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Spontaneous Thoracic Dural Tear Presenting With Postural Headache: A Case Report

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Background: Incidental dural tear (durotomy) is a known complication of many forms of spinal instrumentation. The majority of durotomy cases are due to a known traumatic force, such as an intentional durotomy during neuraxial anesthesia, or an unintentional tear during lumbar decompression surgery. However, spontaneous dural tears have occasionally been reported.

Case Report: We report a case of a 16-year-old woman with postural headaches who was found to have a spontaneous thoracic dural tear on magnetic resonance imaging. She underwent a successful fluoroscopic-guided epidural blood patch with resolution of symptoms.

Conclusion: This case highlights the importance of considering spontaneous dural tears as a possible cause of postural headaches.

Key words: Spontaneous dural tear, traumatic dural tear, idiopathic dural tear, durotomy, post-dural postural headache, epidural blood patch, headache, CSF leak, case report

BACKGROUND

A rupture of the dural sac results in leakage of cerebrospinal fluid (CSF) into the local vertebral space. This leakage of CSF disrupts the closed system of the intraarachnoid space resulting in cerebral hypotension (1). Clinically this can result in a postural headache that worsens when standing or sitting upright and is relieved when the patient is recumbent. These headaches are typically frontal and occipital. Post-dural postural headaches can also present with various symptoms including nausea, vomiting, spinal pain, dizziness, cranial nerve VI paresis, photophobia, or tinnitus. Feared complications of CSF leak include CSF fistula formation, pseudomeningocele, and meningitis (2). Postural headaches in the setting of neuraxial anesthesia typically resolve with time. However, if the headaches do not resolve with time, the treatment for a CSF leak in the setting of dural tear, is an epidural blood patch or surgical intervention.

Spontaneous dural tears are very rarely reported and may be very difficult to diagnose. Generally, spontaneous tears occur in the setting of premorbid spinal anatomical abnormality or connective tissue disorders, such as Marfan's Syndrome (3). There have been reports of dural tears after minor trauma, but this is also very rare (4).

Our report showcases a unique instance of spontaneous dural tear with subsequent development of post-dural headache.

CASE DESCRIPTION

A 16-year-old woman with no medical history was referred for evaluation for atypical headaches. The headaches had started following a rugby game 3 months prior. She reported typical contact during the

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game, but no specific inciting injury, head contact, or loss of consciousness. She was evaluated for concussion initially and was cleared. The headaches were described as global in nature with positional improvement with lying or reclining. The headaches were daily, better in the morning with worsening symptoms throughout the day. She denied photophobia, aura, or known triggers. She had tried acetaminophen and over the counter nonsteroidal anti-inflammatory drugs (NSAIDs) with minimal benefit. She had been seen by neurology as well as her pediatrician. The patient had a magnetic resonance imaging (MRI) of the brain that was unremarkable. Due to the refractory nature of the headache, an MRI of the cervical and thoracic spine was performed. The MRI showed a T4- level CSF collection suggesting a spontaneous dural tear (Figs. 1-3).

The patient underwent a targeted thoracic epidural blood patch with fluoroscopic guidance with improvement and resolution of her headache at 2 weeks. She continued to report relief at her 3-month follow-up visit. As a note, informed consent was not obtained as it was not required by an institutional policy for case reports.

DISCUSSION

Dural tears can occur for a multitude of reasons. Iatrogenic dural tear is a known complication of axial instrumentation, including spinal anesthesia or neurosurgical interventions. Traumatic dural tears can occur in the setting of spine fractures. In one study, traumatic dural tears were identified in 9.1% of cervical, 9.9% of thoracic, and 17.6% of lumbar spine fractures (5). Spontaneous dural tears are reported to occur rarely, most often in the setting of a congenital structural defect in the dura or spinal canal. Spontaneous dural tears resulting in CSF leak is relatively rare, however the incidence of this lesion is assumed to be frequently misdiagnosed and therefore likely underreported (6). It has been postulated that such tears can be the result of dural mechanical weakness, disc herniations, osteophytic spurs, or CSF venous fistula (7).

In cases of dural tear resulting in CSF leak, CSF loss from the subarachnoid space results in a decrease in CSF volume and intracranial hypotension. Clinically this can present as a positional headache that improves in the recumbent position (8). This underscores the importance of obtaining a thorough history and considering a CSF leak in a patient who reports positional headache with improvement in recumbent positioning.

Diagnosis of spontaneous CSF leak can be made using spinal imaging, including computed tomography (CT) myelogram or MRI. CT myelography may be advantageous in that it is better at showing slow-flow leaks, shows anatomic detail in greater quality, and can identify CSF-venous fistula which are poorly visualized on MRI. However, MRI is more widely available and is noninvasive, making it a suitable alternative. Lumbar

Fig. 1. Sagittal T2 weighted MRI image showing CSF leak at the level of the T4 vertebrae.

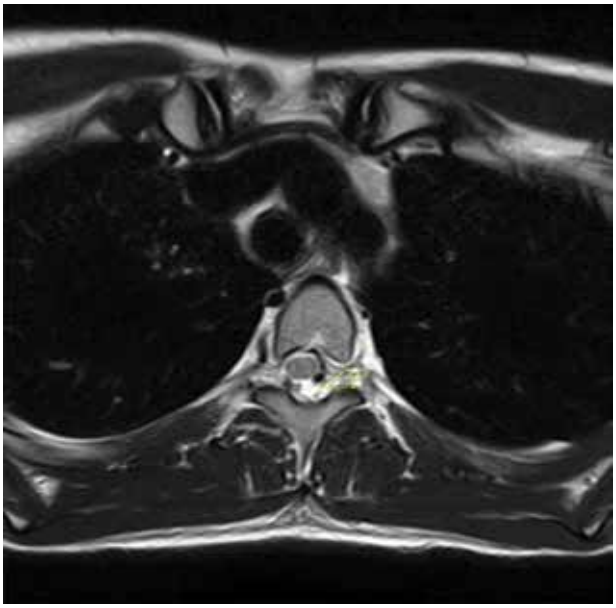

Fig. 2. Axial T2 weighted MRI image showing CSF leak at the level of the T4 vertebrae.

puncture is another clinical tool that may be used. CSF opening pressure during lumbar puncture that is < 6 cm H2O is considered low and may be indicative of leak, however this test has a low sensitivity and is invasive, so should not be used alone in the diagnosis of dural tear (6).

Treatment for spinal CSF leaks can be divided into 3 categories: conservative therapy, epidural blood patching, and surgery. Since most dural headaches resolve spontaneously, conservative treatment is the first-line therapeutic option and includes bed rest and hydration. Patients can also be prescribed oral medication such as caffeine, oral steroids, and NSAIDs. In refractory cases, epidural blood patching is the mainstay of treatment. If the location of the leak is known, practitioners will perform a targeted blood patch, whereby autologous blood is injected toward the area of the leak using spinal imaging studies such as fluoroscopy. If the location of the leak is not known, a nontargeted patch can be performed where blood is injected "blindly" into the thoracic or lumbar epidural space. Studies have shown improved outcomes when the injection is able to be targeted (6). If epidural blood patching fails, surgical treatment may be necessary. Treatment for spontaneous dural tear may also be more challenging than for traumatic and iatrogenic tears. Epidural blood patch treatment requires the clinician to accurately localize the leak which can be difficult in spontaneous cases. Also, epidural blood patching may be less effective in spontaneous leaks as treatment is typically delayed due to prolonged diagnostic workup.

CONCLUSION

In conclusion, this case report highlights the importance of considering spontaneous dural tears, including thoracic tears, as a possible cause of postural headaches, even in the absence of a history for spinal surgery, neuraxial anesthesia, or significant trauma.

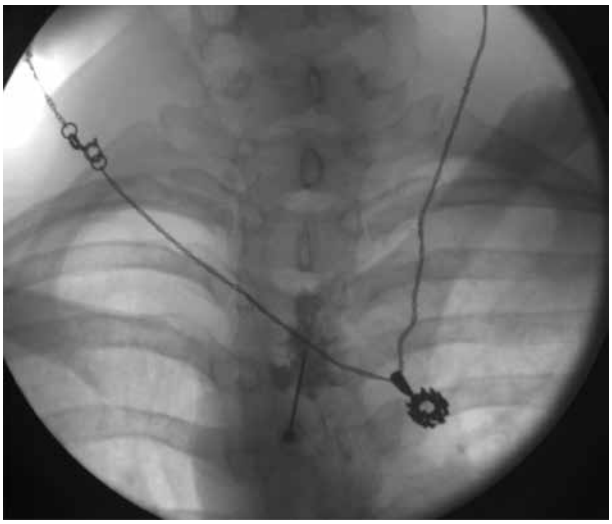

Fig. 3. Anteroposterior fluoroscopic image of contrast spread obtained during interlaminar epidural blood patch at T3/4.

Additionally, we report a refractory case of 3 months of symptoms. Spontaneous dural tears resulting in CSF leak are relatively rare and may be frequently misdiagnosed and underreported. Obtaining a thorough history and considering CSF leak in a patient who reports positional headache with improvement in recumbent positioning can help identify this condition.

The treatment of dural CSF leak can range from conservative measures to more invasive options depending on the severity of symptoms and patient preference. The use of epidural blood patches, as seen in this case, can be an effective treatment option with full resolution of symptoms. Clinicians should be aware of this potential diagnosis and consider prompt evaluation and treatment to prevent serious complications, such as CSF fistula formation, pseudomeningocele, and infectious complications. Further research is needed to better understand the etiology, diagnosis, and treatment of spontaneous dural tears.

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