Management of Inadvertent Dural Puncture (IDP) and Post Dural Puncture Headache (PDPH) in Obstetric Patients

Author: Dr Sarah Cooper (Anaesthetic Department)

Approved by: Anaesthetic department

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Accidental dural puncture occurs in 0.5 to 1.0% of mothers who have an epidural sited for analgesia in labour at Bradford Royal Infirmary. In accordance with the December 2018 OAA guideline, all women who experience dural puncture with an epidural needle or PDPH after a spinal block should be reviewed daily by a member of the anaesthetic team. When a woman experiences PDPH, follow up should continue until the headache resolves. The Initial anaesthetic review for suspected obstetric PDPH should take place within 24 hours of symptoms starting.

Before hospital discharge, all women who have experienced dural puncture with an epidural needle (even if they have not had symptoms of PDPH), must be given information on symptoms that require further medical assessment and instructions on how to contact labour ward to obtain anaesthetic advice. All women who experience dural puncture with an epidural needle, or PDPH should be referred to the obstetric anaesthetic clinic by emailing obstetric.AnaestheticClinic@bthft.nhs.uk

Detection of an inadvertent Dural Puncture (IDP)

- An IDP may be detected during the siting of an epidural by free flow of CSF from the Tuohy needle hub. If there is any uncertainty about as to whether fluid is CSF or Saline, testing the issuing fluid with a glucose indicator stick may be helpful as the presence of glucose will confirm that the fluid is CSF.

- If CSF is detected at the hub of the Tuohy needle, do not withdraw the needle, but attempt to pass an epidural catheter intramurally, leaving 3-4cm within the subarachnoid space. (NB make sure catheter and filter are first primed with saline). If the catheter does not pass easily remove it along with the Tuohy needle. An attempt to site an epidural at another interspace should be made, **by a more senior anaesthetist if possible / appropriate.**

- An IDP may also be detected after epidural insertion when free flow of CSF down the catheter is noted. This situation should be managed as outlined below under **Subarachnoid catheter management.**

Management of analgesia during labour following an IDP

- **Subarachnoid Catheter Management:** Top-up for labour pain management **must be done by the anaesthetist only**. Use 1-2 ml increments of plain 0.1% bupivacaine. **Label the catheter as intrathecal.** If delivery in theatre is needed, use hyperbaric 0.5% bupivacaine in small increments - 0.5 -1.0 ml, until a satisfactory block level is obtained. **This must only be done by an anaesthetist.**

- **If an epidural catheter has been sited in an adjacent space:** give slow (5ml over 1 min) bolus top -ups of 0.1% bupivacaine with fentanyl 2µg/ml. Maintain analgesia with an epidural infusion of the same solution at 10ml/hr. Any further top ups during labour **must be given by the anaesthetist** and should be given slowly.

Management following delivery

- **Remove the subarachnoid or epidural catheter:** Encourage the patient to mobilise as soon as sensation has returned and encourage oral fluid intake.

- Review daily, enquiring about the presence and severity of any headache.

Management of Post Dural Puncture Headache

PDPH is classically fronto-occipital and is often associated with neck stiffness. Sometimes the pain radiates to both temples, may be felt behind the eyes, or is more diffuse than localised. The headache typically has a postural element, with the pain exacerbated by sitting or standing, and alleviated by lying flat. The postural feature of the headache differentiates it from other serious intracranial causes of headache such as intracranial haemorrhage. PDPH may be associated with other symptoms such as nausea, vomiting, hearing loss, tinnitus, vertigo and dizziness. Visual disturbances such as diplopia and photophobia can also occur.

90% of headaches will occur within 3 days of the procedure and 2 thirds within the first 48 hours. However, PDPH can develop up to 14 days after the procedure. Very rarely it can occur immediately.

Most PDPH will resolve spontaneously within 7 days if left untreated. In a minority of patients the headache can persist, occasionally for years.

Assessment:
A medical history should be taken and physical examination performed to exclude other potential causes of postnatal headache. Document symptoms of headache (mild/moderate/severe) whether this changes with posture, where the headache is focused, any associated neck stiffness, nausea and vomiting, photophobia, diplopia, hearing loss/tinnitus, fits or other problems.

Diagnosis of PDPH is usually made on the basis of described symptoms along with a history of dural puncture. If in doubt, there should be a low threshold for ordering additional investigations such as CT/MRI brain to rule out other serious causes of headache.

Differential diagnosis of PDPH:

- Non-specific postnatal headache
- Migraine (history of migraine, unilateral pulsatile headache associated with vasomotor signs)
- Pre-eclampsia (recent labour complicated with condition, up to 10 days postpartum)
- Septic and aseptic meningitis (increasing headache, nausea, vomiting and neck stiffness)
- Intracranial haemorrhage/mass lesion (signs of intracranial hypertension)
- Cerebral vein thrombosis (increasingly intense headache, convulsions, intracranial hypertension, deteriorating consciousness and fever. MRI and MRA are diagnostic)
- Postnatal depression headache
- Pneumocephalus (sudden headache, due to the injection of air in the subdural or subarachnoid space, associated with epidural using loss of resistance to air technique. Headache is worse in sitting position and relieved by lying down. It disappears after a few hours).

Ascertain the patients symptoms and assess for severity of headache. For example, with mild PDPH patients will still be able to mobilise and carry out activities, are unlikely to have associated symptoms and are likely to respond to non-opiate analgesics. With severe PDPH, there will be complete restriction of daily activities, the patient will be bedridden and display associated symptoms as described above. This situation is unlikely to respond to conservative management.

Investigations :

Check for markers of infection such as pyrexia, raised WCC and CRP. If there are signs of infection, send blood cultures and urine for MC and S. (Remember that raised WCC up to 16 in 3rd trimester and 20-30 in labour/early postpartum may be normal).

Where there is doubt regarding the pattern of symptoms, (if the headache changes in nature, neurological signs develop, conscious level reduces, or when 2 epidural blood patches have been ineffective), consider other serious causes of post part headache and have a low threshold for considering urgent CT/ MRI brain or other specific investigations e.g lumbar puncture, to rule out other intracranial pathology as described above.

Always discuss your assessment and differential diagnosis with a senior anaesthetic colleague.

Management :
All cases of suspected PDPH should be discussed with a consultant anaesthetist as soon as possible.
Patients with recognised accidental dural puncture should be reviewed daily by an obstetric anaesthetist
Provide information for the patient and help them to consider the pros and cons of the available treatment modalities, success rates and possible further complications. (Appendix 1).

Conservative Management
Relief of symptoms while waiting for the dural tear to heal by itself.
Daily review by a member of the anaesthetic team is required for 72 hours (face to face or by telephone if the patient goes home) or until the headache is completely resolved.

Posture:
There is no evidence to support bed rest or specific postures following ADP/PDPH. Although lying down relieves symptoms, it does not prevent them. Therefore patients should be encouraged to adopt the position which they find most comfortable. Prolonged bed rest increases the risk of other complications (VTE/ Chest infection) therefore if a patient's headache is severe enough to make them bedridden, they must be provided with TED stockings and prescribed prophylactic tinzaparin. Bear in mind plans for potential epidural blood patch and think carefully about the timing of each dose of LMWH.

Hydration:
There is no evidence to support a therapeutic benefit of vigorous hydration, however no patient with PDPH should be allowed to become dehydrated. Maintenance IV fluid (1ml/kg/hour) may be required if there is ongoing nausea and vomiting such that oral intake is poor.

Analgesia:
Regular paracetamol and NSAIDS (if no contraindication) may be enough in mild cases. A weak opioid such as tramadol 100mg QDS may be needed as well in moderate cases. Morphine may be given in severe cases. Give laxatives PRN alongside opioids. Long term opioid therapy is not recommended. **Ensure that opioids started in hospital for PDPH are deprescribed prior to discharge from hospital.**

Caffeine:
There is limited/weak evidence to support the use of caffeine. It may reduce intracranial vasodilation, which is partly responsible for the headache. There is some evidence for potential association with seizures, so enhanced caffeine intake is not recommended. There is insufficient evidence to recommend the use of theophylline or aminophylline.

ACTH and analogues:
There is currently insufficient evidence to recommend the use of ACTH and its analogues.

Steroids:
There is currently insufficient evidence to recommend the use of hydrocortisone, dexamethasone or methylprednisolone.

Triptans:
There is currently insufficient evidence to recommend the use of triptans.

Gabapentinoids:
There is currently insufficient evidence to recommend the use of gabapentinoids.

Invasive procedures:
There is currently insufficient evidence to recommend the use of acupuncture, greater occipital nerve blocks, sphenopalatine ganglion blocks or epidural morphine. There is currently insufficient evidence to recommend the use of epidural crystalloid infusions. Epidural saline bolus administration may improve symptoms but the effect is usually transient.

Active Management with Epidural Blood Patch (EBP)
When conservative therapy is ineffective and the woman experiences difficulty in performing activities of daily life and caring for her baby, an EBP should be considered. Multiple factors are likely to affect the success of an EBP. Recent evidence suggests that complete and permanent relief of symptoms after a single EBP is only likely to occur in up to one third of cases where headache follows dural puncture with an epidural needle. Complete or partial relief may be seen in 50-80%. In cases of partial or no relief, a second EBP may be performed after consideration of other causes of headache.

Timing
Women should be informed that performing EBP within 48 hours of dural puncture is associated with a reduction in its efficacy and a greater requirement for repeat EBP. However, in severe obstetric PDPH, EBP within 48h may be considered for symptom control, as long as the patient is counselled that this may need to be repeated.

Preparation

- Before performing an EBP, written information should be offered to women to aid the consent process. This should include discussion of the risks of EBP as detailed below. (Link to OAA patient information on PDPH)
- **As an EBP is a therapeutic intervention, written consent using the BTHFT consent form is recommended.**
- Ensure the patient is apyrexial
- Ensure that maternal systemic infection has been excluded
- Ensure that symptoms suggestive of an alternative diagnosis have been excluded
- Ensure that more 12 hours or more have elapsed since the last dose of LMWH.

Risks of performing EBP

- Failure of symptom resolution
- Repeat dural puncture
- Back pain during an EBP may occur in 50% of women. 24 hours after EBP over 80% of women may experience back pain. (This pain may be severe. Therefore back pain should be specifically discussed as part of the consent process for EBP). Back pain may continue for several days but severity usually decreases over a few days with resolution for most by 4 weeks. There is no evidence to support increased rates of **chronic** back pain after an EBP.

- Neurological complications
- Infection

Risks of not performing EBP

- There is currently insufficient evidence to suggest that an EBP reduces the risk of chronic headache or back pain, cranial subdural haematoma or cerebral venous sinus thrombosis.
- There is insufficient evidence to suggest that EBP improves outcome in cranial nerve palsy in obstetric PDPH.

Conduct of EBP

Prepare the patient as detailed above
The patient is advised to feed the baby and pass urine before the procedure as she will need to lie flat in bed after the blood patch for 2 hours.
The procedure is carried out in the obstetric operating theatre under strict sterile conditions.
2 anaesthetists are required, one of whom should be an experienced 'epiduralist', preferably a consultant.
The procedure should be done under strictly aseptic conditions with both anaesthetists scrubbed.
Aseptic technique must be meticulous at both the epidural site and the site of blood-letting - usually the antecubital fossa.
An epidural should be performed at the same or a lower vertebral interspace as the dural puncture with the woman in the lateral position to minimise CSF pressure in the lumbar dural sac.
Once the epidural space has been identified, 20ml of blood is obtained. There is currently insufficient evidence to recommend that blood cultures should be sent routinely when performing EBP or that antibiotics should be given prophylactically when performing EBP. An EBP should not be performed in the presence of systemic maternal infection.
Inject the blood slowly through the epidural needle until pain occurs (commonly in the back or legs) or to a maximum of 20ml. If pain occurs, pause and if the pain resolves, try continuing a slow injection. If the pain does not resolve, or recurs, then stop.
To allow the clot to form, maintain bed rest for at least 2 hours then allow slow mobilisation.
Check maternal pulse, Bp and temperature regularly for 12- 24 hours after EBP.
Advise the patient to avoid straining, lifting or excessive bending for 48 hours. (There are obvious limitations when a woman has a new born infant to care for).
Repeat EBP may be performed once other causes of headache have been excluded. Where the diagnosis of PDPH is likely and and EBP has resolved symptoms but headache subsequently returns, a second EBP may be offered as it is likely to be of benefit. If an EBP produced some improvement of symptoms but headache persists, a second EBP **MAY** be of benefit. If a first EBP had no effect on headache or there is doubt about the diagnosis, discussion with other specialities including obstetrics, neurology and radiology should take place before a second EBP is performed.
Follow up is required for all patients after EBP.

Documentation and Follow up

- All patients who have a recognised inadvertent dural puncture must be followed up so that they can access advice and treatment if symptoms develop late.
- Patients who are reported by ward staff as having a suspected PDPH should be reviewed as soon as possible and discussed with the senior anaesthetist on labour ward.
- Patients with ADP/PDPH should have daily review until discharge.
- Patients who have had EBP should be reviewed by an anaesthetist within 4 hours of the procedure.
- Each follow up visit must be documented, using the Medway anaesthetic follow up workflow. Use the free text box to provide an up to date plan for ongoing management and clear notes regarding results of investigations and outcomes of any intervention or treatment provided.
- While patients remain under review, do not remove them from the Medway follow up list after each visit.
- Please assign patients who have had an EBP to the ADP follow up group on Medway

- Patients who are discharged home on the day of an EBP should be contacted the following day.
- Before discharge, women should be given verbal and written advice on how and when to contact the hospital, should their headache return or other symptoms develop.
- All women who have had a recognised ADP or developed a PDPH should be offered an appointment for follow up at the obstetric anaesthetic clinic. Please email obstetric.AnaestheticClinic@bthft.nhs.uk to make a referral for follow up at around 6 weeks post discharge and advise the patient that this has been done.
- Provide written information about what has happened to the patient's G.P. (see standard letter in appendix 2).

Appendix 1: Template G.P Letter for EBP follow up.

Bradford Teaching Hospitals NHS
NHS Foundation Trust

Department of Anaesthesia
Bradford Royal Infirmary
Duckworth Lane,
Bradford,
BD9 6RJ

Dear Dr

Regarding :
RAE
DOB
Address:

This lady underwent epidural anaesthesia for the management of pain/obstetric delivery at the BRI on (date).

Unfortunately, the technique was complicated by an inadvertent dural puncture of the dura mater, which resulted in the patient suffering with a postural headache in the puerperium.

In line with our policy to reduce morbidity through active medical management, the patient was offered an autologous epidural blood patch, which was performed on (date).

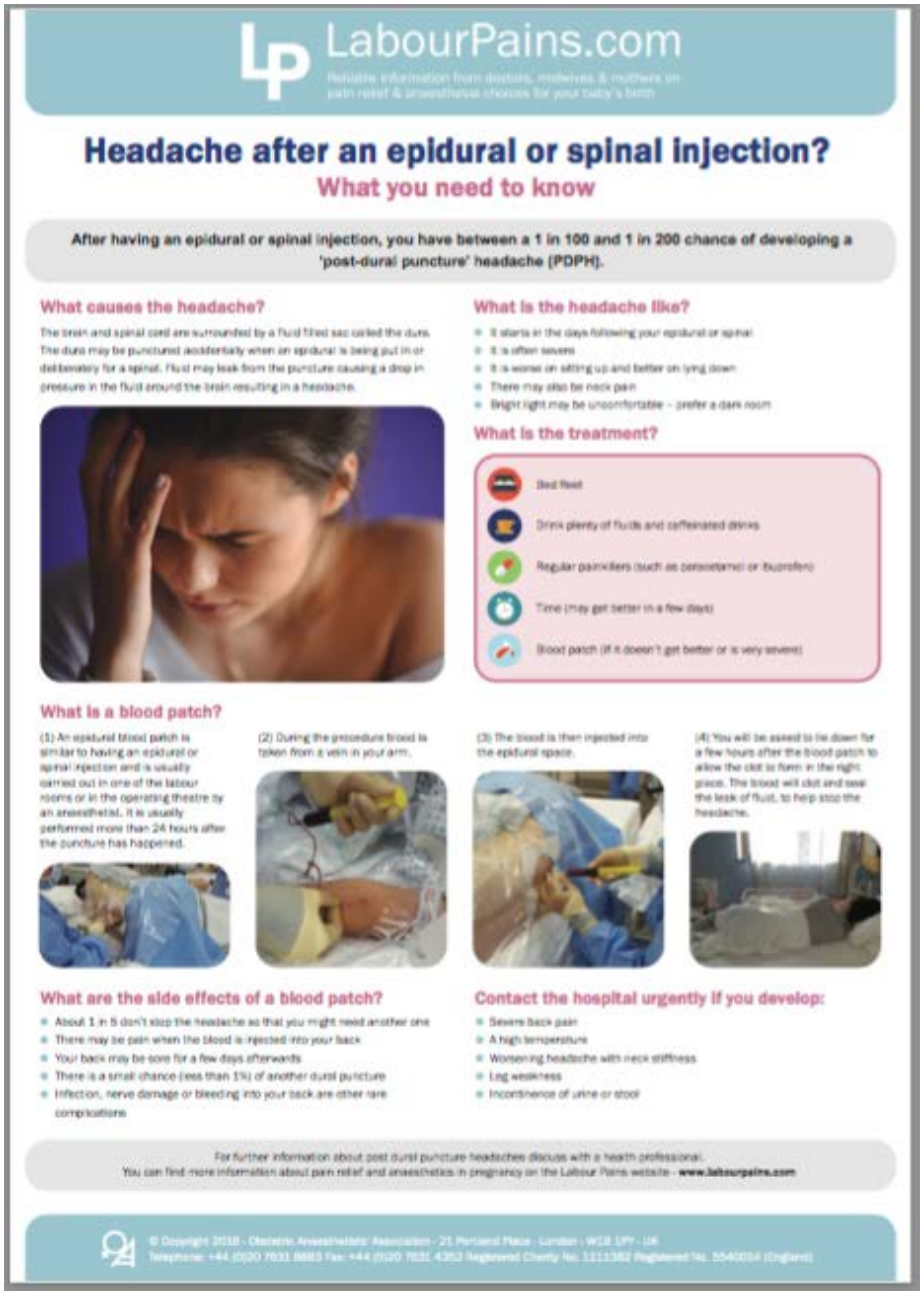
She was discharged on (date), when she was pain free.

Occasionally, postural headache can reappear some days after discharge. If your patient should present to you with postural headache symptoms, please would you contact the on-call anaesthetist at the BRI Delivery Suite (01274 364515).

If no further problems occur, we will plan to see the patient for routine follow up in around 6 weeks time in the obstetric anaesthetic clinic.

Yours Sincerely

Appendix 2: Image of OAA patient information leaflet on PDPH (please access the original leaflet via the link provided above).



LabourPains.com

Reliable information from doctors, midwives & mothers on pain relief & anaesthesia choices for your baby's birth

Headache after an epidural or spinal injection?

What you need to know

After having an epidural or spinal injection, you have between a 1 in 100 and 1 in 200 chance of developing a 'post-dural puncture' headache (PDPH).

What causes the headache?

The brain and spinal cord are surrounded by a fluid filled sac called the dura. The dura may be punctured accidentally when an epidural is being put in or deliberately for a spinal. Fluid may leak from the puncture causing a drop in pressure in the fluid around the brain resulting in a headache.

What is the headache like?

- It starts in the days following your epidural or spinal
- It is often severe
- It is worse on sitting up and better on lying down
- There may also be neck pain
- Bright light may be uncomfortable – prefer a dark room

What is the treatment?

- Bed Rest
- Drink plenty of fluids and caffeinated drinks
- Regular painkillers (such as paracetamol or ibuprofen)
- Time (may get better in a few days)
- Blood patch (if it doesn't get better or is very severe)

What is a blood patch?

(1) An epidural blood patch is similar to having an epidural or spinal injection and is usually carried out in one of the labour rooms or in the operating theatre by an anaesthetist. It is usually performed more than 24 hours after the puncture has happened.

(2) During the procedure blood is taken from a vein in your arm.

(3) The blood is then injected into the epidural space.

(4) You will be asked to lie down for a few hours after the blood patch to allow the clot to form in the right place. The blood will clot and seal the leak of fluid, to help stop the headache.

What are the side effects of a blood patch?

- About 1 in 5 don't stop the headache so that you might need another one
- There may be pain when the blood is injected into your back
- Your back may be sore for a few days afterwards
- There is a small chance (less than 1%) of another dural puncture
- Infection, nerve damage or bleeding into your back are other rare complications

Contact the hospital urgently if you develop:

- Severe back pain
- A high temperature
- Worsening headache with neck stiffness
- Leg weakness
- Incontinence of urine or stool

For further information about post dural puncture headaches discuss with a health professional.
You can find more information about pain relief and anaesthetics in pregnancy on the Labour Pains website - **www.labourpains.com**