difficult airway management.

References:

19AP7-2
Attenuation of haemodynamic responses to tracheal intubation by the Airway Scope®

Y. Koyama, M. Nishihama, G. Inagawa, Y. Kamiya, T. Goto
Department of Anesthesiology, Saiseikai Yokohama-shi Nanbu Hospital, Yokohama, Japan

Background and Goal of Study: The Airway Scope® (AWS, Pentax, Tokyo, Japan) is a new video laryngoscope for tracheal intubation. Because the AWS does not require linear alignment of the oral, pharyngeal, and tracheal axes, we tested the hypothesis that the AWS would be associated with less hemodynamic responses to tracheal intubation than the conventional laryngoscope.

Materials and Methods: After institutional approval and written informed consent, 46 normotensive patients undergoing elective surgery were randomly assigned to receive tracheal intubation either with the AWS (n=23) or the Macintosh laryngoscope (n=23). Anaesthesia was induced with IV 2 mcg/kg fentanyl, followed by 1.5 mg/kg propofol 2 min later. Vecuronium, 0.15 mg/kg, was given after loss of consciousness. Mask ventilation with 1% sevoflurane in oxygen was continued until the train-of-four response completely disappeared.

Then, tracheal intubation was performed. The blood pressure and heart rate were recorded at the following times: a) before administration of anaesthetics...
The Airway Scope used in this study was provided by Pentax, Tokyo, Japan, with no charge.

**Results and Discussion:** The Macintosh laryngoscope produced significantly greater changes in the systolic blood pressure (SBP) (ΔP) from the baseline from the time point of "at intubation" to "4 min after intubation" than did the AWS group (p < 0.05, Figure 1). The heart rate (HR) change was also greater with the Macintosh laryngoscope at intubation (p < 0.01, Figure 2). All values in these figures are expressed as mean ± SD.

**Conclusion(s):** The AWS causes less haemodynamic responses to tracheal intubation than does conventional Macintosh laryngoscope. Therefore, the AWS may be valuable when haemodynamics disturbances should be limited.

**Disclosure:** The Airway Scope used in this study was provided by Pentax, Tokyo, Japan, with no charge.

**19AP7-3**

**A comparison of the quality of intubation conditions in 300 patients using three video-laryngoscopes**

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Anesthesiology, ICU & Pain Therapy, Catharina Hospital, Eindhoven, Netherlands

**Background and Goal of Study:** Video-laryngoscopes (VL) offer improved viewing of the glottic entrance to facilitate easier intubations, which is not entirely irrefutable. Many manufacturers are producing VL with differing specifications, user interfaces and geometry, however, the relative performance of the different models is unknown.

**Materials and Methods:** 390 patients (BMI < 35) were randomly selected to one of three VL studied ( McGrath® Series 5, Aircraft Medical, UK; Macintosh VL, Karl Storz, Germany; and GlideScope®, Valhalla Inc., USA). A classic Macintosh blade was first used on the patient, and the anesthesiologist continued to practice until they decided that they could score the best possible view of the glottis. For each patient, the VL used was the same pre- (BMI, thyromental distance, Mallampati grade) and intra-procedural ( Cormack-Lehane grade) metrics of intubation difficulty were measured, as well as intubation time, number of attempts, and subjective difficulty.

**Results and Discussion:** All VL tested offered significantly better view of the glottis compared to traditional intubation techniques (p<0.001). Mean intubation times: 34±20s ( GlideScope®), 20±12s (Storz), and 38±23s ( McGrath®). Only using the Storz VL was a significantly faster intubation achieved than with the other two blades (p<0.001). Age, ASA grade, dentition, and the blade type were all significant predictors of the number of attempts required for intubating the patient. Additionally, the same metrics were all strong predictors of the overall satisfaction score of the anesthesiologist - with the, surprising, addition of gender. The overall satisfaction scores for men were slightly better, though not clinically relevant. Of especial interest, the Mallampati grades for the patient were NOT predictive of the intubation time, attempts, or overall satisfaction grade.

**Conclusion(s):** Video-laryngoscopy offers superior viewing of the glottis over classical approaches, rendering such a common metric of pre-procedural intubation difficulty - the Mallampati grade - completely redundant. The VL available on the market differ significantly in their ease of use, even when the visual quality is essentially identical. Macro data as an indication of the intubation difficulty using the VL seems clinically spurious. Therefore blade geometry must be critical and seem to remain the bottleneck to optimal laryngoscope design.

*References:*
longer than that of the AWS group (P<0.001). We have excluded patients with limitation in mouth-opening from this study. If they were included, however, the result might have been different.

Conclusion(s): The use of an AWS resulted in a higher success rate in shorter time than that of a FG in inexperienced trainees.

References:

19AP7-6
New introducer for the true view EVO2 laryngoscope.
A preliminary study
F. Maches, A. Lopez, S. Galindo
Anesthesiology, Hospital Madrid Montepincipio, Boadilla del Monte, Spain

Background and Goal of Study: Video laryngoscopes enable indirect vision of the larynx, improving in some cases, the Cormack and Lehane grading during laryngoscopy. However, an introducer may be required to guide the tracheal tube through the vocal cords. Our aim was to compare the time taken to obtain a laryngoscopic view with the True View EVO2 (TEL, Truphatek, Israel) with the Macintosh video-laryngoscope (MVL, Karl Storz Endoscopy, Tuttinglen, Germany). A new articulated introducer Truflex (TFX, Truphatek, Israel) was used to guide the tracheal tube with the True View Laryngoscope, assessing its efficacy by recording the time taken at each tracheal intubation.

Materials and Methods: Prospective study of 20 adult patients ASA I and II, scheduled for elective surgery requiring general anesthesia and tracheal intubation. The study was carried by anesthesiologists with more than ten years of experience. In the operating room standard monitoring was established. The anesthesia was induced with ketamin and diazepam, followed by maintenance with isoflurane. Intubation with a single lumen tube (8mm) was facilitated with pancuronium and the animals were mechanically ventilated with 45% O2/air. The bronchial blocker (Twinblocker®, figure 1) was introduced and observed using fiberoptic bronchoscopy. The position of the tube, the moment of separation of the lungs and the position of the inflated balloons were recorded.

Results and Discussion: In 6 of the animals proper position of the new device was achieved at the first attempt. The other took several attempts. Sequential lung isolation after inflating one of the cuffs proved possible in all animals. During the observation period the blocker remained in the proper position. As experience improved introduction and positioning became easier.

Conclusion(s): Lung isolation with this novel blocker device, with two cuffed tips, proved feasible. In this animal model the right position of the distal tips in both mainstem bronchi was easily achieved. Dislocation of the tips was not observed during the study periods. This device seems a promising new tool for lung isolation. Further studies are warranted to demonstrate the overall safety and efficacy of this technique.

Disclosure: Part of this study was supported by an unrestricted grant from Anaesthetic, Rotterdam, The Netherlands.

19AP8-1
Endotracheal intubation and alternative airway management devices in healthcare professionals
B. Wahlen, P. Mayr, N. Roewer
Department of Anaesthesiology, Julius Maximilians University Hospital, Wuerzburg, Germany

Background and Goal of Study: Management of the difficult airway is one of the major challenges in anesthesia and emergency medicine. Direct laryngoscopic tracheal intubation is taught to many healthcare professionals, but a difficult skill to acquire and maintain. Therefore we investigate the degree of difficulty in the use of and the practicability of different airway management devices by disparate healthcare professionals.

Materials and Methods: Each 25 anaesthetists, non-anaesthesiological medical, anaesthesia-nurses, nurses and paramedics were instructed in using LMA™, PLMA™, LMA-Fastrach™, CT™, LT™ as well as in performing laryngoscopic tracheal intubation. After a 20 min. demonstration the participants were asked to use each of the devices three times in a randomized order. The rate of, and time to, successful insertion of the device as well as the subjective degree of difficulty were recorded.

Results and Discussion: In all study groups statistically significant learning curves could be observed in the use of CT™, LMA-Fastrach™ and endotracheal intubation. None of the groups displayed a significant learning curve in utilization of LMA™, PLMA™ or LT™ from the first to third attempt. Anaesthetists performed endotracheal intubation significantly quicker (3rd attempt: 19.1±2.6) in all attempts than all other healthcare professionals (< 0.05). Using the LMA-Fastrach™ anaesthetists intubated more rapidly than all other groups (p < 0.05). Anaesthesia nurses were statistically significant faster in all three attempts (3rd attempt: 40.5±7.7) in the use of LMA-Fastrach™ than nurses (3rd attempt: 54.6±9.0), paramedics (3rd attempt: 57.4±9.1) and medicals (3rd attempt: 55.2±8.3) (p < 0.05). Using the LMA®, PLMA™, LTM and CT™ no statistical significance between the study groups could be observed concerning the insertion times. Even though alternatives to endotracheal intubation have been developed, the present trial indicates that they can only be used to some extend, without extensive training. Especially in case of emergency, time to secure the airway and protection against aspiration have to be taken into consideration. With regard to this, LMA™, PLMA™ and LT™ seem to be beneficial.
Background and Goal of Study: Tracheal intubation (TI) has been traditionally used in airway management for prolonged anesthesia for two reasons: facilitation of positive pressure ventilation and protection of the airway due to increased aspiration risk with time. The LMA ProSeal (PLMA) with its unique antispasmodic strategy2 seems to be an ideal airway protection in prolonged anesthesia.

Materials and Methods: Adult female patients undergoing breast replacement and one stage microsurgical reconstruction using abdominal wall tissue free flaps were studied. Anesthesia was induced with midazolam, suxamethonium and propofol and maintained with isoflurane, suxamethonium, atracurium. PCV, FGF 02/AIR 300 ml/min was maintained during anesthesia.

Results and Discussion: The PLMA was successfully used in all cases (n=46; age median 43.5 (27 – 64) years; BMI: median 24.4 (18-34). Midline approach or introducer tool placement – 1st in 69.4%. Bougie guided technique (PLAN B) was used in 2nd (13%) and 3rd (2.1%) attempts; PLMA No. 4 (88%) and No.3 (12%) were used to obtain clear airway. PLMA cuff pressure 35-50 cm H2O. Oropharyngeal leak pressure: median 30 cmH2O (23-35). Gastric tube was inserted using ProSeal gastric drain tube (first attempt success rate 98.54%); gastric content in the end of anesthesia: 0 ml in 20 patients (43.4%), 26 patients (56.6%) median: 8.5 ml [max:42 ml]. min 6 ml ventilation time with PLMA; median 478 (362-689) min. There was no perioperative regurgitation or aspiration. Smooth emergence with PLMA: removal in OR in only 8.6% cases; 91.4% in PACU (Post-Anesthesia Care Unit) – 83.3% removal by trained nurse and 16.7% by patient. PLMA cuffs were observed after use and in all cases internal and external parts were clean. There were no major postoperative complications or morbidity, mild sore throat was reported by 8.6% patients.

Conclusion(s): PLMA is a suitable and safe alternative to TI in prolonged anesthesia. According to our experience there is no increase in aspiration risk with prolonged ventilation time. PLMA increases the operation case turnover thanks to safe removal in awake patients in PACU.

References:

19AP8-4
Efficacy of the new supraglottic airway (i-gel®) as a ventilatory device. Preliminary data
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Background and Goal of Study: The i-gel airway is a new supraglottic airway that uses an anatomically designed non-inflatable mask made of a gel-like thermoplastic elastomer. The aim of the study was to evaluate the efficacy of the gel-gel as a ventilatory device in anesthetised paralysed patients.

Materials and Methods: After IRB approval 60 anesthetized, paralyzed adults, ASA 1-2, were studied. Patients with anticipated difficult airway or at risk of regurgitation were excluded. Patients were divided in three groups according to different device size depending on body weight (No 3: <60 kg, n=13; No 4: 60-90 kg, n=33; No 5: >90 kg, n=14). Airway management was by senior anesthesiologists with no prior experience with the i-gel, but considerable experience with extravaginal airway devices. All patients underwent two stages of positive pressure ventilation at different ventilator settings (8ml/kg, 10ml/kg) under standard monitoring and the respective peak inspiratory pressures (PIP) were recorded. Then airway sealing pressure (P's leak) was determined by closing the expiratory valve of the circle system at 6 L/min and noting the airway pressure at which equilibrium was reached. The IP leak and the respective maximum tidal volume (Vt max) expected at IP leak were recorded.

Results and Discussion: The results are presented in table 1.

Conclusion(s): The i-gel proved to be a reliable ventilatory device in anesthetised paralysed patients. It provides excellent airway seal that contributes in achievement of high tidal volume during PPV. However, our results apparently concern a healthy surgical population.

References:

19AP8-7
Airway management in prone position with LMA Supreme®
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Background and Goal of Study: Insertion and efficient use of laryngeal mask airway (LMA) in prone position is feasible although still a challenge for anaesthesiologists (1-3). The aim of this study is to assess the clinical performance of the single-use LMA Supreme® inserted in prone position.

Materials and Methods: Fifteen patients, ASA 1 and 2, who underwent surgery in the prone position were prospectively included. Exclusion criteria was pulmonary disease, obesity or difficult airway. Patients were asked to lie in prone (or genupectoral) position and preoxygenated. After anaesthesia induction (without neuromuscular blockade), patients were ventilated with facial mask and LMA Supreme® was inserted by trained users. Number of insertion attempts, insertion time, seal pressure, ventilation quality and perioperative airway complications were registered. If insertion failed at third attempt or patients could not be ventilated with facial mask, they were turned into supine position.

Results and Discussion: Manual ventilation in prone position before LMA insertion was easy. LMA Supreme Insertion was successful in all the patients at the first attempt in a 34±28 sec. The ventilation through LMA Supreme® was
successful in all patients, although some correcting manoeuvres were required in two cases. The mean seal pressure was 26.6±3.6 mmHg. No complications such as hypoxia, laryngospasm, bronchospasm occurred in any case. In one patient LMA was stained with blood and other patient referred sore throat.

Conclusion(s): LMA Supreme® insertion in prone position can be safely and efficiently used for airway management by trained staff in patients without difficult airway.

References:

19APB-8
Laryngeal mask airway in neurosurgery
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Background and Goal of Study: In many hospitals laryngeal mask airway has become a routine method of airway management in anesthesiological maintenance of different kinds of surgery. What about neurosurgical anesthesia?

Materials and Methods: In our hospital we have the following indications for using LMA: 1) urgent neurosurgery, when airway management difficulties are to be expected; 2) ventriculoperitoneostomy; 3) endovascular surgery; 4) craniotomy, after awake anesthesia is used. 5) Instrumental diagnosis (Magnetic resonance, Positron emission tomography), 6) peripheral neurosurgery.

Results and Discussion: In our hospital we have carried out more then 200 cases of laryngeal mask airway. The unsuccessful rate of securing the airway using LMA was about 6% in the initial attempt. And, after the second attempt, only 1% of the patients required different methods of airway management. We registered no cases of life-threatening complications such as aspiration, falls of hemodynamic or oxygen saturation when performing laryngeal mask airway.

Conclusion(s): Using LMA provides an opportunity of rapid awakening of the patient during endovascular operations which makes possible to estimate the dynamic of changes in neurological conditions and then keep on controlled mandatory ventilation with medicamental myopoeia without changing head position.

References:
1. Using LMA can provide a secure airway during long-time examinations (for example, Magnetic resonance, Positron emission tomography, Computed tomography), when complete immovility is needed. Laryngeal mask airway makes these procedures comfortable for the patients.

19APB-9
LMA-ProSeal™ (PLMA) is safe alternative of airway management for laparoscopic cholecystectomy
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Background and Goal of Study: General anesthesia with endotracheal intubation and controlled ventilation is usually used for laparoscopic procedures. In our hospital we have carried out more then 200 patients undergoing laparoscopic cholecystectomy. PLMA, 76 TRAM (52 PLMA), 33 DIEP (21 PLMA), TIVA anesthesia was performed with a standardized application of propofol, fentanyl and rocuronium. PLMA), 76 TRAM (52 PLMA), 33 DIEP (21 PLMA), TIVA anesthesia was performed with a standardized application of propofol, fentanyl and rocuronium.

Materials and Methods: Into prospective study were recruited patients undergoing laparoscopic cholecystectomy. Materials and Methods: Into prospective study were recruited patients undergoing laparoscopic cholecystectomy. Materials and Methods: Into prospective study were recruited patients undergoing laparoscopic cholecystectomy. Materials and Methods: Into prospective study were recruited patients undergoing laparoscopic cholecystectomy. Materials and Methods: Into prospective study were recruited patients undergoing laparoscopic cholecystectomy. Materials and Methods: Into prospective study were recruited patients undergoing laparoscopic cholecystectomy.

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Background and Goal of Study: LMA ProSeal in breast surgery
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Randomized study
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Background and Goal of Study: We wanted to study the efficiency of these 2 new supraglottic devices as a mean to provide ventilation during general anesthesia with pressure controlled ventilation (PCV) and no neuromuscular blockade.

Materials and Methods: 62 ASA I and II patients were randomized into 2 groups: Supreme™ (A) IGel™ (B). Patients with contra-indications for or of supraglottic devices were previously examined. Before the start of the operation, a standardized induction device was inserted according to the users guide’s instructions. All patients were ventilated using PCV and anesthesia maintained with Desflurane/0.5%N2O to an adjusted MAC of 1 with flow rate of 1 l/min. We recorded the pressure needed to achieve a tidal volume of 8 ml*kg⁻¹ and the CPAP pressure at which there was evidence of air leak. 4 categories were considered: air leak at pressures ≤ 10, 11-20, 21-30 and ≥ 31 cmH₂O. Number of attempts to a successful device and gastric tube insertion was recorded. At the end, a fibroscopic view of the airway was made and the existence of blood on the device after its removal noted.

Results and Discussion: There were not significant differences between the two groups regarding sex, age, weight and ASA classification. The pressure needed to achieve a tidal volume of 8 ml*kg⁻¹ was 10±2 cmH₂O for group A and 11±3 for group B. No patient had evidence of air leak with pressures ≤ 10 cmH₂O. In group A, 3.2% of patients showed air leak for pressures 11-20, 41.9% for pressures 21-30 and 54.8% for pressures ≥ 31. In group B, 19.4% of patients had evidence of air leak for pressures 11-20, 71.0% for pressures 21-30 and 9.7% for pressures ≥ 31. Group A showed a 90.3% rate of successful insertion at the first attempt compared to 54.8% on the group B. The success rate for insertion of the gastric tube was 98.6% in group A and 100% in group B. Fibroscopic view was normal in 87.1% of cases in group A and 80.6% in group B. Abnormal findings at fibroscopy included downwarding of the epiglottis (4 cases in group A, 2 in group B) and compression of the arytenoids (4 cases in group B). Visible blood was found in 25.8% of group A and in 16.1% of the group B devices.

Conclusion(s): Both devices proved to be easy to insert and to allow adequate ventilation under these anesthetic conditions. Supreme™ had fewer cases of air leak with higher pressures, which seems to indicate that this device allow effective ventilation even with higher pressures. IGel™ had less evidence of blood on the removal, which may imply it is a less traumatic device.
needed intubation. Placement of gastric tube was done at first attempt. Total operative time was between 90 min till 14 hours.

**Conclusion(s):** PLMA showed her efficacy in airway control in patients operated of breast surgery independently of operative time. It gives a tighter seal against glottic opening, separates the digestive tube from the respiratory tract and allows gastric tube placement against possible regurgitation. PLMA was placed by expert anaesthetist.

**References:**
Surgery, oral 1AP1-6, 3AP6-9, 14AP5-7
Surgery, orthopaedic 1AP2-8, 4AP3-5, 4AP3-6, 6AP1-4, 6AP2-3, 8AP2-8, 14AP11-3, 14AP11-5
Surgery, paediatric 10AP2-8
Surgery, plastic 14AP7-2, 19AP8-11
Surgery, postoperative period 1AP2-5, 1AP3-1, 1AP3-8, 1AP4-6, 1AP4-9, 4AP2-4, 6AP4-7, 8AP6-4, 12AP5-5, 12AP7-3, 14AP5-4, 17AP1-3, 17AP1-4
Surgery, preoperative period 1AP3-2, 1AP4-2, 1AP4-4, 1AP4-8, 1AP4-9, 6AP1-3, 6AP1-4, 6AP1-7, 6AP2-5, 6AP4-6, 19AP4-9
Surgery, spinal 2AP3-7, 3AP1-5, 8AP6-6
Surgery, thoracic 2AP1-1, 5AP2-4, 5AP2-6, 5AP2-8, 6AP4-9
Surgery, thyroidectomy 5AP1-3
Surgery, transplantation 3AP2-8, 3AP2-11
Surgery, vascular 1AP2-5, 3AP2-1, 4AP7-11, 15AP1-6
Sympathetic nervous system 3AP7-9
Sympathetic nervous system, clonidine 4AP1-5, 4AP1-6, 8AP2-3, 8AP4-4, 11AP1-4
Sympathetic nervous system, dexmedetomidine 4AP7-8, 9AP7-10
Sympathetic nervous system, dobutamine 9AP1-5
Sympathetic nervous system, esmolol 4AP7-8
Sympathetic nervous system, ganglion block 8AP7-1, 14AP7-1
Sympathetic nervous system, noradrenaline 4AP7-10
Sympathetic nervous system, norepinephrine-vasopressin, 4AP1-9
Sympathetic nervous system, sympatoadrenal response, 5AP4-1
Sympathetic nervous system, yohimbine 9AP4-6
Temperature, body 2AP1-4, 4AP2-8, 12AP8-3
Theories of anaesthetic action, cellular mechanisms, ESAPC1-1, 7AP5-8, 7AP6-7, 9AP1-8
Thromboxane 6AP2-7
Toxicity 9AP1-3

Toxicity, local anaesthetics 9AP4-2, 9AP4-8, 9AP4-10, 14AP4-2, 19AP1-5
Toxicity, organophosphorus compounds 13AP2-1, 13AP3-2
Transfusion 6AP1-3, 6AP1-9, 6AP4-5
Transfusion, complications 6AP4-7, 6AP4-8
Transfusion, stored blood 6AP1-5, 6AP1-9, 6AP3-1, 6AP4-3
Uterus, oxytocin 11AP2-5

Veins, cannulation ESAP1-2, 4AP8-7
Veins, jugular 4AP8-7
Veins, subclavian 5AP3-2
Ventilation, airway pressure 19AP8-4
Ventilation, apnoea 9AP5-6
Ventilation, artificial ESAPC1-3, ESAAP1-4
Ventilation, continuous positive pressure 3AP4-7
Ventilation, failure 13AP2-1, 19AP4-8
Ventilation, fresh gas flow 3AP3-2
Ventilation, hyperventilation 5AP4-3
Ventilation, hypoxic response 5AP1-7
Ventilation, mechanical 3AP4-4, 5AP3-5, 5AP3-7, 12AP2-1, 12AP2-7
Ventilation, mechanics 5AP4-6
Ventilation, muscle, diaphragm 5AP2-3
Ventilation, one-lung 5AP2-1, 5AP2-5, 5AP2-7, 5AP2-8, 19AP7-7
Ventilation, positive end-expiratory pressure, 5AP4-10
Ventilation, postoperative 5AP4-5, 5AP4-8, 5AP4-10
Ventilation, pressure support 5AP3-6, 5AP3-7, 5AP4-4
Ventilation, spontaneous 5AP3-7
Vomiting, antiemetics 1AP2-2
Vomiting, nausea 9AP6-2, 9AP5-1, 12AP8-8, 14AP5-11, 14AP11-1
Vomiting, nausea, anaesthetic factors 1AP2-2, 1AP2-10, 2AP1-5, 14AP5-2, 14AP6-9
Vomiting, nausea, surgical factors 2AP2-6
<table>
<thead>
<tr>
<th>Author Name</th>
<th>Index</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abreu, J.</td>
<td>6AP1-2, 12AP3-2, 12AP3-5, 12AP6-6</td>
<td></td>
</tr>
</tbody>
</table>