

The role of regional anaesthesia in the management of acute pain

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Abstract

Regional anaesthesia is a powerful tool in the management of acute pain and offers additional advantages, although there are caveats. For certain sub-groups of patients the advantages are greater than others; either in avoidance of opioid-based analgesic regimes, or benefits related to the direct use of local anaesthetics. The future role of regional anaesthesia in the context of acute pain is expanding, and key directions are focussing its role as part of a multimodal enhanced recovery package, and also the role of local anaesthetics in perioperative cancer care.

Keywords Acute pain; adjuvants; complications; local anaesthetics; regional anaesthesia

Royal College of Anaesthetists CPD Matrix: 1D02, 2E01, 2G01

The traditional model of escalating analgesia according to the World Health Organization pain ladder is internationally accepted and provides a stepwise systematic approach to pharmacologically managing pain of increasing severity. At each step of this process a consideration must be given to the use of adjunctive drugs. One key approach which is often excluded from such descriptions of the adjunctive approaches is that of regional anaesthesia. However, with increasing severity of pain, the ability of regional anaesthesia to effectively manage it becomes more pronounced, whilst being able to minimize the side effects associated with more extensive opioid use. (Figure 1) This article aims to explore the role of regional anaesthesia and analgesia within the context of acute pain.

Regional anaesthesia is the application of local anaesthetic to tissues or around nerves to provide a temporary reversible blockade of nerve transmission; this may render a part or parts of the body insensate or provide motor or autonomic blockade.

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Learning objectives

After reading this article, you should be able to:

- describe the rationale for regional anaesthesia (RA) in acute pain
- describe the advantages and disadvantages of RA
- contrast RA with alternatives
- describe key patient groups for whom RA may be particularly beneficial
- appreciate additional benefits of using RA in an acute pain setting

Postoperative, or surgical pain, describes a set of conditions where there is a known quantity of tissue injury, and therefore a reasonably predictable estimate of pain severity can be made. In this context, the stepwise model outlined above may be used from 'top-down', including the use of adjuncts such as regional anaesthesia.

Regional anaesthesia in comparison to systemic pharmacotherapy

Successful regional anaesthesia completely ablates (or significantly reduces) afferent nociceptive traffic from the area of tissue injury/surgery. This makes it a very powerful tool in reducing unwanted side effects from strong opioid-based analgesia and other adjuncts.

Specific advantages and disadvantages of regional anaesthesia are outlined in Table 1.

Complications associated with regional anaesthesia

Every intervention or procedure performed in medicine carries some risk with it and regional anaesthesia is no different. The risk of complication will be very dependent on the expertise of the anaesthetist and to a lesser extent the anatomy of the patient. There are some 'complications' that can be expected with nearly every block, for example motor blockade, phrenic and stellate ganglion nerve block when performing an interscalene approach to the brachial plexus. This is simply due to the proximity of unrelated nerves to the targeted sensory nerves.

Other complications that Regional Anaesthesia-United Kingdom suggests mentioning to patients during the consent process are infection, haematoma, local anaesthetic toxicity and nerve injury.

Nerve injury can be temporary (up to 10% in the days following the nerve block) or permanent (1.5:10,000). The exact aetiology of neuronal injury is varied; but is increased in patients with pre-existing neuropathy, and prolonged exposure of the nerve to high concentrations of local anaesthetic agents. The risk of nerve injury due to intraneural injection can be minimized with sound knowledge of the anatomy, use of a fascial plane as end-point for injection rather than the nerve structure, use of ultrasound and nerve stimulator for dual monitoring during procedure, and using a pressure-monitoring device to ensure pressure during injection is as low as possible. Table 2 identifies advantages and disadvantages of regional anaesthesia in comparison to other analgesic strategies.

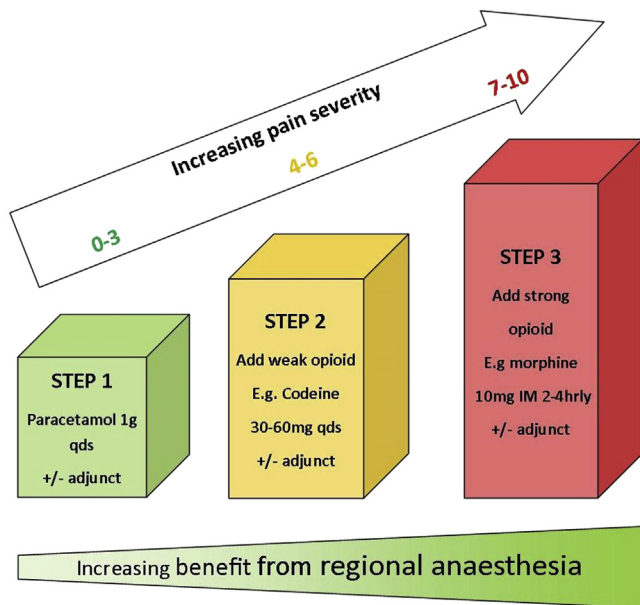


Figure 1 Demonstrating the relationship of pain severity to the WHO analgesic ladder and the potential benefit from regional anaesthesia.

Complex patients/comorbidities

The patient with severe respiratory disease

Unwanted side effects limit the effectiveness of opioid-based analgesic regimes in severe respiratory disease. Regional anaesthesia allows the provision of analgesia whilst allowing compliance with respiratory physiotherapy, an effect particularly pronounced following major abdominal or thoracic surgery, or following thoracic trauma, including extensive rib fractures. This benefit may reduce the high mortality especially associated with thoracic trauma in the older person.

However, techniques such as interscalene brachial plexus block, or a high intrathecal block, may compromise respiratory function; care must be used to choose the correct technique to obtain the benefits without the complications.

The older patient

Due to alteration in pharmacodynamics with ageing, such as increased time to elimination, older patients may be more susceptible to the unwanted side effects of systemic analgesics, such as constipation, nausea and vomiting, confusion, drowsiness and respiratory depression.¹ It is recommended opioids be used with caution and at smaller doses in this age group.

Regional anaesthesia has demonstrable benefits for the older person with a fractured neck of femur, where patients with femoral nerve blocks had less delirium, earlier mobilization and less systemic opioid. Emerging evidence suggests a mortality benefit in this group, and femoral nerve blocks or fascia iliaca blocks are now recommended. This benefit is also clearly demonstrated with epidural analgesia in the older person following major surgery.

The paediatric patient

Children often need to undergo elective or emergency surgical procedures, but have a varying level of understanding of pain and the reasons for it. Regional anaesthesia has been clearly

shown to provide beneficial effects beyond that of surgical site infiltration; continuous catheter techniques can be safely used to prolong the analgesia for a required duration safely. Although these techniques are performed under general anaesthesia, the complication rate is no higher than that in the adult population, and is significantly lower than the use of neuraxial approaches.

Caution must be used with the site and total dose administered of local anaesthetic to avoid local anaesthetic toxicity.

The opioid-tolerant patient

Patients with a history of chronic pain treated with opiates, or patients who have recreationally abused opiates may get limited analgesic benefits from this class of drugs due to tolerance, thought to be caused by changes to opiate receptor type, location and functionality. This can make them very difficult to manage when presenting with acute pain, and these patients may be susceptible to be under-analgesed, or have escalating analgesic requirements. There is also a threat from mis-prescription of the patient's standard opioid regime, and either under- or over-dosing.

Regional anaesthesia in this setting provides the additional analgesic needs whilst allowing the patient to maintain their usual opioid dosing to avoid withdrawal phenomenon.

The patient with cancer

Regional anaesthesia has been shown in multiple trials to be linked to an improved outcome in reducing cancer recurrence. Breast cancer remission was found to be 94% in a group of patients who had paravertebral blocks compared with 77% in a group who had morphine for analgesia.² A similar effect has been seen in prostate and ovarian cancer with epidural vs general anaesthetic and opioids^{3,4} and there is also evidence that regional technique may improve long-term outcomes following melanoma surgery.⁵ However, no relationship between epidural use and outcome has been shown with bowel cancer and this area of investigation is still really in its infancy.⁶ The relationship between cancer outcomes and regional techniques is

Advantages and disadvantages of regional anaesthesia in acute pain management

Advantages	Disadvantages
Exceptional analgesia	Requires skills, training and equipment
Avoidance of opioids/others	Invasive procedure
May avoid general anaesthetics	Limited duration only
Reduction in sensitization	May cause motor block
Preventive for chronic post-surgical pain (especially after thoracotomy, abdominal, breast surgery)	Site-specific side effects (motor block etc)
	Complication rate (nerve damage, infection, haematoma)

Table 1

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