



Regional anaesthesia and pain relief after surgery

Michael J Fredrickson, R Ross Kennedy

Pain relief after surgery is important for many reasons beyond the ethical duty to minimise pain and suffering.¹ The physiological insult of surgery is lessened,² recovery and general patient wellbeing may be improved with patients returning to normal activities faster,³ and the incidence of chronic pain is reduced.⁴ Despite widespread understanding of these principles there are frequent impediments to implementing high quality pain relief. Current practice emphasises “multimodal analgesia”. Although this is commonly understood to mean using a range of drugs, appropriate use of local anaesthetics is frequently an important part of a multimodal approach to pain relief after surgery.²

In this issue of the *Journal*, Aung and colleagues⁵ discuss the use of abdominal wound catheters as an alternative to epidural administration of local anaesthetics.

The peripheral application of local anaesthetics has increased dramatically in recent years through the increased use of interventional regional anaesthesia/analgesic techniques. While this change has been due in part to the perceived complexity and complications of optimal management of epidural blockade mentioned by Aung et al, and to developments in the available analgesic agents, two technological breakthroughs have played a key role. These are ultrasound guidance for nerve localisation and perineural catheters for providing extended peripheral nerve blockade. Both technologies emerged in the late 1990s, and have been progressively incorporated into routine clinical practice over the last decade.

Advances in ultrasound technology have made high quality portable ultrasound machines, capable of nerve localisation for local anaesthetic deposition, commonplace in the operating suite. In addition to allowing visualisation of nerves and plexuses, real-time ultrasound guidance has, for the first time, enabled visualisation of important adjacent structures, the advancing needle and subsequent local anaesthetic spread.

Evidence from randomised controlled trials have shown a reduction in the number of needle passes, small reductions in procedure related pain and a reduction in procedural time when compared to traditional nerve localisation techniques.⁶ However, ultrasound has not been shown to unequivocally increase block success rates, as success rates were already high with blocks performed by experienced practitioners using existing techniques.⁶ Intuition would suggest that real-time needle guidance should translate into a reduction in iatrogenic needle related complications; to date this has only been demonstrated with respect to inadvertent vascular puncture.⁷

The most feared complication of peripheral nerve blocks, iatrogenic nerve injury, is fortunately very rare so it is unlikely to ever be demonstrated whether real-time ultrasound needle guidance has any impact on this complication.⁷ Although the evidence of reduced risk is equivocal, ultrasound has resulted in more patients

receiving perioperative peripheral nerve blockade, which has been good for the perioperative care of surgical patients.

While ultrasound technology has attracted most of the attention over the last 5 years, the development and availability of perineural catheters, allowing continuous peripheral nerve blocks, has had the greatest positive impact on the perioperative experience of orthopaedic patients.⁸ The management of pain after shoulder surgery exemplifies this development.⁸

As recent as 2003, it was not uncommon for patients having had rotator cuff surgery to require a 2-night hospital admission for intravenous opioid. Now, with our ability to accurately and safely place catheters at the appropriate position along the brachial plexus, together with the availability of affordable ambulatory local anaesthetic delivery systems, we can provide prolonged brachial plexus blockade in the ambulatory setting (typically 3–5 days), thereby providing extended potent postoperative analgesia largely devoid of opioid related side effects.

The technique has been shown to be well tolerated and associated with high patient satisfaction.^{9,10} Consequently, rotator cuff procedures can now be performed as overnight or even day stay procedures.⁹ Similar results have been achieved for a wide range of painful peripheral limb surgery and promising results have been reported for major knee surgery.^{11,12}

Although many still consider continuous epidural analgesia the gold standard for pain relief after abdominal surgery, there are valid concerns about the risks and costs of postoperative epidurals. The development of peripheral catheters and self contained local anaesthetic delivery systems have allowed widespread use of wound catheters in abdominal surgery as a simpler alternative.

The audit of Aung et al suggest that although the improvement in analgesia is not as spectacular as seen in peripheral orthopaedic surgery, abdominal wound catheters can be used simply and safely in a wide variety of hospital settings.

Competing interests: MJF: Research support from I-Flow International.

Author information: Michael J Fredrickson, Clinical Senior Lecturer, Department of Anaesthesiology, University of Auckland, Auckland; R Ross Kennedy, Clinical Associate Professor, Department of Anaesthesia, University of Otago, Christchurch

Correspondence: Assoc Prof Ross Kennedy, Dept of Anaesthesia, Christchurch Hospital, Private Bag 4710, Christchurch, New Zealand. Email: ross.kennedy@otago.ac.nz

References:

1. Cousins MJ, Brennan F, Carr DB. Pain relief: a universal human right. *Pain*. 2004;112:1–4.
2. Kehlet H, Wilmore DW: Multimodal strategies to improve surgical outcome. *Am J Surg*. 2002;183:630–41.
3. Ilfeld BM, Mariano ER, Girard PJ, et al. A multicenter, randomized, triple-masked, placebo-controlled trial of the effect of ambulatory continuous femoral nerve blocks on discharge-readiness following total knee arthroplasty in patients on general orthopaedic wards. *Pain*. 2010 Sep;150(3):477–84. Epub 2010 Jun 22.
4. Brennan TJ, Kehlet H: Preventive analgesia to reduce wound hyperalgesia and persistent postsurgical pain: not an easy path. *Anesthesiology*. 2005;103:681–3.

5. Aung ET, Fluri P, Aiono S. Introduction of continuous regional analgesia via wound catheters in a peripheral hospital. *N Z Med J*. 2010;123(1324). <http://www.nzma.org.nz/journal/123-1324/4380/content.pdf>
6. Liu SS, Ngeow J, John RS. Evidence basis for ultrasound-guided block characteristics: onset, quality, and duration. *Reg Anesth Pain Med*;35:S26–35.
7. Neal JM. Ultrasound-guided regional anesthesia and patient safety: An evidence-based analysis. *Reg Anesth Pain Med*;35:S59–67.
8. Fredrickson MJ, Krishnan S, Chen CY. Postoperative analgesia for shoulder surgery: a critical appraisal and review of current techniques. *Anaesthesia*. 2010;65:608–24.
9. Fredrickson MJ, Ball CM, Dagleish AJ. Successful continuous interscalene analgesia for ambulatory shoulder surgery in a private practice setting. *Reg Anesth Pain Med*. 2008;33:122–8.
10. Ilfeld BM, Enneking FK. Continuous peripheral nerve blocks at home: a review. *Anesth Analg*. 2005;100:1822–33.
11. Williams BA, Kentor ML, Vogt MT, et al. Reduction of verbal pain scores after anterior cruciate ligament reconstruction with 2-day continuous femoral nerve block: a randomized clinical trial. *Anesthesiology*. 2006;104:315–27.
12. Fredrickson MJ, Danesh-Clough TK. Ambulatory continuous femoral analgesia for major knee surgery: a randomised study of ultrasound-guided femoral catheter placement. *Anaesth Intensive Care*. 2009;37:758–66.