

Title: Epidural Analgesia

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1. Introduction

Epidural infusions of local anaesthetic and opioid offer an excellent method of postoperative analgesia after thoracic, abdominal and lower limb surgery. Epidural analgesia provides better pain relief than parenteral opioids. It can reduce mortality after surgery and may lead to reductions in postoperative complications, particularly respiratory and cardiovascular, but it has the potential for producing rare, but serious, complications.

The infusion is delivered via an epidural catheter, which is normally placed in position before surgery commences by the anaesthetist providing anaesthetic care for the patient. Occasionally this catheter may be placed following surgery or trauma. (Please see "Catheter Insertion" for further details.)

2. Purpose/Scope

To aid with the prescribing, administration and monitoring of patients receiving epidural analgesia.

3. Responsibilities

Those responsible for the prescribing, administration and monitoring of patients receiving epidural infusions of local anaesthetic, with or without opioid, should read and understand this guideline.

4. Guideline/Procedure

I. Indications

Epidural analgesia and/or epidural anaesthesia may be indicated in patients undergoing:-

- major intra abdominal surgery
- major thoracic surgery
- vascular surgery to the lower limbs
- major orthopaedic surgery

The decision to use epidural analgesia will normally be made following a discussion between the patient, the anaesthetist and the operating surgeon.

II. Contraindications

- Patient refusal
- Significant coagulopathy
 - Platelet count less than $100 \times 10^9 /l$
 - INR 1.5 or greater
 - Anticoagulant/anti-thrombotic drugs may preclude epidural use
- Allergy to any of the drugs to be used
- Uncorrected hypovolaemia
- Localised skin infection at the proposed level of the epidural injection

Epidural infusion analgesia should not be carried out in any area that lacks an appropriate number of appropriately trained staff.

III. Cautions

Care should be taken when considering the use of epidural analgesia in patients with:

- Cardiac disease, particularly those with limited ability to increase their cardiac output in response to vasodilation– eg aortic stenosis, HOCM
- Previous back surgery. This may make an epidural more difficult to place, less likely to work satisfactorily and increase the risk of some complications.

IV. Catheter insertion

The epidural catheter will be inserted in the operating theatre by an appropriately trained anaesthetist.

- An epidural pack is available in the operating theatre which contains all the equipment needed for the procedure. A 16G epidural needle and catheter is usually used at the BRI. 18 G kits are available.
- Full asepsis must be maintained
- An inline bacterial filter (0.22 micron) must be used.
- A clear plastic sterile dressing will be applied to the entry site
- In addition, a small amount of surgical topical skin adhesive (Liquiband) may be used at the point of entry to ensure fixation.
- Clearly label all catheters/lines and pumps

V. Catheter care

- The skin entry site should be checked regularly by inspection through the clear plastic dressing. Try to avoid disturbing the dressing, or redressing the catheter, as this is likely to result in dislodgment of the catheter. At least daily checking is suggested.
- If the site appears infected (marked redness, pus or significant tenderness) it should be removed and the tip sent for microbiological investigation. If in doubt please contact the acute pain service (APS).

VI. Monitoring

The following monitoring must be recorded **one hourly for the first 24 hours and then four hourly** thereafter (see APMC for details).

- Pain score
- Conscious level
- Nausea and vomiting score
- Intravenous site inspection
- Epidural catheter site inspection (daily)
- Opiate use via the PCAS (if used)
- Blood pressure
- Respiratory rate
- Oxygen saturation
- Leg strength assessment (Bromage scale)

VII. Adverse events

Common complications/adverse events with epidural analgesia

1. **Motor block** – the patient may complain of loss of power and/or inability to move their legs. Significant motor block is more likely if high doses of local anaesthetic are infused, but should wear off three or four hours after the infusion has been stopped. Please refer to monitoring section for further details of how to manage excessive motor block.
5. **Sensory block** – some degree of sensory block is common with epidural analgesia and numbness and/or tingling in the legs or trunk may occur. This should resolve over the course of the epidural infusion, but please refer to the monitoring section for further information. One should remember that if the patient has reduced sensation they are more at risk of developing pressure sores.
6. **Urinary retention** – can be caused by both the drugs used in the epidural infusion. The majority of patients will have a urinary catheter in place because of the nature of their surgery.
7. **Pruritis** – is common after opioids, particularly when given by the epidural route. Ondansetron 4mg iv 6 hourly may be helpful.
8. **Nausea and vomiting** - may be caused by the opiate component. Antiemetics should be prescribed.
9. **Hypotension** – Epidural blockade can cause hypotension. However, when hypotension occurs after surgery other common causes should be considered and excluded, e.g. bleeding, myocardial insufficiency, sepsis, pulmonary embolus, dehydration. If the systolic blood pressure is less than 80mm Hg, the patient should be placed in a supine position with feet elevated. Recheck the blood pressure after 5 mins. Contact the ward doctor. If the patient is hypotensive, and other causes have been excluded, it may be necessary to reduce the rate of the epidural infusion or stop it temporarily.
10. **Inadequate analgesia** – if analgesia is inadequate consider increasing the rate of the epidural infusion within the limits prescribed by the anaesthetist on the Acute Pain Management (APM) chart. Rate increases will take some time to improve analgesia. If a rate increase does not help, or if the patient is in severe pain contact the Acute Pain Service (APS) as a bolus dose may be needed to be given via the epidural. This bolus may only be administered by an anaesthetist working on behalf of the APS. The patient should lay flat/semi-recumbent for 20-30 min after the bolus has been given due to the risk of hypotension, which can occur quite rapidly. The patient should be monitored for effects i.e. improved pain relief, motor block, nausea etc. The patient's blood pressure should be recorded every 5 minutes for 15 minutes.
11. **Accidental disconnection** of the epidural infusion line from the filter at the 'patient' side of the filter presents an infection risk to the patient.

The epidural should be stopped and removed. The patient must be assessed and prescribed alternative analgesia by an appropriate route. Please contact anaesthetist/acute pain team as per contact information on the APM chart.

12. **Respiratory depression** – is unlikely with the small doses of opiates used in the standard epidural regimen. The risk increases markedly if other opiates are administered, by any route, in addition to the epidural. Such drugs should not be prescribed for the duration of the epidural. However, if respiratory depression does occur – and this will be interpreted as a respiratory rate of less than 10 per minute, Oxygen should be administered, contact the ward doctors and check again in 5 minutes. If respiratory rate is less than 8 per minute the ward doctor should treat with intravenous naloxone 50 mcgs IV every 5 minutes as required up to a total 200mcg and contact the ICU anaesthetist via switchboard. It may be necessary to discontinue the epidural temporarily.

Rare complications after epidural analgesia

1. **Local anaesthetic toxicity** – the risk is minimal with the low concentrations of drugs that are used at the BRI.

2. **Epidural Haematoma**

This rare complication (1 in 50,000) occurs from a bleeding epidural vein causing a haematoma in the epidural space. Being an enclosed space this creates pressure on nerves which can cause permanent harm. The treatment for this complication may involve surgical decompression via a laminectomy. The best results occur if surgical decompression occurs within 12 hours of the symptoms developing so prompt identification is essential. **Regular monitoring of leg strength is the best way to enable early identification.**

If an epidural haematoma is suspected then the patient must have an urgent MRI scan to confirm the diagnosis and facilitate referral to the spinal surgeons at Leeds.

3. **Epidural abscess**

This rare complication (1 in 50,000) occurs when infection gets into the epidural space leading a collection of pus there. In a similar way to an epidural haematoma this fluid collection can cause pressure on the nerves in the epidural space, which can cause permanent damage. Again urgent surgical treatment may be needed, so prompt identification is important, as highlighted under “Epidural Haematoma”

Monitoring of leg strength to aid early detection of an epidural haematoma or an epidural abscess

A degree of motor block (weakness in the legs) or sensory block (numbness or tingling in the legs) is common after an epidural or spinal anaesthetic, particularly when surgery has been on the legs or lower abdomen, and especially if the epidural has been inserted in the lumbar

spine. This should resolve within 2-4 hours if an epidural infusion is not used for postoperative pain management. If an epidural infusion is used for postoperative analgesia this may lengthen the time for complete resolution of the motor and sensory block by a few hours, possibly to as much as 24 hours. However, there should be gradual improvement in the patient's symptoms with weakness and numbness slowly improving over time. If the weakness in the legs fails to get better, or particularly if it is worsening, the epidural infusion should be stopped, and leg strength assessed half hourly. This should lead to a rapid improvement in symptoms (weakness and/or numbness). If symptoms do not resolve please contact the Acute Pain Team or on-call anaesthetic team (either via switchboard or Nucleus theatre 3 Ex 4328) **immediately** as this may be due to an epidural haematoma or epidural abscess (see section above), but they will need to review the patient ASAP in any case. Please refer to the "**Assessment and escalation process for suspected epidural haematoma and/or epidural abscess in patients with postoperative epidural infusions at the BRI**" (Appx 2) and the "**Epidural leg weakness flow chart**" (Appx 3) for further information.

If a patient with an epidural has unexplained pyrexia or back/leg pain the acute pain team/first on call intensive care anaesthetist should be contacted.

VIII. Prescribing and review

- The epidural infusion will be prescribed on the Acute Pain Management Chart (APMC) and the main drug chart, by the anaesthetist inserting the epidural catheter. They will also record an appropriate range of infusion rates. This will lie between 2 and 15 mls/hr, although it is unusual to require rates higher than 12 mls/hr.
- Patients with an epidural infusion will need oxygen therapy as prescribed by the anaesthetist, usually via a nasal cannula for the first 24hrs and each night whilst on treatment.
- Patients with an epidural infusion must be reviewed daily by the APS

IX. Equipment

1. The epidural must be infused using a CME Bodyguard 545 Epidural infusion pump and a CME Epidural infusion set (ref 100-163XE90S)
2. The infusion pump should be placed no more than 80cm (30 inches) above the infusion site.
3. Infusions in use at the BRI

Standard infusion

- Fentanyl 2 mcg/ml in 0.1% Bupivacaine 250 mls.

Opioid free infusion

- Bupivacaine 0.125% 250mls

4. The bags will be changed at 24 hours even if solution remains in the bag.
5. The epidural infusion will be connected to the epidural catheter either in theatre, or in recovery, by the anaesthetist who has sited it. If this is not possible it will be connected by another anaesthetist involved in the patient's care.
6. The epidural infusion should be labelled at two sites **before the patient leaves recovery**. One label should be placed on the epidural infusion set above the filter (upstream) and the second should be applied to the epidural catheter below the epidural filter (downstream). Both labels should be yellow and the wording should make it clear that the infusion is epidural. (Please see appendix 1 for an illustration.)
7. The epidural catheter will be secured with an occlusive dressing. This should not be removed unless necessary, to prevent dislodging of the catheter.
8. Epidural infusions can occlude. In the event of this try changing the position of the patient's back and ensure that there are no visible signs of 'kinking'. If problems persist please contact the acute pain service.
9. Please ensure that the epidural pumps are plugged in whenever possible to allow the battery to recharge.

X. Wards

Epidural infusions should only be managed on the following wards:
8,11,12,14,20,21,26,28,ICU,HDU

XI. Stopping an epidural infusion

Epidural infusions should be stopped when appropriate. This would normally be when the patient's pain is adequately controlled, their analgesia requirements can be met by standard oral analgesia and they are able to take oral medication.

An epidural should normally be discontinued after 3 to 4 days to minimise the risk of infection, but exceptionally may be continued for longer if a close check is kept for localised infection. This decision should be made by the APS.

XII. Removal of an epidural catheter

1. The patient must have alternative analgesia prescribed prior to stopping the epidural.
2. The patient should be given alternative analgesia before the full effect of the epidural wears off to pre-empt any pain.
3. The line should be removed if there are signs of infection and the tip of the epidural catheter should be sent for culture and sensitivity – if there is infection present there is a risk of epidural abscess.
4. Accidental removal of the epidural catheter – the catheter may be pulled out accidentally, if this happens the site should be checked for signs of bleeding or infection and a sterile dry dressing applied. The patient must be monitored for signs of epidural haematoma. The patient should have an alternative methods of pain relief before the affect of the epidural 'wears off'

5. If difficulties are experienced when attempting removal of an epidural catheter please contact the acute pain service/other contacts as per APM chart

XII. Thromboprophylaxis/anticoagulation and removing an epidural catheter

When removing a epidural catheter there is a small risk of causing bleeding within the epidural space. If the patient's coagulation profile is normal this risk is minimal. However, if the patient is receiving drugs that may affect their coagulation system the risks of bleeding within the epidural space may be considerably higher. The following paragraphs set out some guidance about the safe times for removal of epidural catheters in patients on such drugs. Further guidance is available in the document *Regional Anaesthesia and Patients with Abnormalities of Coagulation (2013)* published by the Association of Anaesthetists of Great Britain and Ireland.

1. If the patient is receiving daily LMWH (low molecular weight heparin) injections at a **thrombo-prophylactic dose** the catheter must not be removed before 12 hrs have elapsed since the last LMWH injection. Further LMWH injections must not be given for 4 hours after catheter removal to reduce the risk of bleeding in the epidural space (epidural haematoma).
2. If the patient is receiving DVT/PE **treatment dose** of LMWH the catheter can only be removed at least 24 hours after the last dose. There must then be a period of 4 hours before the next dose of LMWH is given.
3. If the patient is receiving intravenous heparin at a treatment dose it should be stopped for 4 hrs prior to removal of the catheter. The intravenous heparin may recommence 4 hrs after removal of the catheter. Occasionally the intravenous heparin may need to be restarted more quickly than 4 hours after catheter removal for clinical reasons. Such a decision will be made by the clinical team responsible for the patient's surgical care after a discussion with the anaesthetic team or APS.
4. **Rivaroxiban:** The use of Rivaroxiban whilst an epidural catheter is still in place is not recommended. If the patient is receiving Rivaroxaban the catheter can only be safely removed 18 hours after the last dose. This time assumes normal renal function and may need to be increased in there is significant impairment of renal function. There must then be a period of 6 hours before the next dose may be given..
5. **Clopidogrel;** clopidogrel **should not be administered** until after the patient's epidural catheter has been removed. If it is given the recommendation is to wait 7 days before it will be safe to remove the catheter. After the epidural catheter has been removed it is safe to administer clopidogral after a wait of 6 hours.
6. **Other novel anticoagulants:** the advice is to avoid administration of such drugs until after an epidural catheter is removed as it is difficult to give well supported advice as to a safe time gap to recommend. Once an epidural catheter has been removed the safe time to leave before administering one of these drugs is probably 6 hours. (see RCOA 2013 guidance for details)

7. If the patient is thought to have any impairment of their coagulation profile other than the therapies listed above, then the epidural should only be removed following discussion with the acute pain team/anaesthetist as per contact information on the APM chart.

References:

Online access

Regional Anaesthesia and Patients with Abnormalities of Coagulation (2013)

http://www.aagbi.org/sites/default/files/rapac_2013_web.pdf - accessed on 9th May 2016

National Audit of Major Complications of Central Neuraxial Block in the United Kingdom (2009)

<http://www.rcoa.ac.uk/nap3> - accessed on 9th May 2016

Appendix 1

Connecting an epidural infusion



ALWAYS attach a label to the catheter after insertion

ALWAYS attach a label to the end of the infusion line nearest the Luer connector after preparation

ALWAYS verify correct connection with a second person

Appendix 2

Assessment and escalation process for suspected epidural haematoma and/or epidural abscess in patients with postoperative epidural infusions at the BRI

Identification

Epidural haematoma and epidural abscess are rare complications of postoperative epidural analgesia (1 in 19,500 patients when used for postoperative analgesia – NAP3 data). Permanent neurological damage is likely to occur if an epidural haematoma is not treated early (within 12 hours of onset of symptoms)

Presentation is most likely to be with increasing leg weakness and/or numbness beyond that expected with the analgesic mixtures in use at the BRI (ie . bupivacaine 0.1% to 0.125% with or without low-dose opioid). Symptoms may be one-sided.

Worsening back pain may be present, as may loss of bladder or bowel control. Urinary incontinence may be difficult to identify in postoperative patients who have an indwelling urinary catheter. About half of epidural haematomas associated with epidural infusions occur following the removal of the epidural catheter.

Monitoring of leg strength during an epidural infusion

Leg strength must be assessed regularly as part of routine monitoring during an epidural infusion, preferably at the same time intervals that other routine monitoring is carried out. (hourly for the first 24 hours and 4 hourly thereafter) Please see Bromage scale chart for details of leg strength assessment.

Some leg weakness is common with a lumbar epidural, which is usually used for vascular surgery in the leg(s) or pelvic surgery (gynaecology or urology), and occasionally for orthopaedic surgery. Such weakness should improve whilst the epidural is running, but sometimes can take as long as 24 hours to resolve completely. Leg weakness should not occur with a thoracic epidural infusion.

Management of leg weakness with an epidural infusion

If a patient has a leg strength score of 3 or 4 the epidural infusion should be stopped temporarily and leg strength assessed half hourly. The weakness should start to improve quickly, certainly in 2 hours or less. Please follow the guidance on the flow-chart. If in doubt contact the acute pain service.

Note:

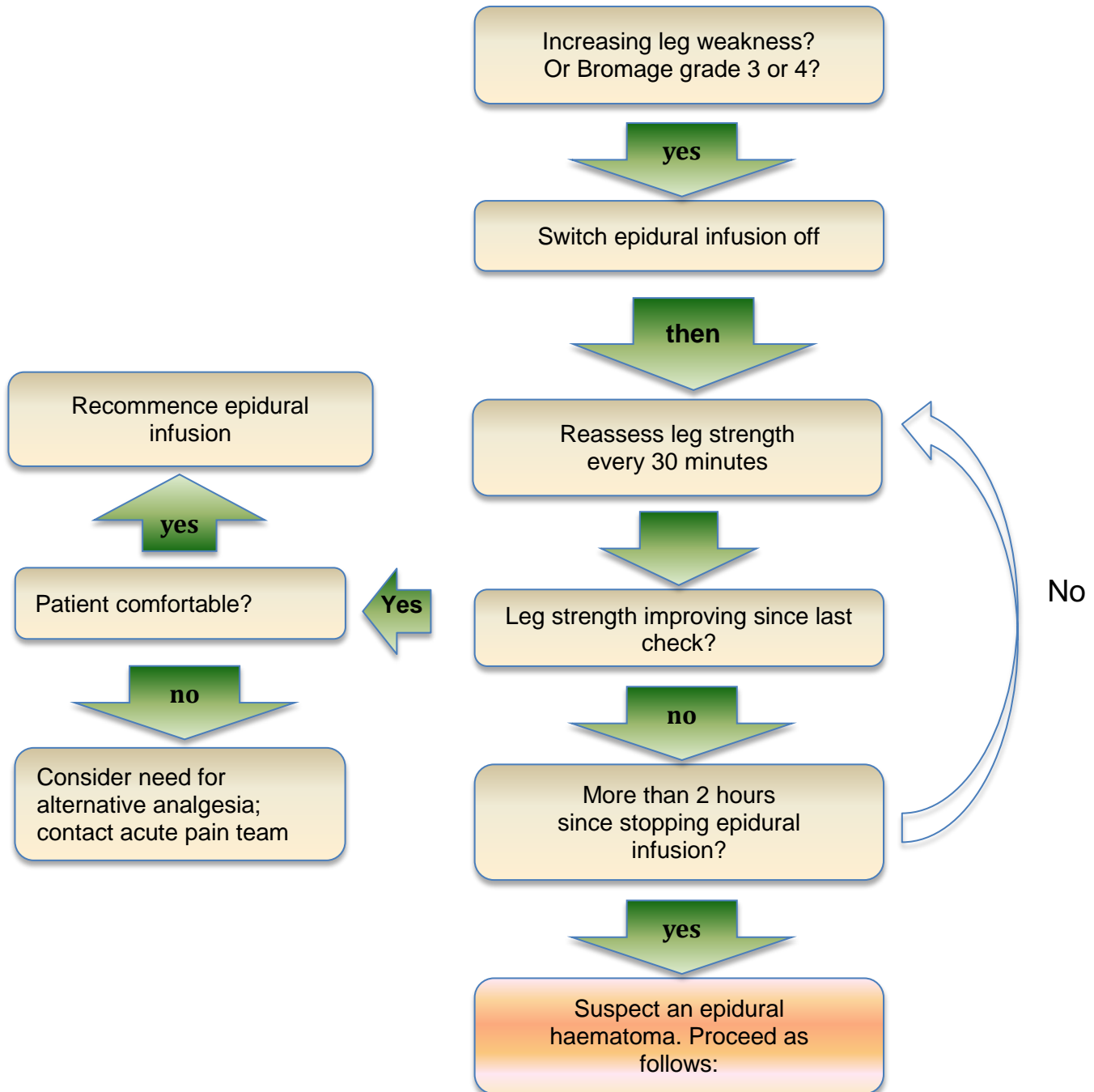
Significant leg weakness is common immediately after spinal anaesthesia but should resolve within 4 to 6 hours of the spinal injection. This would usually mean that the weakness will be resolving when the patient returns to the ward, or soon after this. A large volume of high concentration bupivacaine (0.5%) injected intra-operatively as part of the anaesthetic can produce a picture very like a spinal anaesthetic with marked leg weakness for a few hours post-operatively. Again, this should resolve quickly.

Red Flags

- Significant leg weakness with a thoracic epidural
- Worsening leg weakness whilst an epidural infusion is running
- Unexpectedly marked leg weakness, including unilateral symptoms
- Significant new back pain
- Urinary or faecal incontinence

If an epidural haematoma is suspected this must be treated as soon as possible to improve the chance of full recovery. Contact the acute pain team and/or on-call anaesthetic team immediately to assist in this management.

All patients with an epidural infusion must have their leg strength assessed regularly, in both legs, using the leg strength score (Bromage scale) that appears on the epidural management chart. Assessment should be hourly for the first 24 hours and 4 hourly thereafter. Increasing leg weakness may be because the infusion rate is too high, but it could mean that the patient is developing an epidural haematoma. This algorithm will help to differentiate between these two situations.



During weekday office hours contact a member of the Acute Pain Team (bleep 417, or Ex 4328 if unavailable) who will arrange an urgent spinal MRI scan through the radiology department. After hours and weekends contact the Anaesthetist on call (ICU CT/ST via switchboard) who will arrange an urgent spinal MRI scan through the on call radiologist. An epidural haematoma has to be evacuated within 12 hours of the onset of symptoms for your patient to have the best chance of recovery of neurological function. Do not delay.

Bromage Scale: Grade	Criteria
1	Free movement of legs and feet
2	Just able to flex knees with free movement of feet
3	Unable to flex knees, but with free movement of feet
4	Unable to move legs or feet

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