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CASE REPORT

Recurrent chronic subdural hemorrhage due to cervical spinal CSF leak in a young adult: Report of a case

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Summary Nontraumatic intracranial subdural hemorrhage may result from disorders at remote anatomic sites. Here, we report a young adult who suffered from bilateral subdural hematoma without antecedent head injury. The subdural hematoma did not resolve after surgical drainage. The symptom of postural headache prompted a contrast-enhanced magnetic resonance imaging (MRI) examination of the brain, which revealed signs indicative of intracranial hypotension. Subsequently, MRI of the spine demonstrated leakage of cerebrospinal fluid (CSF) in the upper cervical spine region. The patient recovered after conservative treatment. A review of the patient's medical history revealed that the patient had chiropractic therapy on his neck 2 months prior to admission. Intracranial hypotension due to spinal CSF leak is a rare cause of subdural hemorrhage, yet it should be considered in the absence of head trauma. Copyright © 2011, Taiwan Surgical Association. Published by Elsevier Taiwan LLC. All rights reserved.

1. Introduction

Subdural hemorrhage (SDH) in adults is most frequently due to traumatic head injury. Regarding nontraumatic SDH,

common etiologies include ruptured aneurysms or arteriovenous malformations, intracranial tumor bleeding, and coagulopathy. When these conditions are excluded, SDH is usually attributed to neglected minor head trauma, especially in the elderly population. Intracranial hypotension (IH) due to spinal cerebrospinal fluid (CSF) leak is an uncommon but possible cause of SDH.¹ Here, we report a young adult patient suffering from nontraumatic SDH, which recurred despite surgical drainage. IH was suspected

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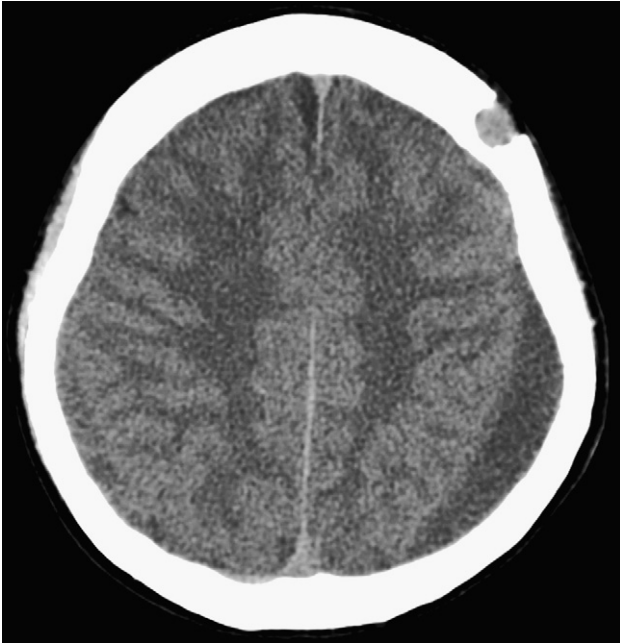


Figure 1 Initial noncontrast head CT showing bilateral chronic subdural hemorrhage with evidence of previous surgical drainage.

after clinical evaluation and confirmed by brain magnetic resonance imaging (MRI). A CSF leak in the upper cervical spine was demonstrated by spine MRI, and managed successfully with conservative treatment.

2. Case report

A 33-year-old male was admitted because of headache for 2 months. The patient denied any systemic disease except hyperthyroidism, which was controlled with medication. Two months prior to hospitalization, the patient received

chiropractic neck manipulation for nuchalgia. However, the neck pain did not resolve and a headache developed. The cranial pain was bilateral, throbbing in character, aggravated by an upright posture. The patient visited a local hospital owing to worsening headache. A head computed tomography (CT) scan revealed bilateral chronic SDH, more on the left side. The patient underwent burr hole drainage, which yielded little relief. He came to our emergency room, where a head CT scan still showed bilateral SDH (Fig. 1). At admission, the patient was conscious and alert. Physical examination showed no nuchal rigidity, skeletal deformity, or joint hypermobility. Neurological examination revealed no deficit. Laboratory data including a platelet count, prothrombin time, and partial prothrombin time were normal. Because of his postural headache, a brain MRI was done to evaluate the possibility of IH. The result demonstrated pachymeningeal enhancement, obliteration of basal cisterns, and SDH (Fig. 2), which were compatible with IH. Subsequently, spine MRI showed CSF leak around the C1–C2 level (Fig. 3). Following conservative treatment with bed rest and hydration for 1 week, the patient had no more postural headache and was discharged. There was no recurrence of symptoms at follow-up.

3. Discussion

SDH occurs most commonly as a result of bleeding from surface cerebral vessels following trauma. Significant injury is often required to rupture the bridging veins which transverse the narrow space between the arachnoid membrane and dura mater. In atrophic brains due to aging processes or alcoholism, these veins are dangled in the subdural space and are more subject to bleeding after minor injury. The same condition may occur in shunted hydrocephalic patients with CSF overdrainage. In cases of IH, occult spontaneous CSF leak could induce SDH similar to the effect of an overdraining CSF shunt, and produce the symptoms of orthostatic headache.²

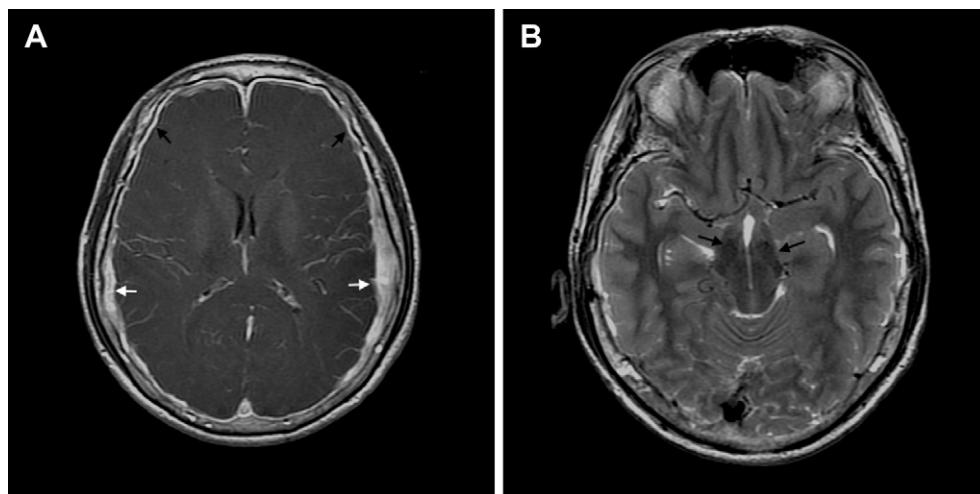


Figure 2 (A) An axial section of brain MRI, T1 weighted with contrast enhancement, showing diffuse pachymeningeal enhancement (black arrows) and bilateral SDH (white arrows). (B) An axial section of brain MRI, T2 weighted, demonstrating obliteration of basal cisterns (black arrows).

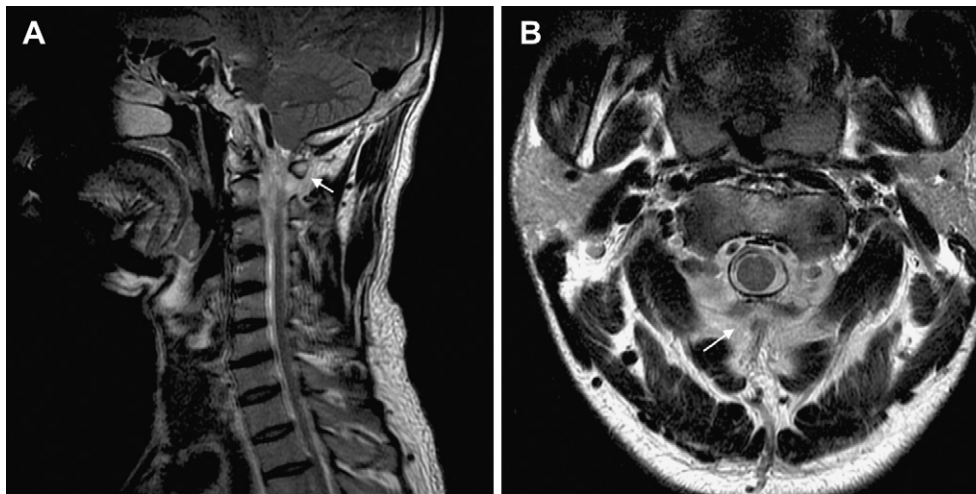


Figure 3 (A) A sagittal section of cervical spine MRI, T2 weighted, showing CSF accumulation around C1–C2 levels (white arrow). (B) An axial section of cervical spine MRI, T2 weighted, revealing epidural CSF fluid, which also infiltrates into paraspinal soft tissues (white arrow).

The origin of spontaneous CSF leak could be cranial or spinal,^{3,4} and the exact mechanism remains obscure. Patients with connective tissue disorders (e.g., Marfan syndrome) have an increased risk of CSF leak.⁵ It is thought that structural weakness in the thecal sac serves as a predisposing factor of meningeal tear following trivial trauma or straining movements in these patients. Our case had no feature of connective tissue disorder. However, he underwent chiropractic neck treatment prior to onset of headache. Because a CSF leak could also result from spinal manipulation,⁶ it is probable that our patient suffered a meningeal tear by mechanical stress during such a maneuver.

IH is an uncommon cause of headache and therefore diagnosis is often delayed. This problem is confirmed when the CSF pressure reads <60 mmH₂O during lumbar puncture. However, the possibility of brain herniation in patients with IH and SDH would contraindicate such a procedure. In current practice, a contrast-enhanced brain MRI examination is the analysis of choice owing to its noninvasive nature. Typical findings include pachymeningeal enhancement, brain sagging, small ventricles, SDH, and obliteration of cisterns.⁷ To locate the exact site of spinal CSF leak requires the use of CT or MRI cisternography/myelography.

The treatment of CSF leak begins with conservative measures. Some patients, such as our present case, recover after bed rest and intravenous fluid supplement. An epidural blood patch or open surgical repair is required if noninvasive approaches fail.^{8,9} Successful treatment of CSF leak will result in resolution of SDH. It is rare that the SDH requires urgent surgical removal if symptomatic brain compression occurs.¹⁰ Failure to recognize and treat the underlying cause would lead to recurrent SDH and further futile procedures in such patients.

Neurosurgeons are responsible for managing the majority of cases of SDH. In patients with nontraumatic SDH, IH due

to CSF leak should be considered. Successful management needs correct and timely diagnosis.

References

1. Buvanendran A, Byrne RW, Kari M, Kroin JS. Occult cervical (C1–2) dural tear causing bilateral recurrent subdural hematomas and repaired with cervical epidural blood patch. *J Neurosurg Spine*. 2008;9:483–487.
2. Mackenzie RA, Lethlean AK, Shnier R, Blum PW. Chronic intracranial hypotension. *J Clin Neurosci*. 1998;5:457–460.
3. Poonnoose SI, Manjooran RP, Mathew J, Ramachandran P. Chronic subdural haematoma associated with nontraumatic CSF rhinorrhea: a management challenge. *J Clin Neurosci*. 2007;14:281–283.
4. Walker DG. Refractory headache due to spontaneous intracranial hypotension from a CSF leak at C1–2. *J Clin Neurosci*. 2003;10:482–485.
5. Davenport RJ, Chataway SJ, Warlow CP. Spontaneous intracranial hypotension from a CSF leak in a patient with Marfan's syndrome. *J Neurol Neurosurg Psychiatr*. 1995;59:516–519.
6. Beck J, Raabe A, Seifert V, Dettmann E. Intracranial hypotension after chiropractic manipulation of the cervical spine. *J Neurol Neurosurg Psychiatr*. 2003;74:821–822.
7. Lin WC, Lirng JF, Fuh JL, et al. MR findings of spontaneous intracranial hypotension. *Acta Radiol*. 2002;43:249–255.
8. Waguri N, Tomita M, Hayatsu K, Okamoto K, Shimoji K. Epidural blood patch for treatment of spontaneous intracranial hypotension. *Acta Anaesthesiol Scand*. 2002;46:747–750.
9. Schievink WI, Reimer R, Folger WN. Surgical treatment of spontaneous intracranial hypotension associated with a spinal arachnoid diverticulum. Case report. *J Neurosurg*. 1994;80:736–739.
10. de Noronha RJ, Sharrack B, Hadjivassiliou M, Romanowski C. Subdural haematoma: a potentially serious consequence of spontaneous intracranial hypotension. *J Neurol Neurosurg Psychiatr*. 2003;74:752–755.