The use of central neuraxial blockade can provide targeted pain relief. Here we discuss the benefits of epidural anaesthesia, the drugs that are used and some common adverse events that can occur.

An update on epidural anaesthesia

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Regional anaesthesia differs from general anaesthesia in that it is used to target a specific part of the body. The term encompasses the use of local anaesthetic drugs (often in combination with low-dose opioids) in central neuraxial blocks and peripheral nerve blocks. This article focuses on the use of central neuraxial blocks, specifically epidurals.

Central neuraxial blockade

Spinal and epidural anaesthesia are collectively termed “central neuraxial blockade” (CNB). Spinal (or intrathecal) anaesthesia involves injecting a local anaesthetic, with or without an opioid, into the cerebrospinal fluid in the subarachnoid space. If the drugs are injected or infused into the epidural space surrounding the spinal fluid sac this is termed epidural anaesthesia. The extent and height of the block are determined by the volume and concentration of drug that is used and the site of catheter insertion.

CNB is often used in obstetrics, and is used in some 8–10% of all operations in the UK (examples include major thoracic, abdominal or lower-limb surgery).

The “Third national audit project” (NAP3) of the Royal College of Anaesthetists contains an overview of the potential benefits of CNB. Although studies are generally underpowered and lack standardisation in design, improved analgesia has been shown repeatedly. Many studies have demonstrated reductions in mortality, with the strongest evidence existing for high-risk patients undergoing major surgery. Other benefits for CNB after major surgery include:

- Reduced infective and non-infective respiratory complications and respiratory failure
- Reduced cardiovascular complications
- Reduced gastrointestinal complications (including delayed recovery of normal function)
- Reduced thromboembolic risk (it is recommended by the National Institute for Health and Clinical Excellence for this reason)

A shorter length of hospital stay with CNB has only been demonstrated as part of “enhanced recovery” trials, which incorporate a range of other interventions (including planned mobilisation and regularly administered baseline analgesia).

Epidural anaesthesia

Generally, epidural infusions contain an opioid analgesic (usually diamorphine or fentanyl) and a local anaesthetic. Bupivacaine is the most commonly used local anaesthetic. There is some evidence that, in high doses, levobupivacaine could be safer than bupivacaine; however, it is also more expensive. In some centres, this additional cost is justified on the grounds of potential improved patient safety (eg, in the case of accidental administration into the wrong site or overdose). This may be particularly relevant in areas where non-anaesthetists administer epidural blocks.

Because epidural administration requires lower opioid doses than systemic treatment, epidural administration is usually associated with fewer side effects (however, other adverse events — eg, due to the local anaesthetic or the complexity of administration — can occur).

Solutions for epidural administration must be sterile and preservative-free. Standard bags of epidural “mixes” (eg, fentanyl 2µg/ml plus bupivacaine 0.1%) can be purchased from special manufacturers. Some patients will not tolerate epidural opioids (see adverse effects below) so a local anaesthetic alone can be used (eg, bupivacaine 0.25%).

Although epidurals are administered as continuous infusions in most centres, the use of patient-controlled epidural analgesia (PCEA) is increasing in popularity. PCEA gives the patient a greater degree of control over his or her pain relief and has the potential to minimise adverse effects by limiting doses required, although evidence supporting this is conflicting.

Intravenous administration of drugs meant for epidural administration has been specified as a “never event” by the Department of Health. Adequate training and multidisciplinary working are vital for safe epidural treatment and auditing clinical practice is also important; best practice guidance has recently been updated.

Sensory and motor block testing

Generally, the aim of epidural anaesthesia is to achieve blockade of sensory nerves, but to avoid motor block.

Sensory block testing is used to assess whether an epidural is working effectively and covering the intended area. Pin prick assessment has largely been superseded by cold testing (using either ice or ethyl chloride spray). The area of reduced sensation should cover the wound site and should not routinely exceed T4 (the nipple level); higher blockade can cause hypotension, due to bilateral blockade of upper thoracic (cardiac) sympathetic nerves, or difficulty breathing, caused by blockade of nerve supply to the intercostal muscles. Small adjustments to the block height (or side) can be made gravitationally by changing a patient’s position, although reducing or discontinuing the infusion may be required until control of block height returns.

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Reduced thromboembolic risk (it is recommended by the National Institute for Health and Clinical Excellence for this reason)
Motor block is tested by assessing a patient's ability to move his or her legs. This is important to determine the extent to which a patient can mobilize and the degree of assistance needed. A sudden onset of motor block can indicate migration of the epidural catheter, epidural abscess or haematoma formation. Some degree of transient motor block is expected when administering opioids in lower thoracic and lumbar epidurals, particularly initially and following bolus doses.

**Adverse effects**

**Respiratory depression and sedation**

Respiratory depression and sedation caused by the opioid component of the epidural can be minimized by providing supplemental oxygen and encouraging deep breathing exercises. A patient's level of sedation should be monitored closely since this will give the earliest warning of potential respiratory depression.

Trusts should have guidance detailing management of sedation, which is usually measured using the "AVPU score", an acronym for alert, (responding to) voice, (responding to) pain, and unconscious. If a patient is not alert or responding to voice, particularly if the respiratory rate is also reduced (ie, less than eight breaths per minute), the epidural should be reduced or stopped and naloxone may be required. Naloxone is usually administered as an intravenous bolus followed by continuous infusion due to its short half-life.

**Hypotension**

Commonly, hypotension occurs perioperatively and can be caused by a combination of factors including general anaesthesia, hypovolaemia and epidural infusion of local anaesthetic. Clinicians should assess patients carefully before assuming that hypotension is caused by an epidural. Following exclusion of other potential causes, management options include administration of fluids, reducing or stopping the epidural, or administration of vasopressors (eg, phenylephrine) or inotropes.

**Itch**

Epidural-associated itch can be severe, prolonged and distressing for the patient. Although this opioid-associated effect is not histamine-related, antihistamines (eg, chlorphenamine) are commonly used for its treatment. Ondansetron and low-dose infusions of naloxone have been found to be effective for the treatment of opioid-induced pruritus, so may be considered for the management of epidural-associated itch.

**Nausea and vomiting**

Propylactic and "rescue" antiemetics should be prescribed for patients at high risk of nausea and vomiting in the postoperative period; this includes patients receiving opioids epidurally.

**Risk of permanent injury**

Paralyse is a feared complication of epidural analgesia among both healthcare professionals and the general population. Cook and colleagues reviewed the incidence of major complications of CNB in the UK (eg, epidural abscess or haematoma) and found that the incidence of permanent injury was between one in 24,000 and one in 54,000 — lower than previously reported in smaller case series.

**Epidural removal**

An epidural catheter should only be removed if 12 hours have elapsed since the last dose of low molecular weight heparin (LMWH). A further two hours should be allowed to pass before administering the next dose. Many trusts routinely give prophylactic LMWH at 6pm, allowing a useful window for catheter removal the following day (morning to early afternoon).

Generally, warfarin is stopped before major surgery and will not be restarted until the epidural catheter is removed (for the newer anticoagulants used in orthopaedic surgery, consult local policies or the product literature). The United Kingdom Clinical Pharmacy Association has produced practical guidance on the removal of epidurals for patients receiving anticoagulants.

**Toxicity**

Local anaesthetic toxicity, characterised by convulsions, cardiac arrhythmias and cardiac arrest, is treated with lipid emulsion (Intralipid). Detailed guidance on the management of local anaesthetic toxicity is available on the Association of Anaesthetists of Great Britain and Ireland website. Intralipid should be stored in an easily accessible location, made known to nursing staff and prescribers.

**References**


