Postoperative and post-discharge pain management in day surgery. Too little and too short lasting?

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Background

In many countries over 50% of all surgery is performed as day surgery. Day case or ambulatory surgery implies that the patient will arrive in the hospital on the morning of surgery and once the operation has been completed he or she will be discharged later on that day so as to occupy his or her own bed at home the same night. This system has many advantages including reduced levels of anxiety for children and the elderly, fewer infections, early mobilisation and hence reduced risk of thrombosis.

However day surgery does place greater emphasis on the patient to care for themselves. This is especially relevant to pain management and the need for good postoperative pain control can limit the potential increased utilisation of day surgery. Thus the optimal management of day case patients requires detailed attention to planning and provision of patient information from all staff members in the day surgery team.

Normally, good pain control can be achieved immediately after surgery when the patient is cared for in the PACU (post anaesthesia care unit) however the quality of analgesia may become harder to maintain at home. Often standardised pain treatment protocols that are known to work well in the hospital setting are not produced and implemented for use in the domestic setting.

Poorly managed pain control prolongs the recovery process especially if pain inhibits the patient’s ability to mobilise as fast as planned. Furthermore inadequate pain control risks the development of longer lasting or chronic pain associated with other organ system dysfunction.

Follow–up of patients after a variety of day surgery procedures (inguinal hernia repair, arthroscopic procedures, cosmetic breast augmentation) for a period of up to 6 months, has identified a requirement to improve post-operative pain control; even following day surgery, patients seem to experience post-operative pain related problems for longer than nurses and doctors usually expect. Approximately 40% of patients experience pain 1 week after day surgery 28% after 2 weeks, whilst even after 4 weeks 20% suffer from pain [1,2] (Figure 1). Results following hallux valgus surgery, revealed 20% of patients who had pain related to their surgery were not pain-free up to 16 weeks after surgery [3].

![Figure 1 a: Symptoms after inguinal hernia repair, % of patients](image)
Pain management

Nowadays a balanced multimodal approach is the standard of care [4]. The use of different analgesic drugs with diverse modes of action leads to an additive and synergistic effect that facilitates the use of reduced doses of each analgesic and therefore fewer adverse effects and toxic reactions.

An opioid sparing regime utilises non-opioid treatment such as paracetamol, non-steroidal anti-inflammatory drugs (NSAID), co-analgesics and local anaesthesia in combination so as to make it possible the reduce dependency on and thus side effects associated with opioid use whilst still maintaining good analgesia. Typical symptoms associated with opioids include post-operative nausea and vomiting (PONV), dizziness and sedation that can delay or prevent a patient’s discharge from hospital.

The most effective nociceptive blocker is the NSAID class of drugs, which possesses the lowest number-needed to treat (NNT) value. A recent systematic review comparing the relative effectiveness of paracetamol, selective NSAIDs or non-selective NSAIDs on reducing side effects associated with morphine identified COX-2 inhibitors to be the most beneficial [5].
Different drugs

Paracetamol (acetaminophen)

Paracetamol is almost always included in the therapy because it is associated with few side effects. Normally, the first dose is given as premedication together with a NSAID.

Non-steroidal anti-inflammatory drugs (NSAID)

Traditional non-steroidal anti-inflammatory drugs are the most effective analgesics for nociceptive pain with a low NNT. When the newer selective coxibs were introduced with the benefits of less inherent bleeding potential in patients with gastric ulcers, there were high expectations that their use would be extended. However newer restrictions based on their own side effect profiles have, in fact, limited their usage. Coxibs are associated with an increased risk of allergic reactions, disturbances of renal function and heart disease. Although etoricoxib has been shown to proved better pain relief than tramadol after hallux valgus surgery in the first week postoperatively [3], reduced bone healing associated with both oral and intra-articular administration of the former is bound to influence analgesic choice. Where a clinician excludes NSAIDs for these reason corticosteroids could be an alternative.

COX-2 inhibitors

COX-2 inhibitors compare favourably with traditional non-selective NSAIDs, by virtue of their reduced effect on platelet function and haemostasis and reduced risk of gastrointestinal bleeding. Wickerts et al describe the benefits versus risks associated with the use of Coxibs [6].

Tramadol

Combinations of tramadol with paracetamol are frequently used. Studies confirm the effectiveness of tramadol after minor surgery including hand procedures. Effective analgesia can be achieved in some circumstances by keeping well within (i.e. by using one third) the maximum dose; this which could be the reason why so few side effects were apparent [7]. Similarly when comparing of etoricoxib with tramadol after hallux valgus surgery, we found more side effects and poor analgesic effectiveness of tramadol when employed in higher doses (3). Most of the patients experienced side effects including dizziness and nausea.

Codeine

Codeine’s effect is dependent on the activity of an intact CYP2D6-enzyme system in the liver. Otherwise conversion of codeine will to morphine not occur and hence codeine will be worthless as a pain treatment. At least 5% of patients have poor CYP2D6-enzyme system. When comparing codeine-paracetamol therapy with a tramadol-paracetamol combination, the tramadol regime was found to reduce the hospitalisation time after a variety of different day-surgical procedures [8].

Morphine

This remains the gold standard analgesic. This naturally occurring opioid has been in use for hundreds or thousands of years.

Oxycodone

This is a frequently used semi-synthetic opioid. The analgesia provided by opioids is required for many surgical procedures. Slow release oral forms for premedication (assuming gastrointestinal delay is absent) may be used in combination with short acting intravenous preparations perioperatively. It has been suggested that high doses of opioids given parenterally have the potential to increase angiogenesis and therefore also the risk for malignancy. More research is needed before any changes in treatment should be made. All opioid-agonists have side effects and, where possible, dosages should be reduced in ambulatory surgery as the side effects might otherwise prevent the patient returning home after surgery. Hence management of acute postoperative pain using a multimodal approach should be employed to reduce the amount of opioids given in the perioperative period.
Co-analgesics

Anti-epileptic drugs have been suggested to be effective as postoperative analgesics. Dauri et al showed that treatment with gabapentin and pregabalin reduces pain and opioid consumption after surgery but did not prevent PONV. Although the use of anti-epileptic drugs in day surgery is not routine practice, pregabalin seems to be the better choice due to its faster onset of action. Co-analgesics such as ketamine and the alpha-2-agonist clonidine are not frequently used in ambulatory surgery. Theoretically non-pharmacological treatments including transcutaneous electrical nerve stimulation (TENS) could constitute part of the multimodal regime but few units have adopted this approach. Corticosteroids such as dexamethasone may be employed to produce an anti-inflammatory effect in place of coxibs in circumstances where their use is contraindicated. In this context the benefit of dexamethasone may be extended to reduce the likelihood of PONV.

Local anaesthesia and peripheral nerve blocks

Injection of the local anaesthetic bupivacaine to the surgical site prior to incision rather than at the conclusion of surgery does not appear to make any difference in the postoperative phase. The same peripheral sensitization will occur. However many studies support the utilisation of both peripheral block and greater use of local anaesthesia at the site of surgical incision at the end of surgery as a method to improve postoperative pain control.

Plexus blocks including interscalene and supravacular approaches provide effective postoperative analgesia for arthroscopy or fracture surgery. However it should be acknowledged that once the block has worn off, especially in the absence of other forms of systemic analgesia, severe pain can result. Recent improvements in equipment including nerve stimulators and their associated needles and greater availability of and training in ultrasound based techniques has improved success rates associate with administration of these blocks with a concomitant reduction in failed blocks and associated nerve damage.

Continuous delivery of local anaesthesia to extend the duration of postoperative analgesia has been suggested to reduce development of long lasting pain. At present, there is no evidence that this confers any improvement in health-related quality of life. Rawal et al evaluated the usefulness of continuous local anaesthetic delivery by a pump at home after day surgery. They showed that this method was safe and provided excellent pain relief.

As an adjunct to local anaesthesia, intra-articular morphine is frequently used and has been found to be effective by Gupta in a systematic review.

Special cases

Poor pain control in the immediate peri-operative period may risk progression to chronic pain. Long-term follow-up studies have revealed that 6% of inguinal hernia repair patients (IHR), 28% of arthroscopy procedure patients (AS) and 4% of cosmetic breast augmentation patients (CBA) still had surgery related pain 3 months after surgery. Those affected by persistent or long-lasting pain had decreased overall to 5% at 6 months’ follow-up (IHR 6%, AS 8%, CBA 2%) (2) (Figure 1). According to the definition of persistent postsurgical pain or chronic post-surgical pain (CPSP) proposed by Macrae and Davies 1999, these patients with surgery related pain that remains after 3 months, have persistent CPSP [9]. The definition criteria are:

- Pain developing after a surgical procedure,
- Pain duration of at least 2 months,
- Alternative causes that might explain pain other than surgery have been excluded,
- No pre-existing painful condition can explain the continuing postoperative pain.
It is important to review the pre-, peri- and postoperative risk factors and mechanisms responsible for developing severe postoperative pain. Preoperative risk factors may be predictive and may play a role in the transition from acute to long-lasting persistent pain [10]. Preoperative risk factors include patient demographics, psychosocial characteristics, genetic elements and preoperative pain. We have found younger patients, the female sex and pre-existing i.e. preoperative pain to be risk factors. The intraoperative risks include the type of anaesthesia employed and use of concomitant medications but most significant is the occurrence of nerve injuries [11]. Postoperative risk factors are the severity of acute postoperative pain (APP) and the choice of pain treatment. Many patients have good pain relief at recovery but severe pain is often reported among many patients on the first postoperative day when they are already at home. More frequent use of local anaesthesia and NSAIDs may be important to ensure better postoperative pain control and reduce progression to CPSP.

Too little

If treatment of postoperative pain control is inadequate the risk of morbidity increases (e.g. due to immobility, stress, paralysis, atelectasis). Furthermore this could also be risk factor for development of chronic pain.

Follow-up after different types of procedures typically performed as day cases shows that pain is moderate to severe for 30-60% of patients on the first day postoperatively and persists at this level for up to 7 days in 25-30% of patients after orthopaedic day surgery [12].

In a German study investigating the implementation of the S3 guidelines more than 2000 anaesthesiologists answered a questionnaire about postoperative pain treatments. Ninety three percent of the responders were satisfied with their management. However only 40% measured and documented pain intensity. Unfortunately the authors concluded that national guidelines designed to improve management of acute pain had only been partially implemented [13].

Patient groups at risk for increased postoperative pain include those already experiencing pain prior to surgery, those receiving ongoing pain treatment, a history of severe pain after previous surgery, surgery known to be painful, and other co-morbidities. These patients need careful planning of perioperative pain management strategies to be put in place at the preoperative visit.

Too short-lasting

If persistent severe postoperative pain occurs, it can be difficult for the patient to know how best to address it in the absence of appropriate information and analgesia. Intrinsic to the provision of local anaesthetic blocks, should be information to address the pain that occurs once the block has worn off. Access to telephone advice will greatly assist the patient if they have questions regarding how to best treat pain if it recurs.

The future

It is important to identify patients predicted to be at greater risk of experiencing severe postoperative pain. We identified that patients with pre-existing pain prior to undergoing arthroscopic surgery were more likely to experiencing post operative pain at follow-up after 30 days. Both the presence of pain and requirements for analgesia preoperatively were factors influencing the occurrence of pain in the PACU. Pre-existing pain, opioid use and fear of pain prior to surgery are important factors predictive factors of the likelihood of severe postoperative pain [14,15].

Patients should be aware of the importance of prophylactic medication to reduce the occurrence of breakthrough pain once at home [16]. Prevention therapy should focus on the whole peri-operative period not only by inhibiting noxious input and central sensitization but also by advocating the use less invasive surgical techniques. The overall incidence of CPSP is about 4-5% after all surgery, whilst inguinal herniorraphy (5-8%), breast surgery and amputation are procedures associated with higher risk.
Kehlet has identified the incidence of acute postoperative pain to be procedure specific ranging from 10-50% depending on the surgery performed. Hence the information provided prior to surgery must also be procedure-specific and relevant with regard to postoperative pain management. The mechanism by which APP appears to be a risk factor for the development of CPSP has is not fully understood. Several studies have evaluated various factors that may have an influence on the incidence for CPSP. Clarke and colleagues showed that acute pain after total hip arthroplasty not could predict CPSP [17]. Hickey and co-workers found that those patients, who experienced high intensity of pain on the fifth day after breast surgery, were the patients most likely to develop CPSP.

A multimodal analgesic regime should be initiated with the premedication. It is much easier to suppress pain by administering analgesia early than to start to address pain after it has become established (Figure 2).

<table>
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<tr>
<th>Careful preoperative information</th>
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<tbody>
<tr>
<td>Oral Premedication: T. Paracetamol 1 g, T. Diclofenac 50 mg, T. Oxycodone s.r. 5-10 mg, nausea prophylaxis if needed (history of PONV).</td>
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<tr>
<td>Anaesthesia: TIVA or Fentanyl/Sevoflurane with laryngeal mask airway, Betametasen 6-8 mg if PONV risk, local anaesthesia in portals and at ligament donor site. At the end of surgery: Inj. 90 mg Ropivacaine + 4 mg Morphine + 30 mg Ketorolac into the joint space. Cold-bandage.</td>
</tr>
<tr>
<td>Short acting Oxycodone if needed p.o. or parenterally at PACU</td>
</tr>
<tr>
<td>At discharge: T. Paracetamol 1 g x 4, T. Diclofenac 50 mg x 3 or T. Etoricoxib 90 mg x 1 only day 1, T. Oxycodone 5-10 mg x 2 if needed for 1-3 days.</td>
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<td>Planned post-operative visit (first or second day) to the day surgery unit to meet the physiotherapist and if needed, the opportunity to ask questions about pain treatment or bandages.</td>
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Example: Pain programme for arthroscopic cruciate ligament repair

Conclusions

Provision of information to the patients preoperatively is an important element in the strategy to ensure successful pain management [18]. When discharged from hospital, patients need to be provided with specific information (orally and written) and instructions how best to use regular medication and rescue does when needed. Provision of a telephone number for the patient to call if he/she experiences problems must be given.

Key learning points

- Use a balanced multimodal form of analgesia, which should be commenced with the premedication.
- Add local anaesthesia when possible.
- Minimize the use strong opioids. Never use weak opioids?
- Comprehensive patient information before and after surgery.
- Do follow ups audits to test your routines.
References


