Post-dural puncture headache in the parturient

Amit R Panigrahi
Cathy Armstrong

Abstract

Post-dural puncture headache (PDPH) is a common and debilitating complication of central neuraxial blockade in the parturient. The obstetric population is at particular risk with up to 80% of women developing symptoms after accidental dural puncture (ADP) during labour epidural insertion. PDPH typically develops 24–48 hours post puncture and is classically described as an occipito-frontal headache with postural features. Diagnosis and assessment should include consideration of other potential causes of post-partum headache. Initial treatment of PDPH includes adequate hydration and analgesics. Epidural blood patch (EBP) remains the gold standard treatment. It is more successful if performed over 24–48 hours after the development of symptoms. Complete and permanent relief of symptoms following a single EBP occurs in up to one third of cases where headache follows ADP with an epidural needle. Complete or partial relief may be seen in 50–80% overall. Higher success rates are achieved following a second EBP. There is now UK national guidance on the treatment of post dural puncture headache published by the Obstetric Anaesthetists Association (OAA).

Keywords Accidental dural puncture; epidural blood patch; post lumbar puncture headache; post-dural puncture headache

Royal College of Anesthetists CPD Matrix: 1A01, 1A02, 2B04, 2G04, 3B00

Learning objectives

After reading this article, you should be able to:

- recognize the diagnostic features of post-dural puncture headache (PDPH)
- summarize other causes of post-partum headache and recognise worrying features requiring further investigation
- discuss the advantages and disadvantages of management techniques at the time of accidental dural puncture (ADP)
- discuss the treatment options of PDPH ranging from conservative strategies to epidural blood patch

Post-dural puncture headache (PDPH) is a common and debilitating complication of central neuraxial blockade (CNB). Cerebrospinal fluid (CSF) leakage into the epidural space via a tear in the dura is thought to cause reduction in intracranial pressure and a downward traction on pain-sensitive intracranial structures, including meninges, veins and cranial nerves. Compensatory vasodilatation due to CSF loss may also occur.[1]

Incidence

In the UK, the incidence of accidental dural puncture (ADP) during epidural insertion for labour is 1.0–1.2%.[2] More than 50% of women develop PDPH after recognized ADP with a 16–18 gauge epidural needle.[3] Of those parturients that develop PDPH following epidural insertion, up to 38% follow a seemingly uneventful procedure. After spinal anaesthesia the incidence of PDPH is lowest when atraumatic needles are used with reported rates of 30 per 1000.[4]

Symptoms

PDPH is classically described as an occipito-frontal headache often radiating to the neck and shoulders with postural features, exacerbated by sitting, standing, coughing and straining, and alleviated by lying flat. Other associated symptoms include nausea, vomiting, hearing disturbance, tinnitus, vertigo, dizziness and paraesthesia of the scalp. Visual disturbances such as diplopia and cortical blindness have been described. Typical presentation is 24–48 hours post puncture, although both immediate and later presentations have been described. Up to 5% of patients may present atypically without a postural component. The International Classification of Headache Disorders (ICHD-3) definition for PDPH is summarized in Table 1.[5]

Assessment and diagnosis

Symptoms of postural headache with a history of CNB are usually sufficient to make a diagnosis of PDPH. Potential differential diagnoses range from benign self-limiting conditions to serious intra-cranial pathologies requiring specialist intervention (Table 2). A thorough assessment should be performed including careful history and neurological examination, with particular

ICHD-3 Diagnostic criteria for post-dural puncture headache[5]

A	Headache attributed to low cerebrospinal fluid (CSF) pressure caused by CSF leakage through the dural puncture. It is usually accompanied by neck stiffness and/or subjective hearing symptoms. Remits spontaneously within two weeks, or after sealing of the leak with autologous epidural lumbar patch
B	Dural puncture has been performed
C	Headache develops within 5 days after dural puncture
D	Not better accounted for by another diagnosis

Table 1

Amit R Panigrahi *MBBS MD is a Clinical Fellow in Anaesthesia at Manchester University NHS Foundation Trust, Manchester, UK. Conflicts of interest: none.*

Cathy Armstrong *MBChB FRCA is a Consultant Anaesthetist at Manchester University NHS Foundation Trust, Manchester, UK. Conflicts of interest: none.*

Causes of post-partum headache

Primary	Pharmacological/metabolic
Migraine	Dehydration
Tension headache	Drug use
Cluster	
Vascular	Other
Ischaemic stroke	Post-dural puncture headache
Intra-cranial haemorrhage	Pre-eclampsia
Venous sinus thrombosis	Space-occupying lesion
Vasculitis	Posterior reversible
Migraine	leukoencephalopathy syndrome
Infection	
Meningitis	
Encephalitis	
Sinusitis	

Table 2

focus on the timing and nature of the headache as well as other symptoms and signs. Worrisome features of post-partum headache that should prompt further investigation include: focal neurological signs, cranial nerve palsy, change in mental status, unilateral headache, headache not relieved by analgesics, sudden uncontrollable vomiting, co-existing medical issues (e.g. bleeding disorder, immunocompromise) and PDPH not responding to epidural blood patch (EBP), especially following two attempts.[6]

Prevention

Technique

Careful technique during epidural insertion and avoidance of ADP is key. While debate over safest loss of resistance technique continues, it is likely that the least risk is presented when the operator uses the technique most familiar to them. Operator inexperience, time pressures due to co-existent workload and fatigue are likely to increase ADP rate. Spinal anaesthesia PDPH rates are lowest when atraumatic needles (Whitacre, Sprotte) are used. Recent evidence suggests that it is spinal needle design (atraumatic vs cutting) rather than actual needle size that significantly reduces PDPH rates.[4] Multiple attempts at either epidural or spinal insertion will increase the risk of PDPH.

Patient risk factors

The obstetric population are young and female which increases the risk of developing PDPH after ADP. Additional risk factors include history of migraine, previous PDPH and either high or low body mass index (BMI).

Management at time of ADP

At the time of ADP, the anaesthetist has three options:

1. Insert an intrathecal catheter.
2. Attempt to re-site another epidural in an alternative space.
3. Abandon regional analgesia and opt for an alternative technique (e.g. intramuscular diamorphine, remifentanil patient-controlled pump).

Interestingly, inserting an intrathecal catheter does not reduce the incidence of PDPH but may reduce the requirement for an epidural blood patch.[7] Table 3 lists the potential advantages and disadvantages of each option. UK surveys have demonstrated an increase in the use of intrathecal catheters following ADP over the past 10 years; safety concerns remain the main reason for avoidance. All three options are acceptable practice, the anaesthetist must make their management decision based on the patient circumstances and local policies. Any continuing regional technique following ADP will need careful monitoring.

It is important that if the operator has recognized or suspects an ADP during epidural insertion that they counsel the parturient appropriately about the possibility of PDPH and ensure appropriate follow-up within 24 hours is arranged. Measures such as routine bed rest, fluid supplementation and prophylactic epidural blood patch are not effective at preventing PDPH.[8]

Treatment

There is now UK national guidance on the Treatment of PDPH published by the Obstetric Anaesthetists Association (OAA).[3]

Potential advantages and disadvantages of management options following accidental dural puncture (ADP)

	Advantages	Disadvantages
Intrathecal catheter insertion	• Good analgesia • Easily used to establish dense intrathecal block if theatre intervention required • Possibly reduces need for EBP • Avoidance of repeat dural puncture • More certainty on where drugs are being administered	• Accidental misuse • Risk of total spinal if not managed correctly • Unsafe if staff unfamiliar with technique • Possible increased infection risk
Epidural re-insertion at another level	• Good analgesia (if effective)	• Risk of repeat dural puncture • Risk of intrathecal drug administration through dural tear
Alternative analgesia	• Avoidance of repeat dural puncture in labour	• May not provide sufficient analgesia

Table 3

The majority of PDPH symptoms in the parturient would resolve spontaneously over 6–12 weeks if left untreated, but due to the debilitating impact on the new mother whilst caring for her baby, some form of treatment is usually required. An OAA patient information leaflet explaining headache following an epidural is a useful resource and is accessible online.[9]

Conservative measures

Although bed rest provides some relief to most patients, the effects are usually transient and prolonged bed rest may increase risk of venous thrombosis, so is not advised.[3] Normal hydration should be encouraged but there is no benefit from overzealous fluid administration. Caffeine drinks may provide some benefit but their intake should be restricted to 300 mg/day, a lower dose of 200 mg/day should be considered in women feeding premature or low birth weight babies (caffeine content is roughly 50–100 mg in a cup of coffee and 25–50 mg in a cup of tea/cola).[3] Simple regular analgesia (paracetamol, NSAIDs, weak opioids) should be offered to women with PDPH. Stronger analgesia (morphine, oxycodone) may be offered if simple analgesia is ineffective but should not be used long term. The use of abdominal binders is not recommended at present due to lack of evidence.[3]

Use of other pharmacological therapies such as steroids, theophyllines, triptans and gabapentinoids are currently not recommended due to lack of evidence.[3]

Epidural blood patch

EBP remains the gold standard for treatment of PDPH in the parturient. If the headache is incapacitating, not controlled with regular analgesia and preventing the parturient from carrying out daily activities and caring for the baby then an EBP should be considered. The timing of EBP remains controversial but there is evidence to suggest that the failure rate is increased if performed within 24–48 hours of ADP. Although success rates of over 90% have been reported in older observational studies, recent evidence suggests that complete and permanent relief of symptoms following a single EBP is only likely to occur in up to one third of cases where headache follows ADP with an epidural needle. Complete or partial relief may be seen in 50–80% overall. However higher success rates are achieved with a second EBP.[3]

Contraindications include sepsis, coagulopathy and patient refusal.

The most common risk associated with EBP is backache. 50% of women may experience backache at the time of EBP and 24 hours post-procedure up to 80% of patients will have backache. This usually improves over several weeks. There is currently no evidence to link EBP with chronic back pain.[3] Repeat dural puncture may occur. Other major complications are rare but include meningitis, epidural abscess, arachnoiditis and cauda equina syndrome. A patient may decline EBP and to date there is no evidence that withholding EBP causes an increased risk of chronic headache, subdural haematoma or worsening in cranial nerve palsies[3].

Pre-procedure, written informed consent should be obtained from the patient after explanation of the procedure and the risks. It is good practice to check baseline observations including temperature and perform a full blood count and C-reactive protein to rule out underlying infection. A clotting profile should be performed if any concerns exist over clotting status. Some parturients may be on thromboprophylaxis. Once the decision for EBP has been made it is important to communicate the plan to withhold thromboprophylaxis and safely time the EBP procedure.

The EBP requires injection of autologous blood into the epidural space. This should be performed in an operating theatre environment.

- Two operators are required – one to find the epidural space and the other to take blood from the patient. Ultrasonography may be useful if the ADP was a result of difficult anatomy.
- It is helpful to access the previous insertion notes for information about original site of dural puncture, depth of epidural space and any technical difficulty.
- Strict aseptic technique should be adopted by both operators.
- A peripheral vein is identified and the site prepared by one anaesthetist while the back is cleaned by the other. The epidural space is identified first and then blood is collected for injection.
- Ideally, the EBP should be performed at the same level or one space below the original site of dural puncture.
- Guidance suggests the optimal blood volume for injection is 20 ml^3 although up to 30 ml has traditionally been accepted.
- If the patient reports persistent pain in the back, head, buttocks or legs during injection then the injection is stopped.

Post-procedure:

- The patient should lie flat for two hours (there is no evidence that bed rest beyond this is beneficial)
- Simple analgesia should continue until symptomatic improvement
- Prescription of stool softener can be considered to avoid constipation
- Patients can be discharged home the same day, if they remain an inpatient daily review should continue until discharge home.
- On discharge, the patient should be given verbal and written advice on when to contact the hospital if further headache persists or other symptoms develop. Telephone follow-up should occur within 24 hours of discharge and a summary of events should be communicated to the GP and community midwife.
- If symptoms only partially resolve or recur and are still thought to be consistent with a PDPH then a second EBP can be performed without need for further imaging. If there is doubt over the cause of the headache or if symptoms persist despite two EBPs then imaging of the head and lumbar spine should be considered.[3]

Other invasive procedures

A plethora of other modalities have been tried to treat PDPH. There is insufficient evidence at present to recommend any of these modalities.[3] These include Epidural administrations of crystalloids, dextran, gelatin, hydroxyethyl starch, fibrin glue, morphine and other interventions such as, acupuncture, greater occipital nerve block and sphenopalatine nerve block. ◆

REFERENCES

1 Gaiser R. Postdural puncture headache. *Curr Opin Anesthesiol* 2006; **19**.

2 Pan PH, Bogard TD, Owen MD. Incidence and characteristics of failures in obstetric neuraxial analgesia and anesthesia: a retrospective analysis of 19,259 deliveries. *Int J Obstet Anesth* 2004; **13:** 227–33.

3 Obstetric Anaesthetists Association. Treatment of Obstetric Post-Dural Puncture Headache. December 2018. Accessed Via: https://www.oaa-anaes.ac.uk/assets/_managed/cms/files/Guidelines/New%20PDPH%20Guidelines.pdf.

4 Arevalo-Rodriguez I, Muñoz L, Godoy-Casasbuenas N, et al. Needle gauge and tip designs for preventing post-dural puncture headache (PDPH). *Cochrane Database Syst Rev* 2017; **4**.

5 HIS. The international classification of headache disorders, 3rd ed. *Cephalalgia* 2018; **38:** 1–111.

6 Klein AM, Loder E. Postpartum headache. *Int J Obstet Anesth* 2010; **19:** 422–30.

7 Heesan M, Klöhr S, Rossaint R, Walters M, Straube S, van de Velde M. Insertion of an intrathecal catheter following accidental dural puncture: a meta-analysis. *Int J Obstet Anesth* 2013; **22:** 26–30.

8 Basurto Ona X, Osorio D, Bonfill Cosp X. Drug therapy for treating post-dural puncture headache. *Cochrane Database Syst Rev* 2015 Jul 15.

9 Obstetric Anaesthetists Association. Headache After Epidural or Spinal? What You Need to Know. 2018. Labourpains.com. Accessed via, https://www.labourpains.com/assets/_managed/cms/files/Headache_after_epidural.pdf.

