

Does regional anaesthesia improve outcome after surgery?

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Abstract

There is conclusive evidence that regional anaesthesia provides better postoperative analgesia than systemic opioid techniques. Regional anaesthesia also has the potential to improve the functional outcome from surgery, although proving this in a clinically relevant way is challenging; many studies are inconclusive with methodological weaknesses making comparison difficult and offering conflicting evidence. Systematic reviews offer better evidence that regional anaesthesia improves outcome but both anaesthetic and surgical practice have evolved over time, so older data may not be relevant to current practice. Regional anaesthesia improves outcome only when incorporated into a structured postoperative rehabilitation and recovery programme (enhanced recovery), using the effective analgesia provided to achieve specific targets. These targets include early mobilization, active physiotherapy and early return to enteral nutrition. Other benefits of regional anaesthesia (reduced blood loss, lower risk of thromboembolic events and duration of ileus) also contribute to a reduction in postoperative morbidity. However, unless the postoperative recovery programme is modified to incorporate these benefits into a patient's recovery, the full impact of regional anaesthesia on surgical outcome will not be realized.

Keywords Epidural; regional anaesthesia; regional analgesia; spinal; stress response; surgical outcome

Royal College of Anaesthetists CPD Matrix: 2G01

Regional analgesia versus systemic opioid analgesia

Major surgery is associated with significant postoperative pain and other morbidity. Effective analgesia is both a humanitarian and a clinical goal and there is good evidence that regional anaesthesia/analgesia (especially epidural analgesia) is superior to opioid-based analgesia.^{1,2} For this reason alone it may be argued that epidurals should be offered whenever clinically justified 'in many cases pain relief alone is an unambiguous clinical indication for postoperative epidural analgesia'.³

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Learning objectives

After reading this article, you should be able to:

- understand the potential benefits achievable with regional anaesthesia
- be aware of the limitations of the available data in favour of regional anaesthesia on overall outcome from surgery
- understand how to incorporate regional anaesthesia into current anaesthetic and surgical practice, to enable faster recovery and better functional outcome

A central neuraxial technique or a major peripheral nerve block reduces or avoids the need for intraoperative opioids compared with general anaesthesia. The avoidance of opioids improves the outcome of early recovery: time to consciousness, the incidence of postoperative nausea and vomiting, return of full cognitive function, time to first supplementary analgesic, etc. Therefore, the analgesic benefits of regional anaesthesia are twofold – lower pain scores from the better quality of analgesia available with regional anaesthetic techniques and the avoidance of opioid-related side effects (Box 1). The opioid-sparing benefits of regional anaesthesia extend into the postoperative recovery period for the duration of the regional technique used; Block et al.² showed that epidural analgesia provided superior postoperative analgesia compared with parenteral opioids on each postoperative day, for all types of surgery, irrespective of the site of the epidural and the drug regimens used. Intravenous patient-controlled analgesia (PCA) and other opioid-based analgesic techniques have not been shown to influence outcome of surgery despite evidence of satisfactory analgesia and good patient satisfaction scores.

Severe, poorly controlled acute pain is a major factor in the development of post surgical chronic pain; many patients (about 50% for major breast surgery or thoracotomy) develop chronic pain following surgery. Paravertebral blocks, following thoracotomy and breast surgery, significantly reduce the incidence of chronic pain syndromes.

Benefits of regional analgesia compared with systemic opioid-based analgesia

- Lower pain scores (visual-analogue scores or verbal-rating scores)
- Less time spent in post-anaesthesia recovery units (PACU)
- Less nursing time and lower nursing dependency in PACU
- Longer time to first analgesic request
- Fewer requests for rescue analgesia and lower total dose required
- Reduced opioid-based side effects
 - Respiratory depression
 - Nausea and vomiting
 - Ileus
- Earlier discharge home from day-surgery units
- Reduced unplanned admission rate for day-surgery patients
- Increased patient satisfaction scores

Box 1

Pre-emptive or preventative analgesia?

The ability to reduce the severity and duration of postoperative pain by instituting effective analgesia before the onset of the pain – *pre-emptive analgesia* is an attractive concept. Although it is possible to demonstrate in animal models, it remains unproven in human studies. Systematic reviews by the Procedure Specific Postoperative Pain Management working group (PROSPECT) have confirmed that the most important factor in treating surgical pain effectively is to ensure that effective analgesia is given in a timely manner during the peri-operative period so that its effects peak in the immediate recovery phase and continue appropriately thereafter – *preventative analgesia*.⁴

Can anaesthesia influence outcome of surgery?

*Epidural analgesia with local anaesthetics has the greatest theoretical potential to affect major outcomes and has been the most thoroughly investigated technique.*¹

Regional anaesthesia has been studied in all three perioperative phases to assess its impact on surgical outcome.

Preoperative

Preoperative regional anaesthesia has little influence on postoperative outcome, although it improves the management of pre-existing pain states before surgery.

Intraoperative

With advances in surgical and anaesthetic techniques, morbidity and mortality associated with surgery and anaesthesia continue to decrease. Serious adverse outcome from anaesthesia is extremely uncommon (less than one death per 185,000 procedures, directly attributable to anaesthesia). The patient's age, preoperative fitness, and the surgical procedure remain the most important risk factors for intraoperative major morbidity or mortality; in general, the choice of regional and general

anaesthesia for surgery makes little or no difference to outcome, in the absence of avoidable errors or individual patient risk factors.

Postoperative

There is a large database of publications confirming the advantages of regional anaesthesia over systemic opioids for specific outcome benefits for different surgical procedures (Table 1). PROSPECT have reviewed postoperative analgesia for 11 major surgical procedures, and regional anaesthesia plays an important role in optimizing both analgesia and outcome for all these procedures, provided that the appropriate techniques are employed.⁴

Major neuraxial regional techniques modulate both the neural and endocrine components of the surgical stress response whereas opioid analgesia has either a neutral or negative effect (Table 2). The effects of thoracic epidural blockade on the stress response are less marked than a lumbar epidural or spinal anaesthetic because of less complete block of the lumbar autonomic nerve supply to the abdominal viscera and lower limbs. Major peripheral nerve blocks also have a localized effect on the autonomic nerve system, inducing an anti-inflammatory response in the affected limb.

It is easier to investigate the influence of regional anaesthesia on a single parameter of the stress response than on overall outcome. Consequently, the benefits of regional anaesthesia on single systems are more evidence-based than the effects on overall surgical outcome (Table 3). Some evidence remains conflicting (e.g. the influence of regional anaesthesia on overall mortality rates, where there is no clear effect demonstrable).

The benefits of neuraxial techniques over systemic opioid-based general anaesthesia have been documented for many years. However with recent improvements in preoperative patient optimization and perioperative care (fluid balance, temperature control, thromboprophylaxis regimens, etc.) the gap

Benefits of regional anaesthesia compared with on-demand systemic opioids or intravenous patient-controlled analgesia

Technique	Surgery	Benefits compared with systemic analgesia
Interscalene brachial plexus	Shoulder replacement or major arthroscopic surgery	Improved pain scores, earlier discharge, improved rehabilitation
Paravertebral	Breast surgery Thoracotomy	Decreased pain and PONV, earlier discharge Decreased pain and haemodynamic dysfunction (compared with epidural), improved oxygenation, decreased risk of chronic pain
Thoracic epidural	Renal surgery Pulmonary/cardiac surgery	Decreased pain and haemodynamic dysfunction (compared with epidural) Decreased pain, improved pulmonary mechanics, faster recovery, reduced risk of perioperative ischaemia
Lumbar epidural	Upper abdominal surgery	Decreased pain, ileus, PONV, pulmonary dysfunction
Spinal or epidural	Lower abdominal, urogenital	Decreased pain, ileus, blood loss, risk of DVT, PONV
Lower limb block	Lower limb surgery (hip/knee joint surgery)	Decreased pain and blood loss, earlier mobilization, improved rehabilitation
	Lower limb surgery (knee joint/foot and ankle)	Decreased pain, earlier mobilization, improved rehabilitation

DVT, deep vein thrombosis; PONV, postoperative nausea and vomiting.

Table 1

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