Postpartum headache – diagnosis and treatment

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Learning objectives
After reading this article, you should be able to:

- Identify and describe the causes of postpartum headache.
- Explain the differences between PDPH and other types of postpartum headache.
- Describe the management strategies available for postpartum headaches.
- Illustrate the paucity of evidence supporting many treatments for PDPH.

More than one-third of women develop headaches in the first week after childbirth.1 Approximately 75% are benign primary headaches such as migraines or tension headaches.1,2 Others are secondary and include headaches of vascular origin or from hypertensive disease, infection, space-occupying lesions and dural puncture (Table 1). The International Headache Society (IHS) has described diagnostic criteria for the various causes of headache.3 When headache develops after a recognised dural puncture, the diagnosis may appear obvious although other causes should always be considered and excluded. It is, therefore, important that anaesthetists are aware of the various causes of postpartum headache and their management.

Initial assessment should include a thorough history with particular reference to previous headaches, antenatal health, neuraxial analgesia and anaesthesia for labour and delivery, and risk factors for various causes of postpartum headache. A neurological examination, including assessment of cranial nerves, should look for features of headache included in the differential diagnosis. The need for further investigations will be dictated by the findings on history and examination. ‘Red-flag’ symptoms, including a change in severity or nature of headache, altered level of consciousness, seizures or focal neurological signs warrant urgent imaging and neurological referral.

Key points

- Headache is a common symptom in the postpartum period.
- There are numerous causes of postpartum headache, some of which can be severely debilitating and require urgent treatment.
- All women who experience accidental dural puncture or postdural puncture headache (PDPH) should be reviewed by a member of the anaesthetic team.
- Other differential diagnoses should be considered before postdural puncture headache is diagnosed.
- Conservative management of PDPH is frequently inadequate, and an epidural blood patch is the most effective treatment.

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Primary headaches

Migraine

Migraine is a disabling, primary headache, particularly affecting women of childbearing age. Patients often experience a prodrome or aura before developing a migraine, which is characterised as a throbbing, often unilateral headache. It may be associated with nausea, vomiting and increased sensitivity to noise and light; headache lasts for between 4 and 72 h.4 Most patients have a history of migraines, and it is rare

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Subarachnoid haemorrhage

Subarachnoid haemorrhage (SAH) is a neurological emergency that mandates urgent referral to a neurosurgeon. The clinical presentation is most often a headache described as ‘the worst [headache] of my life’.1 It is typically severe, sudden in onset, peaking in seconds (thunderclap) or minutes.2 Neck stiffness, nausea, vomiting and focal neurological signs may also occur. Sources of SAH in pregnancy are varied and include ruptured saccular aneurysms, or arteriovenous malformations, hypertension, and moyamoya disease.3 Non-contrast CT performed within 6 h of onset of symptoms has high sensitivity, and should be performed urgently.

Subdural haematoma

Although more usually associated with trauma, intracranial subdural haematoma can occasionally develop spontaneously in pregnancy. Of concern to anaesthetists is a relationship with dural puncture.4 A recent cohort study found that presumed postdural puncture headache (PDPH) after obstetric neuraxial block was associated with a small but statistically significant increase in subdural haematoma, when compared with no postpartum headache. Loss of CSF may result in low intracranial pressure (ICP) creating shearing forces on bridging cerebral blood vessels. Magnetic resonance imaging or CT scanning is required to confirm the diagnosis.

Intracerebral haemorrhage

The risk of intracerebral haemorrhage increases in pregnancy as a result of maternal physiological changes and is most likely to be seen in the immediate postpartum period. Risk factors include increasing maternal age, hypertensive disease and coagulopathy. It is important to recognise the increased risk of intracerebral haemorrhage in women with severe pre-eclampsia who receive general anaesthesia for Caesarean section and take measures to attenuate the hypertensive response to laryngoscopy and intubation. New-onset acute headache is associated with focal neurological signs. The diagnosis is confirmed by MRI scanning.

Cerebral venous sinus thrombosis

Symptoms of cerebral venous sinus thrombosis (CVST) range from headache to seizures to deep coma. Headache is defined by the IHS as having no specific characteristics; it is most often diffuse, progressive and severe, but can be unilateral and sudden (even thunderclap) or mild, and sometimes migraine-like.5 The hypercoagulable state of pregnancy increases risk. Headache from CVST may be mistaken for that from PDPH – especially as it may develop after the onset of PDPH, presumably caused by traction on cerebral veins as a result of intracranial hypotension, which then leads to thrombosis. Diagnosis is best made with a magnetic resonance venogram (MRV). Treatment includes anticoagulation and thrombolysis.6

Cerebral ischaemia

Cerebral ischaemia is an emergency that if untreated can lead to permanent disability or death. Global cerebral ischaemia results from a systemic process such as shock (e.g. in the setting of hypotension). Focal brain ischaemia is a consequence of cessation of blood flow, which may be caused by thrombosis or embolism, leading to symptoms including headache, seizures and contralateral muscle weakness. Most strokes occur in the third trimester or immediately postpartum as a result of the hypercoagulable changes of late pregnancy. Headache originates from intracerebral pain-sensitive structures and is thought to occur in approximately 10% of patients after a stroke.6 Diagnosis is usually made from associated neurological signs. Emergent imaging should be performed and acute management initiated with treatment such as thrombolysis or thrombectomy.

Arterial dissection

Headache and neck pain may be associated with cerebral, internal carotid and vertebral artery dissection. Although rare, in common with other vascular dissections, these result from...
increased cardiac output and shear stress during pregnancy, labour and delivery. Neurological deficit may be a more dramatic and concerning symptom than headache. Treatment depends on the severity of symptoms and clinical situation, and includes anticoagulation, with or without antiplatelet therapy, and endovascular stenting.8

**Posterior reversible encephalopathy syndrome**

Posterior reversible encephalopathy syndrome (PRES) is a condition with multiple aetiologies affecting the white matter of the brain. The posterior parietal and occipital lobes are affected particularly, leading to oedema and the resulting effects of increased ICP. Symptoms may include headache, nausea, vomiting, seizures, visual disturbances and altered consciousness. In the context of pregnancy, it is often related to a sudden increase in blood pressure, for example in patients with severe hypertension and eclampsia. It is similar to (or may be identical to) hypertensive encephalopathy. Treatment includes control of blood pressure and management of underlying conditions.9 Most patients recover, although cerebral haemorrhage and other permanent sequelae have been reported.

**Reversible cerebral vasoconstrictive syndrome**

Reversible cerebral vasoconstrictive syndrome (RCVS) is now the preferred term for headaches resulting from vasoconstriction of cerebral arteries. It is more common in women and its exact pathophysiology is unknown, but it possibly results from transient dysfunction of cerebral vascular autoregulation and disturbance of the blood–brain barrier with vasogenic oedema. The headache is of sudden onset and severe but may remit spontaneously.10 Associated symptoms include agitation and confusion with focal neurological signs. Subarachnoid and intracerebral haemorrhage, seizures and PRES are recognised complications. Findings on MRI may be similar to PRES. A segmental ‘bead-and-string’ appearance may be seen on cerebral angiography.

**Pituitary apoplexy**

Pituitary apoplexy is usually the result of haemorrhagic infarction of the pituitary gland. It is commonly associated with a pituitary adenoma. Pregnancy is a risk factor because oestrogen concentrations are increased.10 The most common presentation is an acute-onset, severe headache that may be retro-orbital. There may be visual field defects and reduced acuity. Blood tests reveal acute adrenal insufficiency and diagnosis is confirmed by MRI. After initial resuscitation, steroid therapy is required. Surgery may be indicated if there are significant visual symptoms.

**Non-vascular cranial disorders**

**Benign intracranial hypertension**

Benign intracranial hypertension is defined as increased ICP (CSF pressure > 250 mm) in the absence of a mass lesion. It typically occurs in young obese women, usually worsened with cough and straining. Headaches are chronic and non-specific. They may be associated with visual disturbances, nausea, vomiting, pulsatile tinnitus and papilloedema. It is a diagnosis of exclusion and treated by reducing CSF pressure with a short course of steroids, diuretics or serial lumbar punctures.11 These headaches are unlikely to initially develop in the peripartum period but should be considered in the differential diagnosis, especially if the cause is not evident.

**Spontaneous intracranial hypotension**

Spontaneous intracranial hypotension is caused by low CSF pressure without dural trauma. It is characterised by a headache, worse on standing and improved when supine, similar to that of PDPH. Other symptoms such as hearing disorders, nausea, vomiting, vertigo and cranial nerve palsies may also be seen. As with intracranial hypotension from dural puncture, MRI findings are a reduction in CSF volume, thickening of the meninges and an increase in venous blood volume.12 Treatment is similar to that of PDPH and includes bed rest, simple analgesia, hydration and caffeine. Interventions such as an epidural blood patch (EBP) (often lumbar if the site of the meningeal tear is unknown), or CT-guided injection of fibrin glue at the location of CSF leak, if known, have been reported.13

**Postdural puncture headache**

Postdural puncture headache is one of the most significant complications for a pregnant patient receiving a neuraxial block.14 It can be extremely debilitating for a new mother who may not be able to perform regular daily activities including caring for her newborn.

The risk of PDPH is 75–85% after accidental dural puncture with an epidural needle, and ranges between 1% and 10% after dural puncture with a spinal needle. It is more likely to occur in women, pregnancy and those younger than 40 yrs. There is conflicting evidence as to whether increased BMI and avoidance of active pushing in the second stage of labour protect against PDPH. Characteristics of the needle used for neuraxial block play an important role. The larger the needle size, the more likely it is that PDPH will develop. Pencil-point needles such as the Whitacre or Sprotte are less likely to cause PDPH compared with bevelled, cutting needles such as the Quincke needle.

The IHS’s definition of PDPH is ‘Headache occurring within 5 days of a lumbar puncture, caused by cerebrospinal fluid (CSF) leakage through the dural puncture. It is usually accompanied by neck stiffness and/or subjective hearing symptoms. It remits spontaneously within 2 weeks, or after sealing of the leak with autologous epidural lumbar patch’.15 A postural component is no longer included in the definition and atypical presentation, which may occur in up to 5% of cases, is increasingly recognised.16 In up to one-third of cases of PDPH, accidental dural puncture may not be recognised.16

Headache usually presents within 24–72 h of dural puncture. In addition, neck, shoulder or intrascapular pain may be observed and other neurological symptoms can develop. PDPH is associated with a significantly increased risk of neurological complications such as CVST, subdural haematoma, and bacterial meningitis.15 Cranial nerve palsies, especially those of cranial nerves VI and VIII may be observed. Although most symptoms resolve within 14 days, PDPH may persist for longer and has been linked to the development of chronic headache and backache.17

Headache is thought to be caused by CSF leakage through the dural puncture leading to intracranial hypotension and traction on pain-sensitive intracranial structures.18 According to the Monro–Kellie doctrine, the sum of the volumes within the cranium (brain, CSF, blood) should remain constant. If there is a decrease in volume of one component, other components compensate by increasing. With a decrease in CSF, intracranial blood volume increases via cerebral vasodilation leading to headache.

Unfortunately, much of the evidence relating to treatment of PDPH is of poor quality. Studies have often been
insufficiently powered, blinding of patients and observers has been unclear and different outcomes have been reported. There has been marked heterogeneity in patients with males and females, and obstetric and non-obstetric patients of varying ages recruited to the same study, with no differentiation between headache after spinal and epidural procedures. Consequently, interpretation of findings is difficult and caution must be advised before any therapies can be recommended. There is currently insufficient evidence to support the use of epidural saline. There has been recent interest in peripheral nerve blocks. Several reports of the benefit of greater occipital nerve blocks (GONB) for PDPH have been published but further well-conducted studies are required before they can be recommended.

**Table 2.**

<table>
<thead>
<tr>
<th>Management Pathway for Patients with Obstetric PDPH.</th>
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<tr>
<td><strong>EBP</strong>, epidural blood patch; <strong>PDPH</strong>, postdural puncture headache.</td>
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<tr>
<td>All women with PDPH should be reviewed daily by a member of the anaesthetic team while in hospital.</td>
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<td>Other potential causes of postnatal headache should be excluded.</td>
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<td>Bed rest may reduce the intensity of symptoms, but prolonged bed rest is not recommended as it may increase the risk of thromboembolic complications.</td>
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<td>Thromboprophylaxis should be considered for women whose mobility is reduced because of PDPH.</td>
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<td>Encourage oral fluids to maintain adequate hydration.</td>
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<td>Offer simple oral analgesics such as paracetamol, weak opioids and NSAIDs if not contraindicated.</td>
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<tr>
<td>Stronger opioids such as morphine or oxycodone may be offered but treatment should usually be limited to &lt;72 h duration.</td>
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<tr>
<td>Caffeine may be offered but limited to 24 h duration with a maximum dose of 900 mg (200 mg maximum in breastfeeding women).</td>
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<td>Offer an EBP when symptoms affect daily living and care of the baby.</td>
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<tr>
<td>Before hospital discharge, women who have experienced dural puncture with an epidural needle or PDPH should be given written information on symptoms that require further medical assessment and on whom they should contact.</td>
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<tr>
<td>Arrangements should be made for appropriate follow-up after discharge for women who have experienced dural puncture with an epidural needle or PDPH.</td>
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<tr>
<td>When women experience dural puncture with an epidural needle or PDPH, primary care health workers should be informed of the treatment received and further management arrangements</td>
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Caffeine has been suggested for the treatment of PDPH as it functions as a cerebral vasoconstrictor, but there is limited evidence to support its use. If caffeine is to be used, recommended doses should not be exceeded (see below). A variety of other medications have been used in the management of PDPH. These include other theophyllines, ACTH and its synthetic analogues; steroids; triptans; gabapentinoids; desmopressin; methylergonovine; ondansetron; and neostigmine with atropine. There is currently insufficient evidence to recommend any of these treatments.

There are several case reports of acupuncture being used for PDPH. However, no randomised studies show a benefit. There has been recent interest in peripheral nerve blocks. Several reports of the benefit of greater occipital nerve blocks (GONB) for PDPH have been published but further well-conducted studies are required before they can be recommended.

**Table 2**


Postpartum headache – diagnosis and treatment
Pneumocephalus may present as an immediate, severe headache worse when lying flat. It may occur after accidental intrathecal injection of air during lumbar puncture or neuraxial block, with as little as 2 ml enough to produce headache. Diagnosis may be confirmed by CT scan. Supplemental high-flow oxygen while supine, which accelerates resolution of intracranial air, has been used successfully.

The optimal volume of blood to be injected in the epidural space is yet to be determined, but 20 ml should be attempted. Back pain can be experienced during injection from nerve root irritation and an increase in pressure in the neuraxial canal. This may limit the volume of blood injected and injection should be halted if the patient experiences significant discomfort. A randomised study of EBP comparing injection of 15, 20 or 30 ml blood found that 30 ml gave no benefit beyond 20 ml; both were superior to 15 ml. However, many women randomised to 30 ml did not receive this volume as they experienced back pain before the full amount was given.

An EBP should be performed at the same interspace as the original dural puncture, or one space below, because of the predominant cephalad spread of blood after injection. Although most patients remain supine for 1–2 h after an EBP, strong evidence to support this practice is lacking.

Women who received an EBP should be reviewed regularly after the procedure. They should be given written information before discharge on possible symptoms that may develop and when to contact the hospital. Information should also be given to healthcare workers in primary care regarding further management. Mothers and Babies: Reducing Risk Through Audits and Confidential Enquiries across the UK (MRBRAICE-UK) has reported deaths from intracranial bleeding and thrombosis in women who experienced accidental dural puncture and chronic headaches but who were not adequately followed up when discharged from hospital.

Space-occupying lesions
Space-occupying lesions should be considered in a patient with headache and signs of increased ICP, especially where there is a longstanding history of headache without additional symptoms. Headache caused by increased ICP may be worse in the morning and associated with nausea and vomiting. Seizures and focal neurological signs may develop. Imaging and urgent neurosurgical consultation should be obtained.

Infection
Sepsis
The onset of sepsis is marked by malaise, shivering and headache. Fever is likely although hypothermia can occur. Urgent assessment and implementation of the Sepsis Six pathway is required with fluid resuscitation and broad-spectrum antibiotics. Paracetamol may help relieve headache and reduce pyrexia.

Meningitis
Meningitis may follow an unsterile neuraxial procedure or a PDPH. The classic triad for meningitis is fever, nuchal rigidity and change in mental status. Many patients also develop a severe headache. As dural puncture is usually necessary, meningitis is more likely to follow spinal anaesthesia. Organisms detected in the patient’s CSF may be matched to those in the upper airway of the operator. Consequently, meticulous aseptic technique is required when performing every neuraxial procedure. Treatment depends on CSF culture, although empiric antibiotics are usually indicated while cultures are pending; ‘aseptic’ (usually viral) meningitis can also occur.

Sinusitis
Sinusitis may develop in the postpartum period, especially in a patient with chronic symptoms. Headache, especially frontal headache, may be unilateral or bilateral depending on the severity of disease. Other symptoms include facial pressure, postnasal drip, cough and purulent rhinorrhoea. Symptoms are often more severe on waking and may be relieved when upright. Treatment comprises antibiotics, decongestants, nasal corticosteroids and consultation with a specialist in ear, nose and throat surgery depending on severity of symptoms.

Disorders of homeostasis
Hypertensive disorders of pregnancy
Both gestational hypertension and pre-eclampsia may be associated with headache. The presence of worsening headache should alert staff to the possibility of impending eclampsia. Headache is typically throbbing and diffuse and may be associated with nausea and vomiting or photophobia. Headache can be treated with simple analgesia; however, the underlying issue should be addressed with antihypertensive therapy, magnesium and often delivery to reduce the risk of eclampsia, cerebral haemorrhage, permanent organ injury and maternal and neonatal mortality. In some cases, pre-eclampsia may first present postpartum.

Headaches attributed to a substance or its withdrawal
Drug-related
A number of drugs commonly used in obstetrics may produce headaches. Nifedipine used for acute blood pressure control often causes headache, flushing and dizziness. Headache may be associated with other hypotensive agents such as nitrates and methyldopa. Ondansetron, a 5HT-receptor antagonist, may produce headaches in up to 17% of patients. Withdrawal of alcohol or opioid medication may result in postpartum headache.

Caffeine withdrawal
Moderate caffeine consumption (>200 mg daily) does not appear to contribute to miscarriage or preterm birth. Many women continue drinking coffee throughout pregnancy. Symptoms of caffeine withdrawal include headache, impaired concentration and fatigue. Severity is associated with the dosing of caffeine intake but even abstaining from low to moderate doses, which often happens peripartum,
can cause withdrawal. Symptoms may occur 12–24 h after abstinence and may last up to 2–9 days. Restarting caffeine ingestion may improve headache. It is recommended that women consume <900 mg caffeine per 24 h (<200 mg if breastfeeding as it is transferred into breast milk and may have adverse effects on the baby) as there may be an increased risk of maternal postpartum seizures.18 Commercially available coffee contains up to 200 mg of caffeine per cup.

Declaration of interests
The authors declare that they have no conflicts of interest.

MCQs
The associated MCQs (to support CME/CPD activity) will be accessible at www.bjaed.org/cme/home by subscribers to BJA Education.

References