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Co-Presentation of Posterior Reversible Encephalopathy Syndrome in a Patient with Post-Dural Puncture Headache

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Abstract

Introduction. Post-dural puncture headache (PDPH) is a well-known complication of neuraxial anesthesia, but the occurrence of seizures and vision loss within a few days after dural puncture could be alarming. Posterior reversible encephalopathy syndrome (PRES) is associated with reversible edema and leukoencephalopathy in the posterior parieto-occipital cortex. We report the co-presentation of PRES and PDPH after labor epidural analgesia. **Case Presentation.** A 25-year-old multiparous African-American woman was admitted for evaluation of new-onset seizures and headache in the postpartum period. She had a recent history of multiple needle insertion attempts and inadvertent dural puncture during epidural analgesia for delivery. Soon after delivery, she was diagnosed with PDPH and was treated with an epidural blood patch, with no relief of symptoms. Six days later, she developed sudden-onset transient blindness, seizures, and altered sensorium, and magnetic resonance imaging of the brain revealed white matter changes suggestive of PRES. **Conclusion.** PRES is an uncommon complication of cerebrospinal fluid leak and intracranial hypotension. We report the occurrence of PRES in a patient with no known risk factors except a traumatic dural tap. Is it important to expand the differentials for headache after dural puncture to encompass PRES as a possibility, especially in patients with a delayed presentation of seizures and cortical blindness.

Key Words: Epidural Blood Patch; Headache; Post-Dural Puncture Headache; Posterior Reversible Encephalopathy Syndrome

Introduction

Since spinal anesthesia was first performed by August Baer in 1898, the occurrence of post-dural puncture headache (PDPH) has been very well known. Headache after dural puncture was a common occurrence in the past but has been less so in recent years because of modifications in the neuraxial techniques and needles. However, the occurrence of seizures and vision loss days after dural puncture is alarming. Posterior reversible encephalopathy syndrome (PRES) is a distinct clinical neuroradiological entity

associated with reversible edema and leukoencephalopathy in the posterior parieto-occipital areas of brain. It was first described by Hinchey in 1996, and since then it has been a topic of great interest and speculation [1]. The same mechanisms that cause PDPH after cerebrospinal fluid (CSF) leak can cause PRES; hence, the diagnosis of PRES can be often confused with PDPH. We report a case of PDPH after inadvertent dural puncture for labor epidural analgesia, complicated by clinical and radiological findings suggestive of PRES .

Description of Problem

A 25-year-old multiparous African-American woman with no previous comorbidities was transferred to our hospital from an outside facility for evaluation of headache and seizures in the postpartum period. The patient's history was complicated by multiple needle insertion attempts and inadvertent dural puncture during epidural analgesia for vaginal delivery 10 days before presentation in our hospital. She developed lower back pain soon after the procedure. Four hours after delivery, she developed severe constant frontal headache, 10/10 in intensity. This was also associated with intense pressure radiating from the neck upward to the occiput. The headache was typically described as positional, with severe photophobia, nausea, and multiple episodes of vomiting. She also described difficulty in maintaining body balance in the upright position. Within a day after the onset of headache, an epidural blood patch was performed. The back pain worsened soon after the blood patch, but there was no improvement in headache. She was also managed conservatively with the oral nonsteroidal anti-inflammatory drug (NSAID) ibuprofen and acetaminophen and was encouraged to lie flat and drink caffeinated beverages. The patient declined a second epidural blood patch. She was discharged in 2 days and continued to have persistent headache at home.

The patient was readmitted to the intensive care unit at the outside hospital 6 days after delivery with sudden-onset transient blindness and generalized seizures with postictal confusion, and she was later transferred to our hospital. The Acute Pain Management Service was consulted for the patient's persistent lower backache, although her headache was tolerable. Physical examination revealed severe photophobia and exquisite tenderness over the lower mid-back, with no neurological deficits.

Clinical Solution

Pain was managed with a short course of oxycodone and ketorolac. Eclampsia was ruled out, as the patient's blood pressure, liver function, and kidney function tests were in the normal range. Continuous electroencephalogram showed no evidence of seizure, but magnetic resonance imaging (MRI) of the brain (Figure 1) revealed white matter edema of uncertain origin in the bilateral posterior parietal areas suggestive of PRES. Urgent neurosurgery consult was taken, but a surgical plan was deferred, as the MRI of the cervical and thoraco-lumbar spine showed no evidence of damage to soft tissues. After an uneventful course in our hospital, the patient was discharged with the oral anti-epileptic levetiracetam and analgesics, including oxycodone, acetaminophen-aspirin-caffeine, and gabapentin, and she was advised to follow up in 6 weeks with the epilepsy clinic, but she did not return. During a telephonic conversation after 2 months, the patient reported complete recovery from headache and seizures.

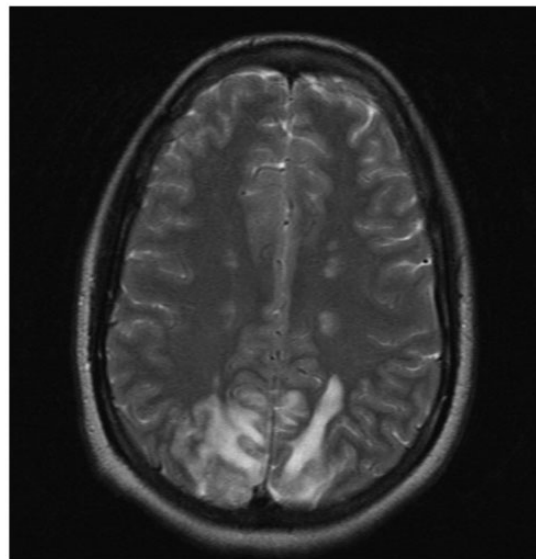


Figure 1. MRI of the brain showing symmetrical areas of hyperintensity suggestive of white matter edema in the bilateral posterior parietal areas consistent with PRES. The edema is usually symmetrical and is most likely to be located in the parietal and occipital areas.

Discussion

PRES is a reversible, predominantly posterior leukoencephalopathy that may clinically present with headache, vomiting, confusion, seizures, cortical blindness, and motor deficits and is radiologically evidenced by extensive bilateral symmetric edema in posterior parts of the brain [1, 2]. The pathophysiology of PRES is controversial. Intracranial hypotension caused by CSF leak leads to increased blood flow in the leptomeningeal vessels, according to the Monroe-Kellie doctrine. Posterior brain regions are less responsive to the protective effects of cerebral autoregulation and particularly more susceptible to hyperperfusion because of sparse sympathetic innervation of intracranial arterioles [3]. Hyperperfusion and cerebral vessel damage lead to vasogenic edema. Risk factors for the development of PRES include hypertensive encephalopathy, preeclampsia, immunosuppressant drugs, sepsis, and autoimmune diseases [2–4]. Although hypertension and preeclampsia are strongly linked to PRES, the latter could manifest without either of these [5]. Our patient did not have any predisposing factors, which makes intracranial hypotension caused by CSF leak a more likely etiology.

There are several case reports of PRES after CSF leak from epidural or spinal tap. Shah et al. reported PRES after an accidental dural puncture during epidural anesthesia for laparotomy [5]. Ho et al. revealed an occurrence of PRES from spinal anesthesia for cesarean section [6]. Hammad et al. detailed the diagnosis of PRES in a patient who underwent laminectomy complicated by accidental dural tear [7]. PRES was described by Shields in a patient who had CSF leak after thoracic discectomy [8]. PRES has also been described in the postpartum period

after epidural anesthesia for cesarean section in the absence of dural puncture [4].

Computerized tomography or MRI of the brain is diagnostic and reveals bilateral vasogenic edema commonly involving the parietal and occipital areas of the brain. This cortical or subcortical edema is usually symmetrical and could present in three major patterns, including parieto-occipital dominance, superior frontal sulcus, and holohemispheric at watershed areas of frontal lobe, inferior temporal lobe, cerebellum, and brainstem [9]. Magnetic resonance angiography shows evidence of vasculopathy with diffuse vasoconstriction and focal areas of vasoconstriction or vasodilation.

The clinical presentation of PRES starts with a severe positional headache, with photophobia, nausea, and vomiting; this is often confused with PDPH [10]. Dural puncture is known to cause persistent CSF leak, which can lead to intracranial hypotension and headache [11]. The patients often manifest symptoms days after hospital discharge and are usually admitted for management of seizures and altered sensorium. Hence, it is prudent to associate the symptoms of PRES with a history of prior dural puncture, as PRES could be a late complication of CSF leak.

Management of PRES is directed at treating the underlying cause (for instance, supportive treatment for CSF leak, antihypertensive agents in patients with hypertension, discontinuation of immunosuppressive agents) and treatment of seizures with antiepileptic agents. Because of the self-limiting course of PRES, resolution of symptoms occurs in a few weeks.

Conclusion

PRES is an uncommon complication of intracranial hypotension resulting from CSF leak. We report the occurrence of PRES in a patient with no known risk factors except a traumatic dural tap. We need to expand the differentials for headache after dural puncture to encompass PRES as a possibility, especially in patients presenting a few days later with seizures and cortical blindness.

Question:

A 70-year-old man presents to the pain clinic for lumbar epidural steroid injection for chronic right-sided radicular pain associated with lumbar spine stenosis. The procedure is complicated by accidental dural puncture, and the steroid injection is aborted. The patient presents to the emergency department 24 hours later with severe throbbing fronto-occipital headache with neck pain, which is worse in the upright position. Which of the following is a definitive treatment option for PDPH?

- A. Reassurance
- B. Aggressive fluids
- C. Caffeine
- D. Acetaminophen and NSAID
- E. Epidural blood patch

Answer: E. Epidural blood patch

Although PDPH often has a self-limited course and resolves spontaneously with the passage of time, the course can be unpredictable and sometimes prolonged if untreated. The symptoms could be severely disabling, impairing the quality of life. Once the diagnosis is made, patients should be informed of the etiology, expected course of recovery, and treatment options.

Although aggressive hydration with intravenous and oral fluids is routinely practiced, there is a lack of supportive evidence for it. Avoiding dehydration is more reasonable than is excess hydration.

Intravenous and oral caffeine is widely used in clinical practice for treatment of PDPH, but studies have failed to demonstrate a benefit of caffeine in moderate or severe PDPH.

Acetaminophen and NSAIDs are commonly used to reduce the severity of headache, but they fail to provide significant analgesia in severe PDPH.

Epidural blood patch is recommended as the “gold standard” treatment option for PDPH. It stops CSF leak by forming a clot over the meningeal tear, as well as by cephalad displacement of CSF, causing a tamponade effect. Fresh autologous blood (10–20 mL) is injected near the dural puncture until the patient experiences intense back pain. This is performed at least 24 hours after symptom onset.

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