PAIN MEDICINE CASE REPORTS

ISSN 2768-5152

Volume 7, Number 5, pp. 233-237

Postdural Puncture Headache, Subdural Hematoma, and Sixth Cranial Nerve Palsy Lumbar Following Spinal Drain, Resolved with Epidural Blood Patch: Case Report

Edward M. Walton, MD and Lisa V. Doan, MD

Background: Postdural puncture headache (PDPH) is a known potential complication of lumbar drain placement. Data regarding incidence of PDPH after lumbar drain placement varies, with a range of 0% to 47%. Furthermore, spinal drain placement has been associated with a significantly increased risk of debilitating neurologic complications.

Case Report: In this article, we describe the case of a patient who developed PDPH, subdural hematoma, and abducens nerve palsy after lumbar drain. The patient was treated successfully with epidural blood patch. To our knowledge, this is the first case report of a patient who developed all 3 of these complications following spinal drain placement.

Conclusion: Dural puncture, whether accidental or purposeful, carries a risk of multiple serious neurological sequelae. After spinal drain placement, close monitoring for symptoms of intracranial hypotension should ensue with a plan for treatment in the event the patient develops a PDPH or other neurologic sequelae.

Key words: epidural blood patch, headache, postdural puncture headache

BACKGROUND

Postdural puncture headache (PDPH) is a known complication of lumbar drain placement (1). Risk factors for development of PDPH include younger age, female gender, lower body mass index (BMI), history as a nonsmoker, larger needle size, cutting needle, and a history of chronic headaches (1). Data regarding incidence of PDPH varies by study population, procedure, and needle type, with a range of 0% to 47% in the literature; for patients who receive a spinal drain as a neuroprotective measure during elective thoracic aortic aneurysm (TAA), the pooled incidence in a systematic review and meta-analysis of 4714 patients was 3.3% (2). Furthermore, spinal drain placement has been associated with a significant increased risk of debilitating neurologic complications, including infections, meningitis, cerebral venous thrombosis, subdural hematoma, chronic headaches, catheter fracture, and persistent cranial nerve dysfunction (1,2).

We present a case of a patient who developed PDPH from spinal drain placement and subsequently a subdural hematoma and sixth cranial nerve palsy; the patient was successfully treated with epidural blood patch. To our knowledge, this is the first case report of a patient who developed all 3 of these complications following spinal drain placement.

The patient has provided written Health Insurance

From: Department of Anesthesiology, Perioperative Care & Pain Management, New York University Grossman School of Medicine, New York, NY

Corresponding Author: Edward Walton, MD, E-mail: walton@nyulangone.org
Disclaimer: There was no external funding in the preparation of this manuscript.
Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.
Patient consent for publication: Consent obtained directly from patient(s).
Authors adhere to the CARE Guidlines for writing case reports and have provided the CARE Checklist to the journal editor.
Accepted: 2023-05-18, Published: 2023-09-30

Portability and Accountability Act authorization to publish this case report. This manuscript adheres to the applicable Enhancing the Quality and Transparency of Health Research (EQUATOR) guideline.

CASE

A 42-year-old man with hypertension, hyperlipidemia, obesity, obstructive sleep apnea, chronic kidney disease type 2 with type B aortic dissection from left subclavian to left common iliac and thoracic aortic aneurysm measuring 5.7 cm in the mid-descending aorta that recently increased in size presented for surgical repair. In preparation for surgery, he had a lumbar spinal drain placed in the sitting position using a 14-gauge Touhy needle at approximately the L3/4 interspace by landmarks. The needle was advanced to loss of resistance at 10 cm and then advanced until clear cerebral spinal fluid (CSF) was obtained. Afterwards, the lumbar drain was fed to a 12-cm depth at the skin and secured. The patient noted a positional headache immediately after the procedure. He underwent open surgical repair without surgical complication and was transported to the intensive care unit intubated. The lumbar drain remained in place until postoperative day (POD) 3, when it was removed without change in neurological exam. On POD 6, one day after extubation, the patient complained of horizontal binocular diplopia. At the time the patient did not have a postural headache but noted neck stiffness and pain. Ophthalmology and neurology services were consulted; it was believed the patient developed a sixth cranial nerve (CN) palsy due to infarct or intracranial hypotension. They recommended magnetic resonance imaging (MRI) of the brain for further evaluation and that the patient wear a right-sided eye patch for symptomatic relief. The MRI showed meningeal enhancement, pituitary enlargement, and subdural collections, consistent with intracranial hypotension (Fig. 1). Neurology recommended close follow-up and blood patch if evidence of persistent intracranial hypotension persisted. A noncontrast head computerized tomography (CT) obtained prior to discharge to follow subdural hematomas showed no progression of the bilateral subdural hematomas (Fig. 2A). The patient was discharged home on POD 9. The patient returned to the emergency department 5 days later with headache, nausea, and continued diplopia. CT at that time showed an increase in the bilateral subdural collections, but no acute hemorrhage (Fig. 2B). The patient was discharged with follow-up with neurosurgery, who felt continued symptoms were likely due to intracranial hypotension. Ultimately, he was referred to pain medicine for possible epidural blood patch (EBP). He noted his headache had some improvement over time but continued to have a frontal and periorbital headache with intermittent neck stiffness and postural improvement when supine. There

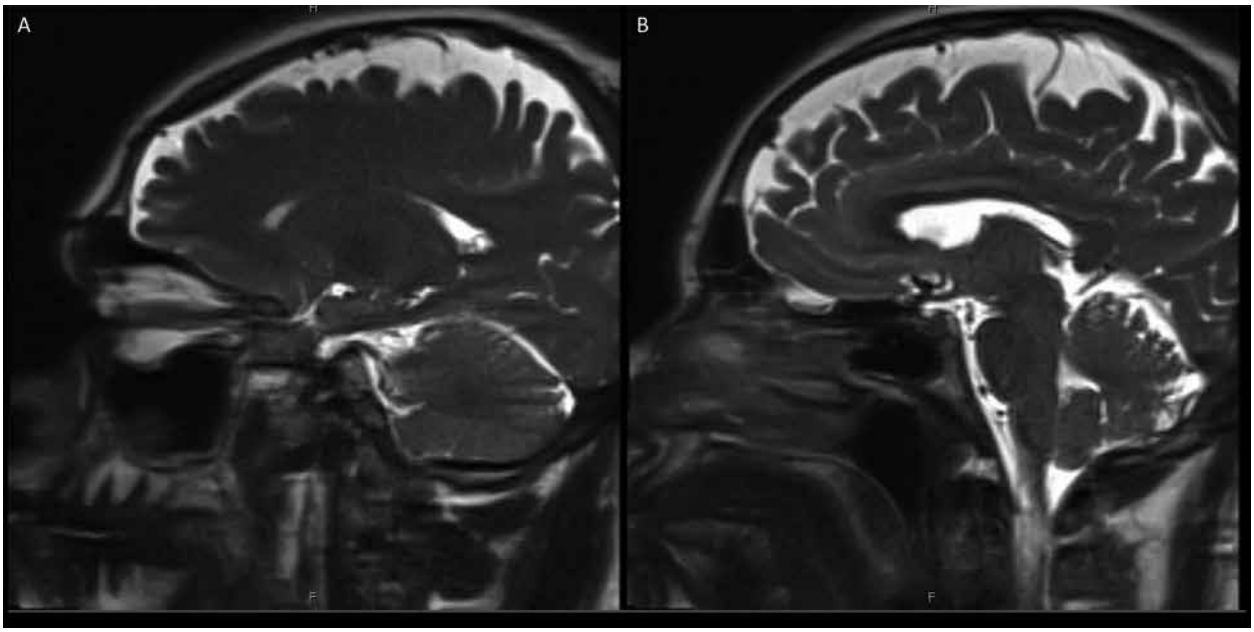

Fig. 1. A: MRI showing meningeal enhancement and subdural collections. B: MRI showing pituitary enlargement and meningeal enhancement

was no numbness or weakness except for sixth cranial nerve (CN VI) palsy. He underwent EBP under fluoroscopic guidance at L4-5. After loss of resistance, contrast medium was injected and showed epidural spread (Fig. 3A/B). Fourteen cc of autologous blood was injected into the epidural space. Afterward, the patient noted resolution of his positional headache and improvement of his sixth nerve palsy within a few days of the procedure. He stopped use of the eye patch one week after the procedure, and on follow-up in clinic, 21 days after the procedure, he noted resolution of the headache and CN VI palsy. One month after EBP, the patient had a follow up CT brain which showed near-complete resolution of the bilateral convexity subdural fluid collections (Fig. 2C).

DISCUSSION

Spinal drain placement is common as a neuroprotective measure for patients undergoing elective TAA repair

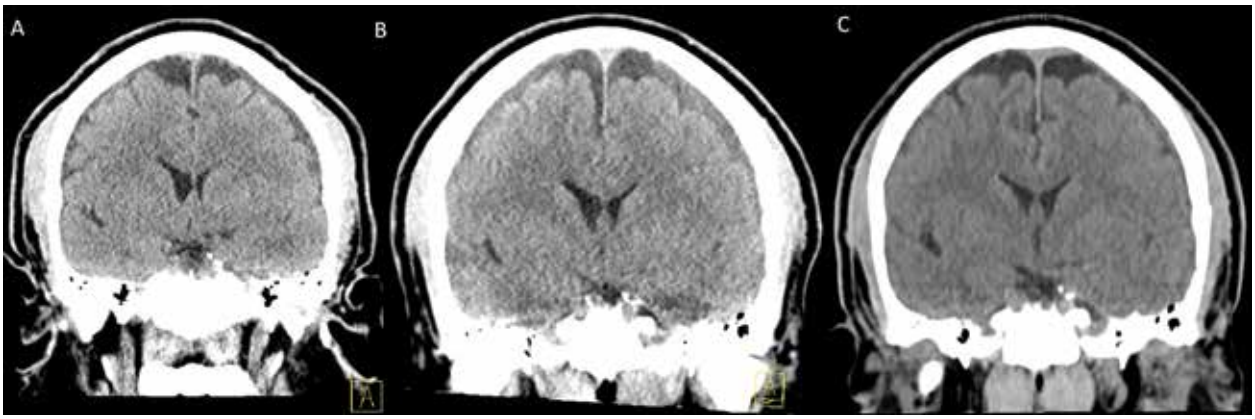

Fig. 2. A: CT brain showing bilateral subdural hematomas and possible intracranial hypertension. B: CT brain showing increase in the bilateral subdural collections without acute hemorrhage. C: CT brain showing near-complete resolution of the bilateral convexity subdural fluid collections.

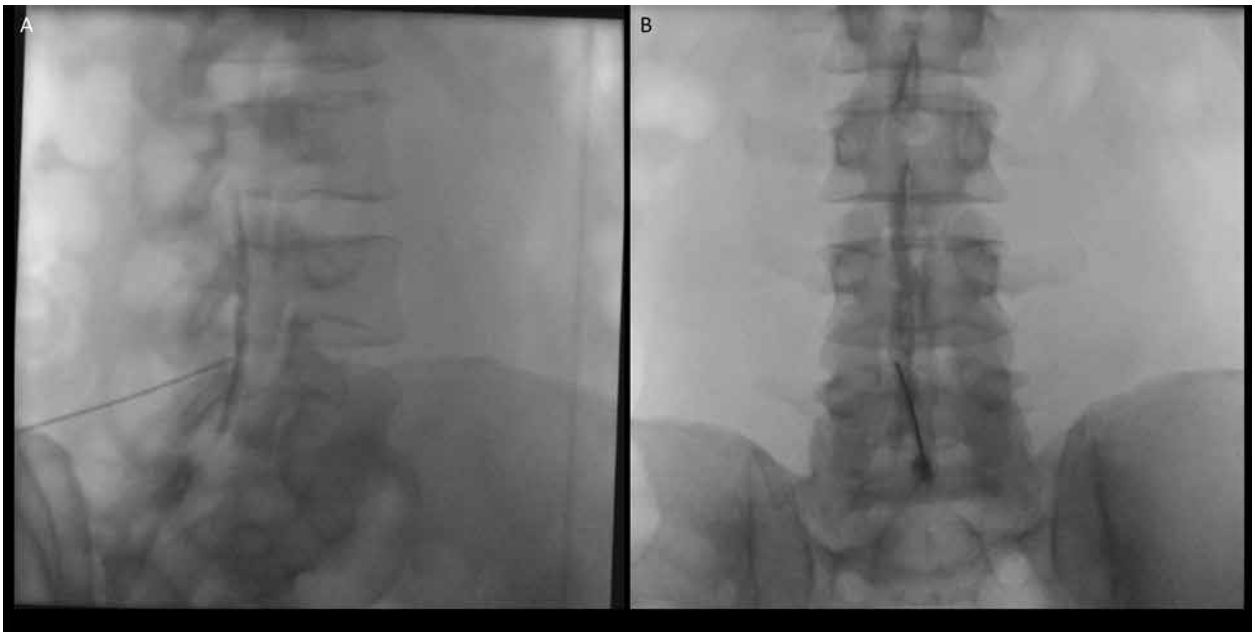

Fig. 3. A: AP view of lumbar spine with epidural spread of contrast medium confirming Touhy placement in epidural space. B: Lateral view of lumbar spine with epidural spread of contrast medium confirming Touhy placement in epidural space
Abbreviations: AP, anteroposterior; CT, computed tomography; MRI, magnetic resonance imaging

(1). Despite the neuroprotective effect of spinal drains, it is not without complications. Unfortunately, PDPH can cause debilitating problems for patients such as low back pain, vertigo, tinnitus, hearing changes, cranial nerve palsies, diplopia, cranial nerve palsies, and even cortical blindness (3). If the intracranial hypotension is enough, patients can develop a subdural hematoma from the tearing of dural bridging veins (3,4). History is often enough to diagnosis PDPH, however imaging can be obtained. MRI of the brain can demonstrate diffuse dural enhancement with evidence of brain sag, descent of the brain, cerebral tonsillar decent, crowing of the posterior fossa, obliteration of the basilar cisterns, and enlargement of the pituitary gland (3,4). A more invasive method of diagnosis is a lumbar puncture demonstrating low opening pressure, slightly raised CSF protein, and a rise in CSF lymphocyte count (3,4).

The case above is unusual as the patient developed multiple rare adverse events from spinal drain placement: PDPH, a subdural hematoma, and CN VI palsy. An international metanalysis of 4717 pooled patients found a pooled incidence of 0.8% for subdural/epidural hematoma and 0.6% incidence for neurological deficits (2), further emphasizing the rarity of a patient developing a complication of this magnitude following drain placement.

One of the more unusual aspects of this case was the patient's abducens nerve palsy. The abducens nerve is commonly affected by a change in intracranial pressure and brain herniation; classically thought to be due to the nerve's long intracranial course, this is now thought to be due to local anatomic relationships (5). Treatment of abducens nerve palsy from intracranial nerve hypotension has varied widely with noninvasive treatments such as steroids, nonsteroidal anti-inflammatory drugs (NSAIDs), eye patching, Fresnel prism lenses, and intravenous hydration (6). Due to the severity of the symptoms, EBP is often used to treat CN VI palsy in patients who develop them from intracranial hypotension. Unfortunately, if treatment of abducens nerve palsy does not resolve symptoms, in rare cases surgical intervention may be needed to correct the visual disturbance (6). Interestingly, one case report suggests that early intervention, within 24 hours of onset of symptoms, may more reliably resolve symptoms (7). Nevertheless, this was not found to be true in our case.

Treatment of PDPH is often conservative at first with 53% of patients finding spontaneous relief of pain within 4 days and 85% within 6 weeks (4). Conservative measures include bed rest, abdominal binders, and hydration (4,8). Patients have poor pharmacological options for relief of their pain as medical management can help control symptoms, but do not provide complete relief of pain. Caffeine has some evidence as an effective medical treatment for PDPH with one study finding transient relief with 300 mg of oral caffeine 2 times a day (4). Other therapies that have poor evidence for success or limitations include desmopressin, adrenocorticotropic hormone, sumatriptan, and theophylline (4,9).

Current recommendations are for treatment of PDPH with EBP when conservative measures fail or when symptoms become debilitating, which may help to minimize the risk of hospital readmission and permanent neurological complications (1,9,10). The efficacy and low complication rate make its use optimal for treatment of PDPH. Contraindications for EBP are fever, suspected bacteremia, and anticoagulation. Despite the negative effects of dural puncture and the success of treatment with EBP, current recommendations are against prophylactic EBP with either accidental dural puncture or when dural puncture is expected with a procedure, such as with spinal drain placement (11).

In this case conservative treatment of his PDPH and abducens nerve palsy was unsuccessful due to the severity of the patient's symptoms. Theoretically, the patient could have coped with his symptoms for up to 6 weeks, at which point 85% of cases have symptomology resolve spontaneously (4). However, considering the patient had failed conservative treatment for 3 weeks and the negative impact his symptoms had on his quality of life, continuing conservative treatment was deemed unacceptable. The patient's headache was mild in comparison to his complaint of double vision, and further trial of medical management was not attempted by the pain management team prior to EBP. With low complication rates and high efficacy, prompt treatment with an EBP was performed, resolving the patient's headache, and making a clinical difference in the patient's vision.

CONCLUSION

Dural puncture, whether accidental or purposeful, carries a risk of multiple serious neurological sequelae and morbidity including PDPH, subdural hematoma, and abducens nerve palsy. Routine placement of lumbar drain placement is not without risk; however, the neuroprotective benefits of a spinal drain outweigh the possible complications. If a spinal drain is placed after discussion of risks and benefits with the

patient, close monitoring for symptoms of intracranial hypotension should ensue with a plan for treatment in the event the patient develops a PDPH or other neurologic sequelae.

Contributions

Edward Walton: This author helped prepare the manuscript.

Lisa Doan: This author helped prepare the manuscript and conceived the study.

REFERENCES

1. Riley SP, Donnelly MJ, Khatib D, Warren C, Schroeder KM. Postdural puncture headaches following spinal drain placement during thoracoabdominal aortic aneurysm repair: Incidence, associated risk factors, and treatment. *J Anesth* 2015; 29:544-550.
2. Rong LQ, Kamel MK, Rahouma M, et al. Cerebrospinal-fluid drain-related complications in patients undergoing open and endovascular repairs of thoracic and thoraco-abdominal aortic pathologies: A systematic review and meta-analysis. *Br J Anaesth* 2018; 120:904-913.
3. Bezov D, Lipton RB, Ashina S. Post-dural puncture headache: Part I diagnosis, epidemiology, etiology, and pathophysiology. *Headache* 2010; 50:1144-1152.
4. Turnbull DK, Shepherd DB. Post-dural puncture headache: Pathogenesis, prevention and treatment. *Br J Anaesth* 2003; 91:718-729.
5. Hanson RA, Ghosh S, Gonzalez-Gomez I, Levy ML, Gilles FH. Abducens length and vulnerability? *Neurology* 2004; 62:33-36.
6. Cain RB, Patel NP, Hoxworth JM, Lal D. Abducens palsy after lumbar drain placement: A rare complication in endoscopic skull base surgery. *Laryngoscope* 2013; 123:2633-2638.
7. Béchard P, Perron G, Larochelle D, Lacroix M, Labourdette A, Dolbec P. Case report: Epidural blood patch in the treatment of abducens palsy after a dural puncture. *Can J Anaesth* 2007; 54:146-150.
8. Russell R, Laxton C, Lucas DN, Niewiarowski J, Scrutton M, Stocks G. Treatment of obstetric post-dural puncture headache. Part 1: Conservative and pharmacological management. *Int J Obstet Anesth* 2019; 38:93-103.
9. Bezov D, Ashina S, Lipton R. Post-dural puncture headache: Part II--prevention, management, and prognosis. *Headache* 2010; 50:1482-1498.
10. Russell R, Laxton C, Lucas DN, Niewiarowski J, Scrutton M, Stocks G. Treatment of obstetric post-dural puncture headache. Part 2: Epidural blood patch. *Int J Obstet Anesth* 2019; 38:104-118.
11. Boonmak P, Boonmak S. Epidural blood patching for preventing and treating post-dural puncture headache. *Cochrane Database Syst Rev* 2010:CD001791.