Headache
© 2006 by American Headache Society
Published by Blackwell Publishing

ISSN 0017-8748
doi: 10.1111/j.1526-4610.2006.00589.x

Correspondence and Clinical Notes

Clinical Notes

Intracranial Hypotension Following Chiropractic Spinal Manipulation

Sashank Prasad, MD; Ghassan El-Haddad, MD; Hongming Zhuang, MD, PhD; Sami Khella, MD

We report a case of intracranial hypotension caused by chiropractic manipulation which, in contrast to previously reported cases, documents the location of the cerebrospinal fluid leak by radionuclide cisternography. Cervical spinal manipulation produced a remote lumbar dural tear in our patient. Spinal magnetic resonance imaging may falsely localize the dural tear in this condition. Although conservative management is often sufficient, precise localization is required for more invasive therapies.

Key words: intracranial hypotension, chiropractic

(*Headache* 2006;46:1456-1460)

Spontaneous intracranial hypotension is characterized by a positional headache caused by cerebrospinal fluid (CSF) leaking form a dural tear. To date, 4 case reports attribute this condition to chiropractic manipulation.[1-4] None of these offers direct evidence of a dural tear and dynamic CSF leak, although 2 suggest a CSF leak at the level of C1-C2 based on fluid collections seen on magnetic resonance imaging (MRI) or CT-myelogram.[3,4] Using radionuclide cisternography (RC), we definitively diagnosed a dural tear in a patient with intracranial hypotension likely caused by chiropractic manipulation. We discuss issues and possible pitfalls in the accurate diagnosis and management of this condition.

CASE REPORT

A 37-year-old woman complained of a positional headache, which abated only when lying supine. One month before our evaluation, she underwent chiropractic spinal manipulation for chronic intermittent neck pain. The maneuver consisted of combined axial tension and head rotation. While on the table she acutely felt a sharp headache that progressed in severity over 2 days. She had never experienced a similar headache. After 1 week, a head CT revealed bilateral subdural hygromas and descent of the cerebellar tonsils. She received an epidural blood patch at the L3-L4 level because she was thought to have intracranial hypotension. The blood patch was ineffective, and she was transferred to our institution for further management.

General and neurological examinations were normal. MRI demonstrated findings characteristic of intracranial hypotension, as well as a possible extra-axial fluid collection in the cervical spine (Figure, Panels A, B, and C). The patient underwent a lumbar puncture under fluoroscopy; 10.7 mCi of filtered Tc-99m Diethylenetriamine-pentacetic acid (DTPA) was injected in the subarachnoid space. Planar scintigraphic images of the spine were obtained at 30, 45, and 60 minutes following the injection. Abnormal radiotracer activity was detected anterior to the thoracolumbar spine (Figure, Panel D). The 4-hour delayed images showed that the abnormal activity progressed anteriorly and became more diffuse in the abdomen (Figure, Panel E).

The patient was treated with bedrest, caffeine, and oral analgesics. She steadily improved. Follow-up imaging

From the Department of Neurology, Hospital of the University of Pennsylvania, Philadelphia, PA (Drs. Prasad and Khella); and Department of Radiology, Division of Nuclear Medicine, Hospital of the University of Pennsylvania, Philadelphia, PA (Drs. El-Haddad and Zhuang).

Address all correspondence to Dr. Sashank Prasad, Department of Neurology, Hospital of the University of Pennsylvania, 3600 Spruce Street, 3 Gates Building, Philadelphia, PA 19104.

Accepted for publication June 9, 2006.

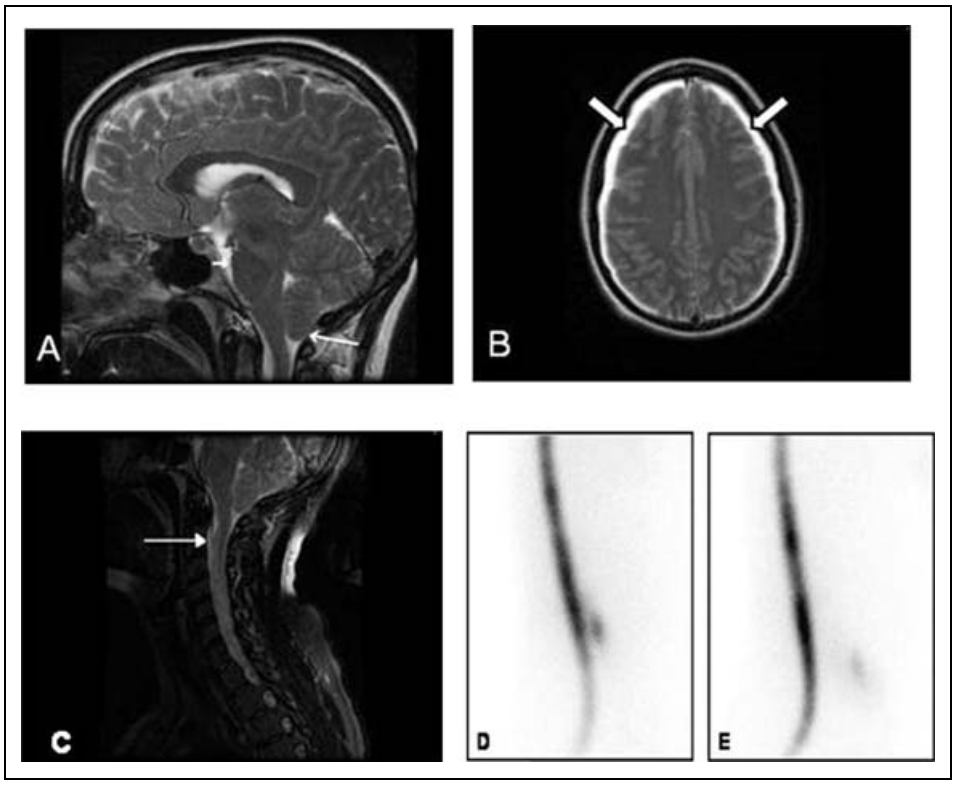

Figure.—Panel A. T2-weighted MRI, demonstrating herniation of the cerebellar tonsils (long arrow), effacement of the prepontine and subarachnoid cisterns (short arrow). Panel B. Large bilateral subdural hygromas. Panel C. Extra-axial CSF-isointense fluid collection at levels C1-C2. Panels D and E. Right lateral planar scintigraphic image of the thoracolumbar spine, demonstrating abnormal activity anterior to the thoracolumbar spine on the 60-minute image, which spread anteriorly and became more diffuse on the 4-hour delayed image.

showed complete resolution of the subdural hygromas and tonsillar herniation.

COMMENT

This is the first report of intracranial hypotension caused by chiropractic manipulation with definitive demonstration by RC of a CSF leak from the anterior lumbar spine.

Findings on brain MRI were typical, including pachymeningeal enhancement with gadolinium enhancement, pituitary enlargement, and subdural effusions (Figure, Panel A).[1] In addition, there was descent of the brain, with effacement of prepontine, perichiasmatic, and subarachnoid cisterns. The extent of descent may be underestimated, given the supine position of the patient during the MRI scan.

Spinal MRI revealed a small contrast-enhancing extra-arachnoid fluid collection (Figure, Panel C). However, this finding at the C1-C2 level may not truly reflect the location of the dural tear.[5,6] At this location the dura does not adhere to the bone as it does intracranially; therefore, dilation of the epidural venous plexus can occur to compensate for CSF loss, causing an extra-axial transudate.[5,7,8] Alternatively, a remote CSF leak may track in the epidural space and egress upon reaching this region of the cervical spine, due to local anatomic features, such as absence of epidural fat and lack of bony support.[6] Whether the C1-C2 fluid collection represents venous exudate or CSF itself, the important point is that this collection is not at the site of the culprit dural tear, and should not be the focus of invasive therapies.

Dural tears caused by chiropractic manipulation may be the result of an unknown predisposition, such as an underlying connective tissue disorder.[9,10] Our patient, however, had no clinical evidence of a connective tissue disorder. Even in the absence of overt clinical predisposition, therefore, it appears that chiropractic manipulation may incur sufficient physical stress on the dura to produce a tear.

The present report illustrates the potential complication of intracranial hypotension due to chiropractic manipulation and is the first to demonstrate the actual site of the dural tear. Although the cervical spine was the site of both the chiropractic manipulation and the MRI abnormalities in our patient, the CSF leak demonstrated by RC was in the lumbar spine. In the 2 previous reports of this condition which

include radiographic evidence, the CSF leak is localized to the site of the manipulation, in the cervical spine.[3,4] However, we report that because force applied to the spine is transmitted throughout its axis, a dural defect may be created at a remote site. In this case, although spinal MRI showed an abnormal cervical paraspinal fluid collection, RC provided direct evidence of the remote lumbar dural tear and dynamic CSF leakage.

Fortunately, intracranial hypotension can often be managed conservatively, with complete recovery. In cases requiring invasive therapy, however, precise localization is indicated. Since the defect may be remote to the site of known injury, RC may be required.

Conflict of Interest: None

REFERENCES

1. Chung SJ, Kim JS, Lee MC. Syndrome of cerebral spinal fluid hypovolemia: Clinical and imaging features and outcome. *Neurology*. 2000;55:1321-1327.
2. Jeret JS. More complications of spinal manipulation. *Stroke*. 2001;32:1936-1937.
3. Beck J, Raabe A, Seifert V, Dettmun E. Intracranial hypotension after chiropractic manipulation of the cervical spine. *J Neurol Neurosurg Psychiatry*. 2003;74:821-822.
4. Matthews MK, Frohman L, Lee HJ, Sergitt RC, Savino PJ. Spinal fluid leak after chiropractic manipulation of the cervical spine. *Arch Ophthal*. 2006;124:283.
5. Yousry I, Forderreuther S, Moriggl B, et al. Cervical MR imaging in postural headache: MR signs and pathophysiological implications. *AJNR Am J Neuroradiol*. 2001;22:1239-1250.
6. Schievink WI, Maya MM, Tourje J. False localizing sign of C1-2 cerebrospinal fluid leak in spontaneous intracranial hypotension. *J Neurosurg*. 2004;100:639-644.
7. Mokri B. The Monro-Kellie hypothesis: Applications in CSF volume depletion. *Neurology*. 2001;56:1746-1748.
8. Chiapparini L, Farina L, D'Incerti L, et al. Spinal radiological findings in nine patients with spontaneous intracranial hypotension. *Neuroradiology*. 2002;44:143-150; discussion 151-152.
9. Di Duro JO. Dural tear and intracranial hypotension in a chiropractic patient. *J Neurol Neurosurg Psychiatry*. 2004;75:346-347.
10. Schrijver I, Schievink WI, Godfrey M, Meyer FB, Francke U. Spontaneous spinal cerebrospinal fluid leaks and minor skeletal features of Marfan syndrome: A microfibrillopathy. *J Neurosurg*. 2002;96:483-489.

CME

Trigeminal Neuralgia in Wind Musicians

William P. Cheshire, MD

The author reports 3 patients with trigeminal neuralgia whose pain was triggered by musical performance. Use of the muscles of embouchure activated the trigger zone when playing the clarinet, saxophone, flute, piccolo, trombone, or whistling. In each case, the location of the trigger zone was perioral, regardless of which division of the trigeminal nerve emanated pain. Trigeminal neuralgia is a particularly disabling affliction when it occurs in wind musicians.

Key words: trigeminal neuralgia, wind musicians

Trigeminal neuralgia is one of the most severe forms of pain in human experience. The characteristically abrupt and phasic temporal characteristics of trigeminal neuralgia have been likened to a percussion instrument within the orchestra of neuralgias.[1] Patients suffer from paroxysmal unilateral facial pain that is often associated with a sensitive trigger zone located near the mouth.[2] This report describes the clinical features of 3 wind musicians whose use of oral muscles to express music consistently triggered their neuralgia.

For CME, visit http://www.headachejournal.org

From the Department of Neurology, Mayo Clinic, Jacksonville, FL, USA.

Address all correspondence to Dr. William Cheshire, Department of Neurology, Mayo Clinic, 4500 San Pablo Road, Jacksonville, Florida 32224.

Accepted for publication June 30, 2006.

CASE REPORT

All 3 patients presented with recurrent, paroxysmal, momentary or repetitive, unilateral facial pain described as