Traumatic Intracranial Hypotension Due to a Calcified Thoracic Disc Herniation

Sami Obaid, Bilal Tarabay, Daniel Shédid, Sung-Joo Yuh

Keywords: Spontaneous intracranial hypotension, Cerebrospinal fluid, Fistula, Thoracic disk herniation

doi:10.1017/cjn.2021.229 Can J Neurol Sci. 2022; 49: 801–803

Spontaneous intracranial hypotension (SIH) is a rare condition resulting from abnormal leakage of cerebrospinal fluid (CSF).[1–5] The exact cause of SIH remains uncertain but may be related to weakening of nerve root sheaths or minor trauma.[1] Recently, calcified intervertebral disc herniations (IVDH) have been recognized as a possible etiology for SIH.[1,6,7] While these small protrusions may indeed puncture the ventral dura and result in CSF egress, their prompt recognition is frequently missed using standard imaging[6] and often puts the patient through nonriskless and sometimes unrevealing surgical explorations.[1] We report the case of a patient who acquired a traumatic CSF leak from a radiologically identified calcified IVDH piercing the dura.

A 47-year-old healthy female was referred to the outpatient clinic for a 4-week history of intermittent diplopia, photophobia and orthostatic headache which abruptly started following a minor crosscountry skiing head trauma. The positional headache was intolerable in the sitting position and completely resolved when lying down. Initial physical examination, including a complete ophthalmologic workup, and head computed tomography (CT) were completely normal. She eventually underwent a contrast-enhanced magnetic resonance imaging (MRI) of the brain which revealed diffuse pachymeningeal enhancement. Considering the high suspicion of intracranial hypotension, she underwent a blind epidural blood patch (EBP) at the L3–L4 level. EBP improved her headaches only transiently, and the patient's symptoms progressively reoccurred within a few days. For that reason, she underwent a cervical MRI which depicted a T2-hyperintense ventral epidural collection at the T1–T2 junction highly suggestive of an anterior CSF fistula (Figure 1 A,B). Interestingly, the axial T2-weighted sequences disclosed a very focal and sharp-looking triangular T1–T2 IVDH located immediately ventral to a possible dural slit, suggesting that the dural opening likely resulted from perforation of the hernia. Moreover, a cervical CT scan unveiled a small protruding calcification which precisely matched the location of the MRI-revealed herniation (Figure 1 C,D). At that point, a traumatic CSF fistula resulting from a sharp calcified IVDH was suspected. Consequently, the patient underwent a dynamic CT myelogram which confirmed the diagnosis (Figure 2). She simultaneously underwent a targeted C7–T1 EBP which resulted in the complete resolution of her symptoms within the next few days. At the 6-month follow-up, the patient remained symptom-free.

Using conventional imaging modalities, we precisely depicted the sharp IVDH as the likely etiology of CSF fistula in the current patient. Accurately identifying the cause of spinal CSF fistula is required to guide subsequent targeted therapy.[6] Without the precise characterization of the nature and location of the causative lesion, therapies are often ineffective.[6] Blind EBP are frequently unsuccessful[1,6] and poorly guided surgical explorations that target the commonly false localizing epidural CSF collection may be noncontributory.[8] Thanks to the accurate radiological delineation of the calcified IVDH and the site of fistula, we were able to perform a targeted EBP which led to symptom resolution. This case reinforces the causal link of calcified IVDH in the development of intracranial hypotension, and highlights manifest imaging features that may help in the identification and concomitant management of this underrecognized pathology.

From the Division of Neurosurgery, University of Montréal, Centre Hospitalier de l'Université de Montreal, Montreal, Québec, Canada (SO, BT, DS, SJY)
Received September 20, 2021. Date of Acceptance September 28, 2021.
Correspondence to: Sung-Joo Yuh, Department of Surgery, Division of Neurosurgery, Centre Hospitalier de l'Université de Montréal (CHUM), 1051 rue Sanguinet, Montreal, QC H2X 3E4, Canada. Email: syuh071@gmail.com

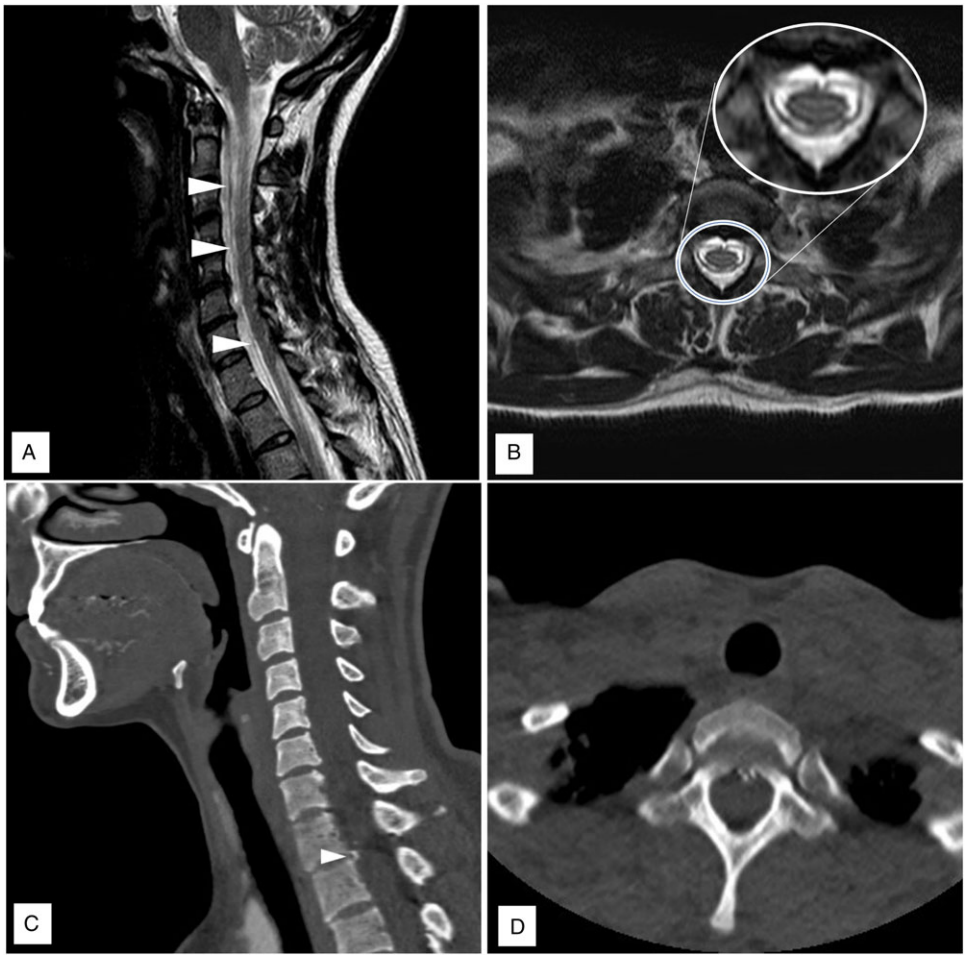

Figure 1: *(A) Sagittal T2-weighted MRI sequences of the cervicothoracic spine revealing CSF extravasation within the anterior epidural space (arrowheads). (B) Axial T2-weighted images showing a very focal triangular T1–T2 disc herniation located on the midline and a similarly shaped triangular dural slit. The shape of the dural opening seems to be molded by the disc herniation. (C, D) Cervical (C) and axial (D) CT scan demonstrating the small focus of calcification just dorsal to the T1–T2 disc space, which corresponds precisely to the location of the disc herniation on axial MRI.*

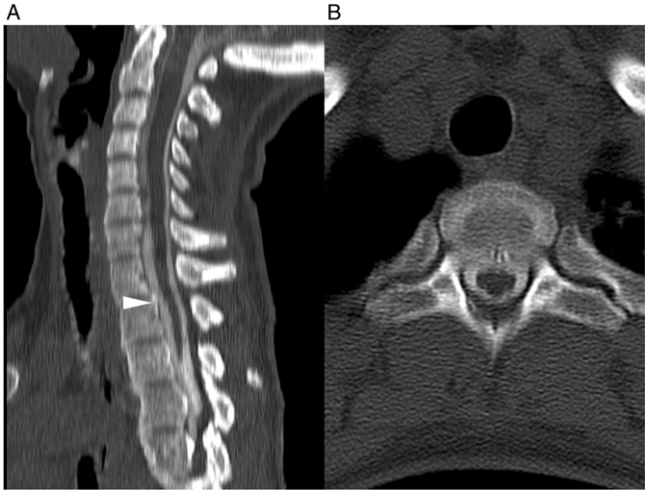

Figure 2: *CT myelogram of the cervicothoracic spine. (A, B) Reconstructed sagittal (A) and axial (B) CT myelography images showing extravasation of CSF outside the thecal sac. The arrowhead depicts the precise location of CSF egress and pinpoints the close relationship between the site of fistula and the calcified lesion.*

Disclosures

The authors report no disclosures or conflicts of interest.

Statement of Authorship

SO contributed to the description of the case and images, literature review, as well as drafting and revision of the final manuscript. BT contributed to the acquisition and description of images, case description, and revision of the final manuscript. DS and SJY provided feedback and revised the final manuscript.

References

1. Beck J, Ulrich CT, Fung C, et al. Diskogenic microspurs as a major cause of intractable spontaneous intracranial hypotension. Neurology. 2016;87:1220–26. DOI 10.1212/WNL.0000000000003122.
2. Fiechter M, Ott A, Beck J, Weyerbrock A, Fournier JY. Intradural non-calcified thoracic disc herniation causing spontaneous intracranial hypotension: a case report. BMC Surg. 2019;19:10–13. DOI 10.1186/s12893-019-0527-3.

https://doi.org/10.1017/cjn.2021.229 Published online by Cambridge University Press

3. Ducros A, Biousse V. Headache arising from idiopathic changes in CSF pressure. Lancet Neurol. 2015;14:655–68. DOI 10.1016/S1474-4422(15)00015-0.
4. Schievink WI. Jacques L.Recurrent spontaneous spinal cerebrospinal fluid leak associated with, nude nerve root, syndrome: case report. Neurosurgery. 2003;53:1216–19. DOI 10.1227/01.NEU.0000089483.30857.11.
5. Schievink WI. Spontaneous spinal cerebrospinal fluid and ongoing investigations in this area. JAMA. 2006;295:2286–96. DOI 10.1001/jama.295.19.2286.
6. Thielen KR, Sillery JC, Morris JM, et al. Ultrafast dynamic computed tomography myelography for the precise identification of high-flow cerebrospinal fluid leaks caused by spiculated spinal osteophytes. J Neurosurg Spine. 2015;22:324–31. DOI 10.3171/2014.10.SPINE14209.
7. Hung LC, Hsu YC. Spontaneous intracranial hypotension resulting from a thoracic osteophyte. J Clin Neurosci. 2015;22:1054–56. DOI 10.1016/j.jocn.2014.12.010.
8. Schievink WI, Maya MM, Jean-Pierre S, Nuño M, Prasad RS, Moser FG. A classification system of spontaneous spinal CSF leaks. Neurology. 2016;87:673–79. DOI 10.1212/WNL.0000000000002986.

https://doi.org/10.1017/cjn.2021.229 Published online by Cambridge University Press