

Pain management in day-case surgery

Liza Tharakan DA FRCA FFPMRCA¹ and Peter Faber MD PhD FRCA FFICM^{2,*}

¹Fellow in Pain Medicine and Anaesthesia, Sunnybrook Health Sciences Centre, Toronto, Canada, and

²Consultant Cardiothoracic Anaesthetist, Department of Anaesthesia, Aberdeen Royal Infirmary, Foresterhill Road, Aberdeen AB25 2ZN, UK

*To whom correspondence should be addressed. Tel: +44 845456 6000; Fax: +44 1224 554483; E-mail: faber@doctors.org.uk

Key points

- Nearly one-third of patients experience moderate-to-severe postoperative pain after day surgery.
- Standardized pain evaluation, protocols, and multi-modal analgesia are key to effective pain management.
- Patient education and preparation will improve patient compliance of analgesia.
- Alternatives to opioids should be promoted in day surgery.
- Local anaesthetic techniques facilitate early and safe discharge of patients from day surgery.

Day-case surgery is defined as a planned surgical procedure for which selected patients are admitted to hospital and discharged home the same calendar day. The Department of Health in 2000 set a target that 75% of all elective surgery should be undertaken as day-case procedures and subsequently the British Association of Day Surgery now lists >200 different surgical procedures suitable for day-case and short-stay units. Additionally, there is an increasing political, managerial, and clinical drive to also admit patients presenting with acute conditions requiring urgent surgery as day cases. Indeed, the National Health Service (NHS) Modernisation Agency states inpatient care should be the exception rather than the rule.¹ Planned changes to admission policies are expected to release nearly half a million in-patient bed days each year, generating large savings for the NHS, while at the same time responding to patients' expectations of a modern, flexible healthcare service. Hence, day-case surgery is continually evolving with more extensive surgical procedures being offered to patients with an increased number of

co-morbidities. Assisting in achieving those targets it is the role of the anaesthetist to plan anaesthetic techniques and pain relief suitable for day-case surgery patients. As postoperative pain is a common cause for extended hospital stay, unanticipated admission, and re-admission, the responsibilities of the anaesthetist encompass not only the immediate patient care but also the implementation and planning of day surgical lists. This paper will, in the context of day-case surgery, discuss the currently available options and future perspectives of high-quality pain management facilitating rapid recovery and safe discharge of patients from day surgical units.

Postoperative pain

Postoperative pain is one of the most common adverse events after day surgery with most studies reporting the incidence of moderate-to-severe postoperative pain reaching 25–30%.² Furthermore, apart from the unacceptable suffering from pain, poor postoperative pain relief has been associated with an increased incidence of nausea and vomiting, cardiovascular instability, disturbance of sleep, and delays in postoperative patient mobilization.

The specifics of surgical procedure and duration are established predictors of postoperative pain. Poor postoperative pain relief has been reported in 40–70% of patients undergoing orthopaedic, urological, general, or plastic surgical procedures. Even after ambulatory, laparoscopic surgery postoperative pain control remains inadequate with only ~60% of gynaecological patients reporting satisfactory pain relief.³ The day after laparoscopic cholecystectomy, the incidence of moderate and severe pain remains high at 65 and 23%, respectively.⁴ Such high incidence of postoperative pain has convinced many day surgical units to develop policies of standardized pain evaluation, pain treatment protocols, and routine use of multi-modal analgesia. Such protocols have successfully been demonstrated to improve pain management and patient satisfaction in the postoperative period.⁵

Planning appropriate pain management

Multiple factors, including the type of surgery, pain threshold, patient age, and expectations, affect the experience of postoperative pain after day surgery with studies suggesting that pain may last more than 3 days and quality of life be reduced for more than 7 days after surgery.⁶ With a high through-put of patients often undergoing relatively comparable procedures, evidence-based protocols for pain management can successfully be implemented at most day-case surgery units with only minor adjustments required for individual patients. From the youngest to the oldest group of patients, day surgery is often the preferred option as it incurs minimal disruption to family routine and avoids prolonged hospitalization and change in environment. However, without planning and subsequent inadequate pain relief such intentions will not be fulfilled.

Patients likely to experience difficult postoperative pain control (e.g. those with high anxiety, chronic pain, and opioid tolerance) should be identified in the pre-assessment clinic and tailored plans for postoperative analgesia discussed in advance of surgery. Within such discussions patient education and preparation should be considered in order to reduce patient and carer anxiety, develop realistic expectations, and improve compliance to post-discharge pain management. Although many patients continue to experience pain and discomfort after discharge, 30–50% do not take adequate analgesia because of misunderstandings and insufficient information.⁷ To increase compliance, especially among patients with poor education and those without a strong social network, information on postoperative home pain relief should be conveyed both verbally and in written form helping patients assimilate the information. Pain in elderly patients is often under-recognized and under-assessed. It should be acknowledged that pain perception and threshold do not decrease with ageing and that elderly patients influenced by their attitude and beliefs may refrain from reporting pain. Additionally, this group of patients may find it challenging to use pain assessment tools primarily developed for younger adults.

In general, patients should be instructed to take regular analgesia for at least 3 days. The first postoperative analgesic medication should be administered before the effects of intraoperative analgesia and local anaesthesia wear off. Prescribed analgesia must be long-acting, and should of course minimize pain not only at rest but also during mobilization and physical therapy.

Obvious measures to alleviate postoperative pain include, where appropriate, minimally invasive surgical techniques and the use of regional anaesthesia techniques. A reliance on long-acting opioids may exacerbate postoperative nausea and vomiting and delay recovery and discharge.

Choice of analgesia

Multi-modal analgesia remains the recommended approach for pain management. Multi-modal analgesia obtains optimal analgesia through different pathways and thereby reduces the overall analgesia-related side-effect profile. Additionally, multi-modal analgesia facilitates timely discharge from hospital and patient ability to resume daily living activities after surgery. A combination of the below-mentioned analgesic medications and techniques is the most current approach for perioperative pain management.

Paracetamol

Paracetamol is a mild analgesic with few side-effects and has in studies been demonstrated to have an opioid-sparing effect. As

oral paracetamol is 80–90% absorbed from the gastrointestinal tract, it is nearly as effective as the i.v. formulation. Oral paracetamol displays peak plasma concentration within 30–60 min; i.v. paracetamol instantaneously with onset of pain relief after 5–10 min. There is a possibility of higher risk of toxicity from i.v. paracetamol in patients with renal or hepatic insufficiency.

Non-steroidal anti-inflammatory drugs

Non-steroidal anti-inflammatory drugs (NSAIDs) have an established role as effective analgesics for day-case surgery and can, provided there are no contraindications, be prescribed to all patients. As for paracetamol NSAIDs have for a range of surgical procedures been demonstrated to reduce the requirement for opioid-based analgesia. As the onset of action is longer compared with opioids, NSAIDs should be administered preoperatively or early during surgery to allow time for peak analgesic effect. The postoperative use of non-selective NSAIDs or the more selective cyclooxygenase-2 inhibitors during the first 3 days has been shown to provide good analgesia after laparoscopic procedures, reduce the need for opioid-containing analgesia, and facilitate a faster recovery compared with opioid-based analgesia.⁸ Additionally, studies indicate synergistic effects on opioid reduction when paracetamol and NSAIDs are prescribed together.

Opioids

The analgesic effect of opioids has to be balanced against an array of unpleasant side-effects; namely nausea and vomiting, sedation, pruritus, respiratory depression, constipation, and urinary retention. The administration of long-acting opioids remains a mainstay of pain management, but it is an important contributor in delaying discharge and recovery because of the high incidence of postoperative nausea and vomiting. Shorter acting opioids, such as fentanyl, may be preferred for day-case surgery attributable to only half the incidence of post-discharge nausea and vomiting compared with morphine.⁹ A reliance on opioids for perioperative pain management may in some patients cause acute opioid-induced hyperalgesia. As is well established, therefore multi-modal analgesia is preferable and indiscriminate use of long-acting opioids is discouraged.¹

Other analgesia

Analgesic adjuvants (e.g. gabapentinoids) N-methyl-D-aspartate (NMDA) receptor antagonists and alpha-2 adrenergic agonists have also been reported to demonstrate a reduction in opioid requirements as part of balanced, multi-modal pain management.¹⁰ In particular, perioperative administration of gabapentin promises an effective adjunct to more traditional postoperative analgesia with a significant reduction in pain score, opioid requirements, and opioid-related side-effects.¹¹ Similarly, i.v. clonidine and dexmedetomidine have also been shown to reduce pain intensity, opioid consumption, and postoperative nausea.¹²

However, the optimal dose regime, timing, duration, and combination with other non-opioid-based analgesia still remains to be established as gabapentinoids and alpha-2 adrenergic agonists may contribute to hypotension, bradycardia, postoperative dizziness, and sedation; thus, delaying mobilization and discharge.

Although i.v. lidocaine has been used in various settings, including day-case surgery, it has been demonstrated to only significantly reduce pain intensity and opioid requirements in

abdominal surgery¹³ and reduce the incidence and severity of chronic pain after breast surgery.

Low-dose i.v. ketamine is a widely used adjunct analgesic in the perioperative setting where it has been demonstrated to effectively reduce postoperative opioid requirements, nausea, and vomiting.¹⁴

Whereas dexamethasone is mostly recognized as an antiemetic, a larger dose of more than 0.1 mg kg⁻¹ has been reported to display intrinsic analgesic effects without an associated risk for postoperative wound infections.

Regional anaesthesia

Well-planned and performed peripheral nerve blocks and local anaesthetic infiltration provide excellent anaesthesia and effective postoperative pain relief often without the requirement for additional opioid-based analgesia. With a concomitant technological development of smaller, high-resolution ultrasound machines and anaesthetic training in regional anaesthesia, the last decade has experienced an increased interest in the use of local anaesthesia for both single injection nerve blocks (SINB) and continuous peripheral nerve blocks (CPNB). SINBs may be insufficient in terms of the duration of analgesia after major ambulatory surgery furthering the popularity of CPNBs. With appropriate training and experience, the benefits of CPNB have attracted much attention with studies demonstrating favourable results and good safety record compared with traditional pain management. Continuous peripheral nerve blocks can be considered for both breast surgery and procedures on upper and lower extremities. The earlier functional recovery and hospital discharge is attributed to the excellent analgesia provided by these techniques. Major and permanent complications related to continuous local anaesthetic infusions are rare.¹⁵ The more common complications include catheter dislodgement or obstruction and fluid leakage at the catheter site. Renal or hepatic insufficiency is a relative contraindication to outpatient perineural infusion, to avoid local anaesthetic toxicity. In the elderly, regional anaesthesia reduces the risk of cognitive impairment in the immediate postoperative period. The use of indwelling catheters providing local anaesthesia requires motivated, well-informed, and compliant patients. Patients may be discharged with residual sensory or motor deficit, provided the limb is protected and appropriate support is available for them at home. Discharged patients, with disposable local anaesthetic infusion systems, should receive discharge instructions that include phone numbers for support should concerns arise because of the nerve block. Obvious to say that close follow-up, good patient, and family education are required for safe discharge of patients with local anaesthetic infusion catheters. Provision should be made for the availability of oral analgesia to take at home before the block wears off. Perineural administration of additives such as epinephrine or clonidine to local anaesthetics have been shown to increase the duration of peripheral nerve blocks, but these have potential complications such as direct vasoconstrictive effects on the nerves or increased risk of sedation, hypotension, and bradycardia because of systemic uptake. An off-label use of dexamethasone has shown that its addition to local anaesthetic prolongs the duration of brachial plexus blocks, theoretically by inhibiting potassium channel-mediated discharge of nociceptive C-fibres.¹⁶

An alternative to local anaesthetic infiltration and wound infusion catheters is a novel injectable liposomal local anaesthetic preparation such as that of bupivacaine, approved by the US Food and Drug Administration (FDA) for post-surgical analgesia in

adults. Infiltration of this preparation of bupivacaine at the surgical site has been shown to provide effective analgesia for minor surgery.¹⁷

Neuraxial anaesthesia

Caudal epidural block is a well-established analgesic technique for perineal and inguinal surgeries in children. Long-acting local anaesthetic drugs provide 4–8 h of analgesia after a single administration caudal block. The use of additional agents to prolong this duration of postoperative analgesia in day surgery is controversial because of side-effects and potential risks.

Spinal anaesthesia is increasingly introduced within the setting of day-case surgery in adults. Patients who receive spinal anaesthesia are more alert and less nauseated than those undergoing general anaesthesia, and consequently have a smoother transition to oral analgesics. Additionally, there is a lower incidence of postoperative pain. With appropriately chosen short-acting local anaesthetic such as hyperbaric prilocaine 2% or low-dose mixture of local anaesthetic and opioid, prolonged motor blocks can be avoided.¹⁸ Considering the delay to peak effect oral analgesia should be commenced before the return of sensation.

Postoperative analgesia

With carefully planned anaesthesia and perioperative pain management, patients should be spending less time in the recovery area before ward discharge; thus, facilitating reduced nursing requirements and contributing to an efficient surgical programme. In the recovery area, pain levels are usually assessed by tools such as verbal rating scale (VRS), numeric rating scale (NRS), or visual analogue scale (VAS). These measures should be audited to assist in recognizing and quantifying the pain experienced by patients in the immediate postoperative period but also for developing local anaesthesia guidelines and pain management protocols. Within the recovery area facilities should be available to allow for the safe administration of analgesia to cover pain and discomfort not sufficiently ameliorated by the choice of perioperative anaesthesia and analgesia.

Before transfer to the day surgery ward, patients should be awake, protective reflexes returned and pain controlled. Before discharge home from the day ward, nurse-led discharge scoring systems (e.g. British Association of Day Surgery's discharge checklist for day surgery),¹⁹ post-anaesthetic discharge scoring system (PADSS), or modified post-anaesthetic discharge scoring system (MPADSS)²⁰ should be applied to assess patient readiness for discharge. These scoring systems include components of pain management.

Discharge analgesia

After discharge home approximately one-third of day surgery patients continue to experience moderate-to-severe pain. The pain is often worse on the second postoperative day when patients start to mobilize. All patients should therefore be discharged home with an adequate supply of analgesia with clear instructions for regular administration and to alleviate breakthrough pain. Free pre-packaged take-home medications should be provided before discharge as they are convenient and prevent delays and unnecessary visits to the hospital pharmacy. Needless to say provisions should consider discharge before weekends and local holidays. For patient queries, a point of contact telephone number will help if questions arise after discharge.

Conclusion

Day surgery encourages patients to mobilize soon after their surgery and empowers them to manage their own pain control. To achieve this, preoperative patient education and high-quality perioperative pain management including pain management after discharge are paramount.

Analgesic techniques that do not increase the incidence of postoperative adverse outcomes, and are safe and cost-effective, facilitate early ambulation.

The financial benefits of day surgery over inpatient surgery are now well established. With increasing healthcare demands for more day-case procedures, multi-modal analgesic techniques in the perioperative period with good extension of analgesia into the postoperative discharge period are essential.

Declaration of interest

None declared.

MCQs

The associated MCQs (to support CME/CPD activity) can be accessed at www.access.oxfordjournals.org by subscribers to BJA Education.

References

1. AAGBI and BADS. Guidelines on day case and short stay surgery. *Anaesthesia* 2011; **66**: 417–34
2. McGrath B, Elgendy H, Chung F, Kamming D, Curti B, King S. Thirty percent of patients have moderate to severe pain 24 hr after ambulatory surgery: a survey of 5,703 patients. *Can J Anesth* 2004; **51**: 886–91
3. Lovatsis D, José JB, Tufman A, Drutz HP, Murphy K. Assessment of patient satisfaction with postoperative pain management after ambulatory gynaecologic laparoscopy. *J Obstet Gynaecol Can* 2007; **29**: 664–7
4. Kavanagh T, Hu P, Minogue S. Daycase laparoscopic cholecystectomy: a prospective study of post-discharge pain, analgesic and antiemetic requirements. *Ir J Med Sci* 2008; **177**: 111–5
5. Elvir-Lazo OL, White PF. The role of multimodal analgesia in pain management after ambulatory surgery. *Curr Opin Anaesthesiol* 2010; **23**: 697–703
6. Beauregard L, Pomp A, Chinire M. Severity and impact of pain after day surgery. *Can J Anaesth* 1998; **45**: 304–11
7. Kamming D. Day surgery analgesia. In: Bromley L, Brandner B, eds. *Acute Pain*. Oxford, UK: Oxford University Press, 2010; 59
8. White PF, Sacan O, Tufanogullari B, Eng M, Nuangchamng N, Ogunnaike B. Effect of short-term postoperative celecoxib administration on patient outcome after outpatient laparoscopic surgery. *Can J Anaesth* 2007; **54**: 342–8
9. Claxton AR, McGuire G, Chung F, Cruise C. Evaluation of morphine versus fentanyl for postoperative analgesia after ambulatory surgical procedures. *Anesth Analg* 1997; **84**: 509–14
10. Macintyre PE, Schug SA, Scott DA, Visser EJ, Walker SM. *Acute Pain Management: Scientific Evidence*, 3rd Edn. APM: SE Working Group of the Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Melbourne: ANZCA & FPM, 2010
11. Peng PW, Wijeyesundera DN, Li CC. Use of gabapentin for perioperative pain control—a meta-analysis. *Pain Res Manag* 2007; **12**: 85–92
12. Blaudszun G, Lysakowski C, Elia N, Tramèr MR. Effect of perioperative systemic α -2 agonists on postoperative morphine consumption and pain intensity systematic review and meta-analysis of randomized controlled trials. *Anesthesiology* 2012; **116**: 1312–22
13. Vigneault L, Turgeon AF, Côté D et al. Perioperative intravenous lidocaine infusion for postoperative pain control: a meta-analysis of randomized controlled trials. *Can J Anaesth* 2011; **58**: 22–37
14. Bell RF, Dahl JB, Moore RA, Kalso E. Perioperative ketamine for acute postoperative pain. *Cochrane Database Syst Rev* 2006; CD004603
15. Ilfeld BM. Continuous peripheral nerve blocks: a review of the published evidence. *Anesth Analg* 2011; **113**: 904–25
16. Choi S, Rodseth R, McCartney CJL. Effects of dexamethasone as a local anaesthetic adjuvant for brachial plexus block: a systematic review and meta-analysis of randomized trials. *Br J Anaesth* 2014; **112**: 427–39
17. Golf M, Daniels SE, Onel E. A phase 3, randomized, placebo-controlled trial of DepoFoam[®] bupivacaine (extended-release bupivacaine local anesthetic) in bunionectomy. *Adv Ther* 2011; **28**: 776–88
18. Camponovo C, Fanelli A, Ghisi D, Cristina D, Fanelli G. A prospective, double blinded, randomized, clinical trial comparing the efficacy of 40 mg and 60 mg hyperbaric 2% prilocaine versus 60 mg plain 2% prilocaine for intrathecal anaesthesia in ambulatory surgery. *Anesth Analg* 2010; **111**: 568–72
19. British Association of Day Surgery. *Nurse Led Discharge*. London: BADS, 2009
20. Chung F, Chan V, Ong D. A post-anaesthetic discharge scoring system for home readiness after ambulatory surgery. *J Clin Anesth* 1995; **7**: 500–6