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Postpartum Presentations: When Risk Arises After Delivery – Headache

Urgent Message: Both common and serious postpartum conditions may present in urgent care. Headache presentations should prompt consideration for possible postpartum preeclampsia, cerebral venous thrombosis, or post-dural puncture headache.

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Editor's Note: *The patient case scenario is hypothetical.*

Abstract

Background: The postpartum period introduces a broader range of possible diagnoses for common complaints seen in urgent care (UC).

Aim: The aim of this review is to enhance clinician familiarity with the diagnosis and management of both common and life-threatening postpartum conditions that may present in the UC setting. This article focuses on headache during the postpartum period.

Conclusion: In addition to the common etiologies of headache, it is important for UC clinicians to consider postpartum preeclampsia (PP); cerebral venous thrombosis (CVT); and post-dural puncture headache (PDPH).

Background

The postpartum period is variably defined and ranges

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Table 1. Postpartum Preeclampsia

Exam	Associated Findings
Cardiopulmonary	• Gallop heart rhythm (eg, S3, S4) • Tachycardia • Rales • Wheezes • Peripheral edema
Neurologic	• Altered sensorium • Diminished visual acuity • Visual field deficits • Focal motor deficits • Hyperreflexia • Clonus

from 6 weeks to 6 months after delivery.[1,2] However, the majority of physiologic change and risk is limited to the first 6 weeks postpartum.[2] Women experience a variety of symptoms and physiologic changes in the weeks following childbirth. Differentiating expected postpartum signs and symptoms from pathologic conditions can be challenging for both patients (especially first-time mothers) and clinicians.[3] However, understanding the conditions for which women are at risk after delivery is a critical first step for clinicians.

Given that postpartum symptomology may be related to anything from benign physiologic changes to life threatening conditions, it is important for UC clinicians to appropriately balance reassurance and vigilance. Assessment begins with a detailed history and focused physical exam. Vigilance should be exercised while considering and evaluating for serious pathologies. Reassurance becomes clinically indicated after these have been excluded.[4]

The case scenario presented in this review is hypothetical but illustrates various postpartum complaints and associated differential diagnoses to provide guidance for UC evaluation and disposition.

Hypothetical Clinical Scenario

A 36-year-old G2P2 (2 pregnancies, 2 live births) woman presented to UC with her husband 6 days after giving birth to a healthy infant by cesarean delivery (c-section) without complication. She presented with a chief complaint of 2 days of a gradual onset headache that was associated with blurred vision. She reported trying acetaminophen at home without relief.

On exam, her vitals were normal except for a blood pressure (BP) of 148/92 mmHg. She was sitting upright on the table holding her head during the exam and appeared generally uncomfortable. Her cardiopulmonary exam revealed clear lungs and normal heart rate and rhythm. Her abdomen was soft, non-tender, and her incision was intact, dry, and without surrounding erythema. Her uterus was firm, nontender, and palpable just below the umbilicus. Her neurologic exam was unremarkable, and specifically her extraocular movements and the remainder of the cranial nerve exam were normal. Her visual fields were intact bilaterally to confrontation. Her reflexes were brisk and symmetric, but there was no inducible ankle clonus.

Headache

Headaches are a common complaint in UC, and the vast majority of headache presentations are related to primary headache disorders (eg, migraine, tension, etc.) and benign.[5] However, there are additional causes of headache which are unique to the postpartum period, such as preeclampsia and CVT.[6] In an effort to address maternal mortality in the United States, the Centers for Disease Control (CDC) and Prevention's Division of Reproductive Health launched a national campaign called "Hear Her" to raise awareness of urgent warning signs of serious conditions during both during pregnancy and the first year postpartum.[7] This campaign continues to create materials and resources to raise awareness for these issues among healthcare professionals in the fields of obstetrics, pediatrics, emergency medicine, and primary care.[7]

Postpartum Preeclampsia

Epidemiology and Pathophysiology

Preeclampsia is a leading cause of maternal morbidity and mortality, with an incidence of up to 12% antenatally and 1.5% in the postpartum period.[8] It is likely that this underestimates the true incidence of PP, however, because milder cases may be missed or miscategorized as hypertension.[9] Experts still are uncertain as to whether isolated PP is caused by the same pathologic processes as antepartum preeclampsia, and work in this area continues.[9]

The most significant risk factors for PP are having preeclampsia or another hypertensive disorder antenatally or during a prior pregnancy, age >35 years, obesity, delivery by c-section, and non-Hispanic Black race.[10] Unlike antepartum preeclampsia, PP does not appear to be more common among primiparous women.[11] Patients who have a c-section have a 2-7-fold increased risk of PP compared to those who deliver vaginally.[12] Patients who receive greater volumes of intravenous (IV) fluids infusions during hospitalization have an increased risk of PP as well.[12] Since IV fluid administration volumes tend to be greater in women undergoing c-section, this may account for the some of the increased associated risk.

History

The most common presenting complaint in women who have PP is headache, which may range from mild to severe.[9] Other symptoms may include changes in sensorium and confusion, vision changes, and focal neurologic deficits. If seizures occur, the condition is then classified as postpartum eclampsia.[13] Symptoms due to volume overload and uncontrolled hypertension such as dyspnea, chest pain, orthopnea, and peripheral edema may also be present.[9] Importantly, a patient's headache response (or lack thereof) to any analgesic agent does not affect the likelihood of preeclampsia.[9] While the onset of headache is often gradual, patients with PP are at risk for intracranial hemorrhage and may have sudden onset/thunderclap headache presentation as well.[14]

Exam

The physical exam should include a thorough cardiopulmonary and neurologic assessment **(Table 1).**[9]

Testing

If considering PP, it is important that the recommended laboratory test results are available during the patient's visit. When this is not practical in the UC setting, immediate emergency department (ED) referral is indicated. The American College of Obstetricians and Gynecologists (ACOG) recommends the following laboratory tests be obtained:[15]

- Complete blood count
- Basic metabolic panel
- Spot urine protein
- Liver function

ACOG subdivides preeclampsia into those with or without severe features.[15] However, whether severe features are present or not, it is usually appropriate to refer patients to the ED or labor and delivery triage immediately if any of the criteria are met **(Table 2, 3).** Preeclampsia requires a gestational age of at least 20 weeks, and the criteria for different severities are the same in PP as well.[16] In the UC setting, it is not advisable to wait 4 hours between blood pressure measurements for patients who otherwise meet criteria for either category of preeclampsia.

Initial Management

In patients presenting with only an elevated blood pressure reading but no other criteria for preeclampsia, lowering the blood pressure is the priority.[17] ACOG recommends treating women with sustained, severe hypertension (≥160/110 mmHg) with rapid-acting antihypertensive agents, preferably through IV administration within 30-60 minutes.[9] Agents used for management of acute, severe hypertension in the postpartum period are similar to those used during pregnancy and include IV labetalol, hydralazine, and nicardipine. Oral nifedipine is given as an alternative option in settings where there is no IV access.[9,18] Magnesium sulfate is also recommended, either intramuscularly or IV, for seizure prophylaxis in patients with clinical suspicion for preeclampsia with severe features,[19] while acknowledging that this recommendation is based on low-quality evidence.[20] Postpartum eclampsia and PP most commonly occur within the first 2-7 days after delivery; the vasodilatory effect of magnesium is thought to decrease peripheral vascular resistance and help protect the blood-brain barrier.[21]

Indications for Referral to Emergency Department

As patients with concern for PP require close BP monitoring, and IV anti-hypertensive agents and magnesium therapy, all postpartum patients with features of preeclampsia should be referred immediately to the nearest ED or obstetric labor and delivery unit.[9]

It is advisable that patients being referred for evaluation and management of suspected preeclampsia do not drive themselves. In patients with reliable transportation, a normal neurologic exam, and no headache, having a family member drive them to the ED is reasonable. However, ambulance transport may be required for patients lacking immediate, reliable transportation or those exhibiting severe features.

Cerebral Venous Thrombosis

Epidemiology and Pathophysiology

Patients experience a transient hypercoagulable state during the later stages of pregnancy and in the postpartum period; this leads to increased risk for venous thromboembolism (VTE), including CVT.[11] In the United States, 6% of all cases of CVT occur either during pregnancy or in the postpartum period.[11,15]

CVT can lead to cerebral ischemia and stroke-like symptoms. However, unlike arterial thrombotic and embolic cerebrovascular accidents (CVA)—which typically affect older patients with vascular risk factors—CVT occurs more commonly in young adults, particularly women.[22] Additional risk factors for CVT in the postpartum period include comorbid preeclampsia, thrombophilia disorders (eg, antiphospholipid antibody syndrome, Factor V Leiden, etc.), homocystinuria, and sepsis.[18,22] In-hospital mortality for patients diagnosed with CVT is approximately 2% and 9% at 1 year. Older

Table 2. Preeclampsia With Severe Features[12]	
Severely elevated blood pressure	Systolic blood pressure (SBP) ≥160 mmHg *and/or* Diastolic blood pressure (DBP) ≥110 mmHg on 2 occasions at least 4 hours apart while the patient is on bedrest
Symptoms of central nervous system dysfunction	New-onset cerebral or visual disturbances including: • Flashes in vision, scotomata, cortical blindness/vision loss, retinal vasospasm *and/or* • Severe headache or headache that persists and progresses despite analgesic therapy with acetaminophen and not accounted for by alternative diagnoses
Hepatic abnormality	Elevated transaminases not accounted for by another diagnosis with values ›2 times the upper limit of the normal range *and/or* Severe, persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by an alternative diagnosis
Thrombocytopenia	Platelet count ‹100,000/µL
Kidney function impairment	Serum creatinine ›1.1 mg/dL *and/or* Doubling of the serum creatinine concentration in the absence of other causes of renal impairment

Table 3. Preeclampsia Without Severe Features[12]	
Elevated blood pressure	SBP ≥140 mmHg *and/or* DBP ≥90 mmHg on at least 2 occasions at least 4 hours apart within 6 weeks of delivery
New onset of 1 or more of the following:	• Proteinuria – ≥0.3g (300mg) in a 24-hour urine – Urine dipstick reading of ≥2+ *or* – Protein/creatinine ratio of ≥0.3 (30 mg/mmol) in a random urine specimen • Platelet count ‹100,000/µL • Serum creatinine ›1.1 mg/dL *or* doubling of the creatinine concentration in the absence of other kidney disease • Liver transaminases at least twice the upper limit of normal concentrations for the local laboratory • Pulmonary edema • New-onset and persistent headache not accounted for by alternative diagnoses and not responding to usual dose of analgesics • Visual symptoms (eg, blurred vision, flashing lights or sparks, scotomata)

age, active malignancy, and presence of associated seizures or intracranial hemorrhage are associated with higher mortality at 30 days and 1 year.[23]

History

Headache is the most common presenting symptom in patients with CVT and is present in nearly 90% of cases.[24] The headache pattern in CVT is typically described as generalized and gradual in onset, progressing in severity over days to weeks. While not the most common pattern, a non-trivial minority of patients with CVT experience a sudden onset, or "thunderclap," headache.[25] Neurologic deficits and seizures may also be present in patients with CVT, although they occur in the minority of patients and are relatively late findings.[26] When present, the most common neurologic signs are hemiparesis, aphasia, and visual field deficits. Other cortical signs and sensory symptoms may occur; one-third of patients experience associated seizures.[22,27] Coma at presentation relatively rare occurring in 9-20% of cases.[26]

Exam

In approximately 40% of patients with CVT, the physical exam is normal.[28] While evident in the minority of cases, the presence of papilledema, scalp edema, and dilated scalp and neck veins, if seen on exam, should prompt consideration of CVT.[11] On neurologic exam, hemianopia, hemiparesis (contralateral to the CVT), and/or aphasia may be seen in 30-40% of cases.[11]

Testing

Postpartum patients presenting with acute headache and new neurological signs warrant emergent brain imaging. While computed tomography (CT) and magnetic resonance imaging (MRI) are rarely available in UC settings, it is important for clinicians to understand appropriate testing when CVT is of concern to ensure rapid referral to a facility with appropriate resources.

CT without contrast is often non-diagnostic for CVT but may demonstrate secondary findings suggestive of CVT.[29] Anatomic variability of the venous sinuses makes non-contrast CT insensitive for CVT, with a normal CT exam reported in approximately 70% of cases.[30] In the ED, specific additional brain imaging studies are often suggested in consultation with a neurologist or radiologist.[31]

If there is clinical concern for CVT, the American College of Radiology (ACR) states that either CT or magnetic resonance venography (MRV) are appropriate imaging studies and similarly sensitive for the diagnosis of CVT.[10,18,32]

Diagnostic Criteria

D-dimer has been explored as a screening test for CVT. However, in contrast to screening for pulmonary embolism (PE) and deep vein thrombosis (DVT), d-dimer has not proven to be sufficiently sensitive to exclude CVT.[33]

The diagnosis of CVT relies on cross-sectional neuroimaging findings. Per the ACR Appropriateness Criteria, either MRI or CT venography are acceptable for excluding CVT and have sensitivities ranging from 95-100%. CVT can be diagnosed when suggestive findings are present using either modality of venography.[10,28,34]

Initial Management

The long-term management of CVT depends on many patient factors as well as the presence and severity of any associated deficits.[35] The mainstay of acute treatment is parenteral anticoagulation with either unfractionated or low-molecular weight heparin and parenteral anticonvulsant therapy if seizures occur.[36]

After initial parenteral anticoagulation, the ongoing management of CVT involves a variable additional period of anticoagulation with either warfarin or a direct oral anticoagulant. Anticoagulation duration can be as little as 3–6 months in provoked CVT to potentially lifelong anticoagulation in recurrent CVT, VTE following CVT, or CVT associated with severe thrombophilias.[36]

"Any postpartum patients with a new, acute and/or severe headache without an alternate explanation and concern for CVT should be immediately referred to an ED; the patient should not drive herself in these situations."

Immediate management of seizures in postpartum patients does not differ from management of seizures in the general population. Initial treatment involves parenteral use of benzodiazepines at appropriate doses (eg, lorazepam, midazolam etc).[37] In cases where there is any possibility of eclampsia, empiric IV magnesium is also recommended, as it is common to have limited history in such clinical scenarios.[37] The appropriateness/necessity of long-term anti-epileptic drug therapy in the setting of seizures associated with a new diagnosis of CVT will be an individualized decision made by the treating neurologist.[38]

Indications for Referral to Emergency Department

Any postpartum patients with a new, acute and/or severe headache without an alternate explanation and concern for CVT should be immediately referred to an ED; the patient should not drive herself in these situations. If neurologic signs or symptoms or seizures are present, EMS activation is recommended for ambulance transport. In postpartum patients without severe headache and neurologic deficits but low-moderate pre-test probability for CVT, an urgent outpatient CT or MRV obtained within 24 hours is a reasonable strategy; such an outpatient plan also requires communication of strict precautions for seeking care in the nearest ED if symptoms progress *and* another responsible adult present who can monitor their status.

Post-Dural Puncture Headache

Epidemiology and Pathophysiology

Epidural anesthesia is used in 30-60% of vaginal deliveries in the developed world.[39] While not an intended

outcome, accidental dural puncture occurs as a complication in approximately 1% of cases of intrapartum epidural anesthesia.[40] Among these patients, a post-dural puncture headache will occur in up to 80% of cases.[41,42] In contrast, post-dural puncture headaches occur in 0.8-6% of cases utilizing spinal anesthesia (eg, c-section).[43]

Headaches after dural puncture are related to cerebrospinal fluid (CSF) leak at the puncture site, which results in intracranial hypotension.[44] PDPH typically present within the first 5 days after the procedure with peak incidence in the first 24-72 hours.[45]

"PDPH is treated symptomatically. If discomfort is non-debilitating, the symptoms can be managed with oral analgesics and/or caffeine (which helps stimulate cerebrospinal fluid production)."

History

The most suggestive distinguishing factor for PDPH is a postural change in headache severity–the headache will typically improve significantly when the patient is supine and worsen with standing.[44] Other associated symptoms may include neck stiffness, hearing changes, tinnitus, neck pain, back pain, visual disturbances/changes, vertigo, and nausea.[45]

Exam

A thorough head/neck and neurological exam is important to evaluate for other more sinister causes of headache (eg, meningitis, subarachnoid hemorrhage). Examine the lower back at the puncture site, specifically noting signs of infection or evidence of CSF leakage.[44]

Testing

PDPH is a clinical diagnosis. In cases when a brain MRI is obtained to rule out other etiologies of headache, 1 or more findings may be present such as caudal displacement of the brain, subdural hygroma, pachymeningeal enhancement due to increased venous flow, and/or expansion of the pituitary gland.[43] Labs are not helpful in the evaluation of PDPH.

Diagnostic Criteria

The International Classification of Headache Disorders, third edition defines a PDPH as occurring within the past 5 days and strongly orthostatic in nature. The diagnosis is also predicated on exclusion of other causes of headache based on other associated symptoms and spontaneous resolution or improvement after a blood-patch procedure.[44]

Brief Management

PDPH is treated symptomatically. If discomfort is non-debilitating, the symptoms can be managed with oral analgesics and/or caffeine (which helps stimulate cerebrospinal fluid production).[43,44] Patients with an intractable headache after dural puncture can be treated with an epidural blood patch, typically placed by an anesthesiologist.[43]

Indications for Referral to Emergency Department

A postpartum patient with headache in whom PDPH is suspected clinically warrants ED referral if the pain and intolerance of standing is debilitating and conservative treatments have failed.[44] Such patients are those in whom blood patch is typically offered. It is important to confirm the availability of anesthesiology services at the hospital the patient is being referred to as this is the specialist who will generally perform a blood patch. Blood patch improves not only immediate symptomatology but also seems to reduce the risk of chronic headache in patients with PDPH.[46]

Patients with concerning neurologic symptoms or symptoms suggestive of alternative diagnoses that may require neuroimaging also warrant immediate ED referral. Ambulance transport is prudent if time-sensitive diagnoses are in the differential and/or the possibility of clinical deterioration exists (eg, CVA, meningitis). Signs of visible CSF leak or infection at the puncture site are also findings that should prompt immediate ED referral.

Other Causes of Headache

In addition to causes of headache unique to the postpartum period, patients may also experience primary headaches (eg, tension, migraine, etc.) or other types of secondary headache (eg, meningitis, sinusitis, neck artery dissection, post-traumatic etc.). The list of differential diagnoses for postpartum headache presentations, therefore, should also include any etiology that might otherwise explain the headache in addition to the diagnoses discussed in this review.

Clinical Scenario Conclusion

In UC, the patient's BP was elevated to >140/90 mmHg. She was allowed to sit quietly in a dark room for 15 minutes, and her BP measurement was repeated. Her BP remained elevated in a similar range. The UC clinician checked a urine dipstick which showed only 1+ protein and no other abnormalities. Given concerns for PP with her persistently elevated BP and headache, the UC clinician called the patient's obstetrician (OB/GYN) who recommended sending her to the ED as immediate lab testing was not available in the UC center. The patient declined ambulance transport, and her husband drove her instead. The UC clinician called the ED and provided a sign-out and summary of her care to the emergency physician on shift.

In the ED, the patient's BP remained elevated, and IV labetalol was started. Her lab testing did not reveal any severe features, and therefore she was not treated with magnesium prophylaxis. She was admitted to the OB/GYN unit and discharged the following day on oral anti-hypertensive agents with instructions to continue to monitor BP at home and follow-up in 2 days.

Summary and Key Points for Urgent Care Providers

- While most headaches presenting to UC are due to a benign etiology, postpartum patients are at risk for specific conditions, namely PP, CVT, and PDPH, which require separate consideration as there may be increased morbidity in cases of delayed diagnosis.
- Postpartum patients are at the highest risk for PP and CVT in the first week after delivery with the risk decreasing over time until approximately 6 weeks postpartum.
- While an elevated BP may be related to pain, in the postpartum period, this should not be presumed until PP is excluded. It is important to recognize that what would in other scenarios be considered mild and non-emergent levels of BP elevation (ie, >140/90 mmHg) would represent an emergency/PP until proven otherwise in patients presenting in the days and weeks after pregnancy.
- High risk signs and symptoms for each respective condition include:
  - **Postpartum preeclampsia**—gradual onset and often severe headache with elevated blood pressure readings; may also have associated vision changes, altered mental status, right upper quadrant or epigastric pain, dyspnea, and peripheral edema. Seizures may occur in severe cases.
  - **Cerebral venous thrombosis**—generalized, progressive headache with stroke-like symptoms including focal neurological deficits like hemiparesis, aphasia. Seizures and coma may occur in severe cases.
  - **Postdural puncture headache**—postural headache that is worse with standing; may have associated neck stiffness or back pain up to 5 days after epidural anesthesia.

"The list of differential diagnoses for postpartum headache presentations, therefore, should also include any etiology that might otherwise explain the headache in addition to the diagnoses discussed in this review."

- Refer postpartum patients to the ED immediately if presenting with a new, severe headache, neurologic deficit, seizure, alteration in sensorium or if BP is elevated. Also refer if there is concern for preeclampsia when laboratory testing and/or neuroimaging is not immediately available in the UC setting.
- Post-dural puncture headaches can be managed symptomatically. Most will resolve without procedural intervention, however, an epidural blood patch may be required to achieve analgesia in those who are unresponsive to conservative therapy. ■

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