
Diagnosing and managing peripartum headache

Erica N. Grant, MD, MSc, Jia Wang, MD, Brian Gelpi, MD, Alison Wortman, MD, and Weike Tao, MD

A 38-year-old gravida 7 para 5 Hispanic woman at 36 weeks and 4 days gestation presented with a postpartum headache following vaginal delivery complicated by an unintentional dural puncture for epidural analgesia. Due to the positional nature of the headache and its frontal and occipital origin, a postdural puncture headache was diagnosed. After failure of conservative treatment, an epidural blood patch was used, which offered immediate relief. However, shortly following the procedure, the parturient's neurological condition deteriorated due to an unrecognized intraparenchymal and subarachnoid hemorrhage requiring an emergent craniectomy. This case highlights the importance of diligence when evaluating and treating postpartum headache despite a classic presentation.

Forty percent of postpartum women have headaches, most of which occur in the first week. Most causes of postpartum headaches are relatively benign, including migraines and tension headaches. Studies have demonstrated that the weeks following childbirth, known as the puerperium, are a particularly vulnerable time period for development of headaches of a variety of primary and secondary headache disorders, mainly due to hormonal, physiological, procedural, and psychological factors (1). This case highlights that the diagnosis of postpartum headache should be evaluated carefully, and secondary causes, that are potentially life threatening, should first be ruled out before diagnoses of common causes are postulated.

CASE DESCRIPTION

A 38-year-old gravida 7 para 5 Hispanic woman at 36 weeks and 4 days gestation with no significant past medical history requested epidural analgesia for pain relief during augmented labor. The first attempt at epidural catheter placement was complicated by dural puncture with a 17-gauge epidural needle, confirmed by free flow of cerebrospinal fluid. The second attempt at epidural catheter placement was successful, and continuous lumbar epidural analgesia was achieved and remained effective throughout the uneventful vaginal delivery.

On the second postpartum day, the patient began to complain of a frontal headache and a verbal pain score of 6 to 10/10 that worsened in the upright position. The patient was initially normotensive with no focal neurological deficits, and

the headache improved to 2/10 with acetaminophen and rest. Given the positional effect on the headache, there was a concern for a postdural puncture headache, and recommendations were made for conservative management, including intravenous hydration and oral caffeine.

On the third postpartum day, the patient's headache persisted and now included both the frontal and occipital regions. She was now hypertensive with blood pressure in the 160s/80s mm Hg and bradycardic with a heart rate of 50 beats per minute. The possibility of preeclampsia was initially discussed with the obstetricians; however, workup was not pursued due to the low likelihood of preeclampsia presenting after postpartum day 2. She was transferred from the postpartum ward to the extended care unit on labor and delivery for closer monitoring and further management of her hypertension. She received intravenous hydralazine to treat systolic blood pressure >160 mm Hg. The patient's headache again was thought to be a postdural puncture headache, and after review of the patient's symptoms and failure of conservative management over the previous 24 hours, she was offered an epidural blood patch.

Immediately prior to the epidural blood patch placement, the patient's blood pressure was 154/90 mm Hg and her heart rate was 59 beats per minute. Immediately following the blood patch placement, the patient's blood pressure was 141/72 mm Hg and her heart rate was 56 beats per minute. An uneventful autologous epidural blood patch of 23 mL was performed, and the patient had immediate relief of her headache.

One hour after blood patch placement, the patient complained of severe right-sided face and neck pain. Examination demonstrated no neurological abnormalities. Her blood pressure was in the 160s/90s mm Hg and heart rate, low 100s beats per minute. Within the next hour, her mental status had deteriorated to a Glasgow Coma Scale score of 10 (eyes, 4; best verbal response, 1; best motor response, 5). She had new

From the Department of Anesthesiology and Pain Management (Grant, Wang, Gelpi, Tao) and the Department of Obstetrics and Gynecology (Wortman), University of Texas Southwestern Medical Center, Dallas, Texas.

Corresponding author: Erica N. Grant, MD, MSc, Department of Anesthesiology and Pain Management, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75390-9068 (e-mail: erica.grant@utsouthwestern.edu).

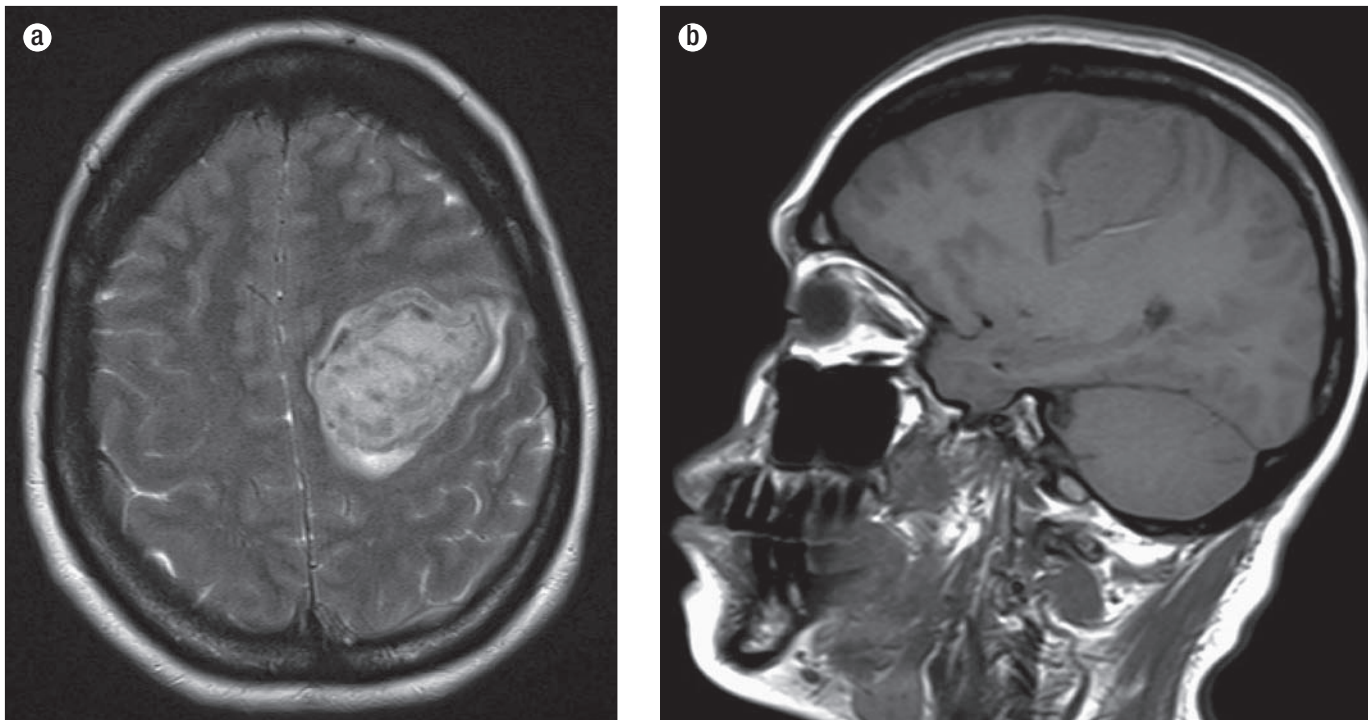


Figure. (a) Transverse and (b) sagittal magnetic resonance imaging views of the head showing left-sided intraparenchymal hemorrhage with an evident midline shift and overlying left-sided subarachnoid hemorrhage (evident by blood in sulci).

onset emesis, increased urine output (2300 mL in 1 hour), and right-sided facial droop. Brain computed tomography and magnetic resonance imaging revealed a large left-sided frontal intraparenchymal hemorrhage (3 cm × 4 cm × 5 cm) with involvement/compression of the motor strip and Broca's area with overlying subarachnoid hemorrhage causing a 4 mm midline shift (*Figure*). Partial preeclampsia lab work was completed by the primary team at the time of neurological deterioration, and all values were within normal range: platelets, $132 \times 10^9/L$; serum creatinine, 0.42 mg/dL; and aspartate aminotransferase, 59 U/L.

The patient was transferred to the intensive care unit for more neurological monitoring and evaluation by neurosurgery. She did not require immediate neurosurgical intervention but the following morning, the fourth postpartum day, she was intubated and taken to the operating room for an emergent craniectomy with evacuation of 500 mL of blood. The patient was extubated on the second postoperative day, transferred to the inpatient stroke rehabilitation unit on the sixth postoperative day, and subsequently discharged home on the 57th postoperative day. Six-vessel angiography immediately following craniectomy on the fifth day and in the fifth month did not reveal vascular injury or an aneurysm. Eight months following the initial event, the patient was discharged from physical therapy after meeting goals including independently performing daily activities, but she continued to have reduced strength in her right arm, mild aphasia, and dysarthria.

DISCUSSION

In this case report, the parturient presented with "classic" symptoms of a positional headache consistent with postdural

puncture headache, a complication of neuraxial analgesia with an estimated incidence of 50% to 85% following unintentional dural puncture with an epidural needle (2, 3). However, worsening symptoms and elevated blood pressure should have triggered the need for further evaluation. The differential diagnosis of postpartum headache includes primary headache disorder, preeclampsia and eclampsia, meningitis, acute ischemic stroke, intracerebral and subarachnoid hemorrhage, cerebral venous sinus thrombosis, posterior reversible encephalopathy syndrome, and reversible cerebral vasoconstriction syndromes. One study found the etiology distribution of severe postpartum headache was tension (39%), preeclampsia or eclampsia (24%), postdural puncture headache (16%), migraines (11%), and hemorrhage/thrombosis/vasculopathy (10%) (4).

Systolic blood pressures >140 mm Hg should have increased the suspicion for preeclampsia, a condition that can be present up to 6 weeks postpartum (1). In this case, laboratory tests were within normal limits. However, the 2013 American College of Obstetricians and Gynecologists guidelines note that systolic blood pressure readings over 4 hours apart above 140 mm Hg along with cerebral symptoms would have been sufficient for a diagnosis (5).

Strokes, on the other hand, are rare in obstetric patients, with hemorrhagic strokes being especially rare. The reported incidence of stroke, both ischemic and hemorrhagic, has been estimated to be approximately 34 per 100,000 deliveries, with most cases occurring in the puerperium (6). Several factors can contribute to an increased risk in the parturient, including hormonal changes that affect cerebral vasculature. Additionally, pushing in the second stage of labor causes elevations in blood pressure (7). Preeclampsia and eclampsia increase the risk of

stroke fourfold. This increased risk is thought to be due to endothelial dysfunction, impaired cerebral autoregulation, and severe hypertension (8).

Last, but of great interest, there are reports of intracranial hemorrhage and subarachnoid hemorrhage following dural puncture (9–12). It has been postulated that leakage of cerebrospinal fluid can cause intracranial hypotension, increasing transmural pressure across the arterial and/or venous wall, facilitating rupture (13). While one or a combination of the aforementioned processes likely contributed to this parturient's unfortunate outcome, another source of uncertainty is the temporal nature of the intracranial hemorrhage and placement of the epidural blood patch. Although an epidural blood patch causes a sudden increase in intracranial pressure, which is one of the mechanisms by which it causes immediate relief of the headache, this patient was exhibiting signs of deterioration prior to its placement. While a prophylactic epidural blood patch has not been shown to reduce the occurrence of postdural puncture headache in the obstetric population (14), there exists the possibility that performing it early normalizes intracranial pressure. The mechanism is due to the increase in cerebrospinal fluid and inhibition of further cerebrospinal fluid loss with subsequent increase in intracranial pressure, decreased shear forces across the vasculature wall, and decreased risk of both intracranial hemorrhage and exacerbation of an existing hemorrhage (15).

The exact etiology of this parturient's intracranial hemorrhage and resulting stroke remains unknown. The case does, however, highlight the importance of clinicians maintaining high levels of suspicion for life-threatening causes of postpartum headache in women who are at increased risk of pregnancy-related stroke. Risk factors include an age >35 years, African American ethnicity/heritage, chronic hypertension/gestational hypertension/preeclampsia/eclampsia, thrombophilias, migraine headaches, diabetes, hyperemesis gravidarum, anemia, thrombocytopenia, postpartum hemorrhage, need for transfusions, fluid/electrolyte/acid-base disorders, and infection (6). Given that postpartum acute neurological conditions occur rarely and require multidisciplinary management teams, vigilance

to evaluate other possible diagnoses is needed to quickly and appropriately treat patients.

1. Edlow JA, Caplan LR, O'Brien K, Tibbles CD. Diagnosis of acute neurological emergencies in pregnant and post-partum women. *Lancet Neurol* 2013;12(2):175–185.
2. Choi PT, Galinski SE, Takeuchi L, Lucas S, Tamayo C, Jadad AR. PDPH is a common complication of neuraxial blockade in parturients: a meta-analysis of obstetrical studies. *Can J Anaesth* 2003;50(5):460–469.
3. Kuczkowski KM. The management of accidental dural puncture in pregnant women: what does an obstetrician need to know? *Arch Gynecol Obstet* 2007;275(2):125–131.
4. Stella CL, Jodicke CD, How HY, Harkness UF, Sibai BM. Postpartum headache: is your work-up complete? *Am J Obstet Gynecol* 2007;196(4):318.e1–e7.
5. American College of Obstetricians and Gynecologists; Task Force on Hypertension in Pregnancy. Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' Task Force on Hypertension in Pregnancy. *Obstet Gynecol* 2013;122(5):1122–1131.
6. Tate J, Bushnell C. Pregnancy and stroke risk in women. *Womens Health (Lond Engl)* 2011;7(3):363–374.
7. Selo-Ojeme DO, Marshman LA, Ikomi A, Ojutiku D, Aspoas RA, Chawda SJ, Bawa GP, Rai MS. Aneurysmal subarachnoid haemorrhage in pregnancy. *Eur J Obstet Gynecol Reprod Biol* 2004;116(2):131–143.
8. Bushnell C, Chireau M. Preeclampsia and stroke: risks during and after pregnancy. *Stroke Res Treat* 2011;2011:858134.
9. Sorour M, Krishn KM, Couldwell WT. Intraventricular hemorrhage after epidural blood patching: an unusual complication. *Case Rep Neurol Med* 2014;2014:406289.
10. Hasiloglu ZI, Albayram S, Ozer H, Olgun DC, Selcuk H, Kaynar MY. Cranial subarachnoid hemorrhage as an unusual complication of epidural blood patch. *Clin Neurol Neurosurg* 2011;113(8):689–692.
11. Benzon HT. Intracerebral hemorrhage after dural puncture and epidural blood patch: nonpostural and noncontinuous headache. *Anesthesiology* 1984;60(3):258–259.
12. Bleeker CP, Hendriks IM, Booij LH. Postpartum post-dural puncture headache: is your differential diagnosis complete? *Br J Anaesth* 2004;93(3):461–464.
13. Böttiger BW, Diezel G. Acute intracranial subarachnoid hemorrhage following repeated spinal anesthesia. *Anaesthesist* 1992;41(3):152–157.
14. Agerson AN, Scavone BM. Prophylactic epidural blood patch after unintentional dural puncture for the prevention of postdural puncture headache in parturients. *Anesth Analg* 2012;115(1):133–136.
15. Matthys LA, Coppage KH, Lambers DS, Barton JR, Sibai BM. Delayed postpartum preeclampsia: an experience of 151 cases. *Am J Obstet Gynecol* 2004;190(5):1464–1466.