Rapid onset and termination of neuroimaging findings in intracranial hypotension

Todd D. Rozen, MD, FAAN

Wouter I. Schievink, MD

MRI findings of intracranial hypotension are well-documented and include diffuse pachymeningeal enhancement, descent of the cerebellar tonsils, decrease in size of the prepontine and perichiasmatic cisterns, flattening of the basis pontis, crowding of the posterior fossa, enlargement of the pituitary gland, and the formation of subdural fluid collections.¹ We present 2 cases that describe the temporal profile of how rapidly these imaging findings can develop and how quickly they can resolve.

Case 1

A 55-year-old woman with encephalopathy had MRI brain completed 48 minutes after a lumbar puncture (LP) (figure 1A). New bifrontal subdural fluid collections were noted that were not present on a CT head scan done 17 hours prior to CSF removal (figure 1B) and thus were believed to be secondary to a state of intracranial hypotension caused by the LP. After the LP, the patient complained of a new mild orthostatic occipital headache.

Figure 1 Case 1 imaging

(A) MRI brain T2-weighted axial image shows bifrontal subdural fluid collections (arrows). (B) Subdural collections were not present on a CT head completed 17 hours prior to MRI (A) and lumbar puncture.

Department of Neurology (TDR), Geisinger Health System, Wilkes-Barre, PA; and Department of Neurosurgery (WIS), Cedars-Sinai Medical Center, Los Angeles, CA.

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Correspondence to: tdrozmigraine@yahoo.com

Figure 2 Case 2 imaging

(A) MRI brain postgadolinium axial image shows bilateral pachymeningeal enhancement (arrows). (B) MRI brain postgadolinium axial image completed 18 hours after (A) shows resolution of pachymeningeal enhancement.

Case 2

A 52-year-old man presented with a 3-day history of an occipital headache that was orthostatic in nature. MRI brain showed dense pachymeningeal enhancement (figure 2A). An epidural blood patch was scheduled for the next day but the headache resolved overnight and MRI obtained 18 hours later showed resolution of the enhancement (figure 2B).

Neurologists depend on neuroimaging to help make the diagnosis of intracranial hypotension, but MRI findings have been shown to be absent in more than 29% of cases.² Based on the Monro-Kellie doctrine, low CSF volume is compensated by an increase in intracranial blood volume typically occurring through the cerebral venous system. It is secondary venous dilation with meningeal venous hyperemia that leads to the pachymeningeal enhancement noted on MRI. Subdural fluid collections (hygromas) are thought to be the result of volume compensation to low CSF volume or in the case of subdural hematomas a consequence of brain sagging with tearing of bridging veins.¹ When intracranial hypotension is alleviated, MRI abnormalities resolve because compensatory phenomena wane. We are now able to demonstrate that some cranial MRI findings may actually appear less than 1 hour after a state of intracranial hypotension develops but can also vanish less than 24 hours after their appearance.

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