

Interesting Imaging Demonstrating a Spontaneous CSF Leak

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Abstract

Headaches are a common and nonspecific cause of many neurology visits. Proper history and physical exam are crucial in properly diagnosing and treating a patient's headache. One rare cause of headache is a cerebrospinal fluid (CSF) leak. With an incidence of only 5 per 100,000 per year it is an easy cause to overlook when seeing a patient with a headache. Here we present imaging findings in a patient who was found to have a CSF leak after presenting to the emergency room complaining of a headache.

Keywords: CSF Leak; MRI; CT Myelogram; Headache

The imaging presented here was taken of a 68-year-old African American female who initially presented to the emergency department complaining of headache. She described her headaches as global, throbbing, and worse upon standing. She also complained of nausea, tinnitus, upper extremity paresthesias and neck pain. The patient was ultimately diagnosed with a spontaneous cerebrospinal fluid (CSF) leak. A spontaneous CSF leak describes a phenomenon in which cerebrospinal fluid extrudes through a tear in the dural lining of the meninges. While CSF leaks may be caused in response to mechanical injury, there is often no inciting event; thus the leak is termed spontaneous and the cause is idiopathic. Imaging of choice in a suspected CSF leak is Magnetic Resonance Imaging (MRI) of the brain with and without contrast (Figure 1). Prominent abnormal features seen on MRI in these patients include pachymeningeal (dural) thickening and enhancement due to increased CSF signaling, sagging of the brain in response to leaked CSF compressing the brain from its location outside of the subarachnoid space, and/or engorgement of cerebral venous sinuses. In figure 1, you can appreciate the bridging veins beginning to separate from the calvarium due to fluid collection outside of the dura pushing the meninges posteriorly. Subdural hygromas, collections of CSF under the dural membrane, are also apparent in the MRI in figure 1. To better localize the site of a suspected leak, Computed Tomography (CT) myelograms are often used (Figure 2). CT myelograms have better resolution than MRI and can therefore more specifically pinpoint a tear in the dura by highlighting the fluid extravasation. The CT myelogram in figure 2 demonstrates subdural fluid collection in the thoracic spine. This patient was found to have extravasation of fluid at the levels of the left nerve root sleeves of T1 - T2 and T2 - T3. This patient also had extravasation of CSF in the cervical region of C7-T1. These fluid collections are identified as areas of extraluminal contrast as seen as contrast outside of the thecal sac. With proper localization of the dural tears, an epidural blood patch can be utilized to seal the damage in the dural lining. CSF leaks are a relatively rare but important cause of headaches and should be considered in patients who present complaining of a headache in the setting of intracranial hypotension. Using MRI and CT myelography, a CSF leak can be diagnosed in these patients based on the characteristic imaging findings of pachymeningeal enhancement and thickening and extravasation of fluid outside of the dura as demonstrated here.



Figure 1



Figure 2

Conclusion

CSF leaks are a rare yet important cause of headaches. It is important to be able to diagnose CSF leaks quickly and efficiently to allow for the best possible patient outcome. Recommended imaging modalities in a case of a suspected CSF leak include MRI with and without contrast, followed by confirmation and localization using a CT myelogram. Findings on MRI include pachymeningeal (dural) thickening and enhancement due to increased CSF signaling, sagging of the brain in response to leaked CSF compressing the brain from its location outside of the subarachnoid space, and/or engorgement of cerebral venous sinuses. A CT Myelogram can localize the spot of the tear in the dura by highlighting the fluid extravasation. Proper identification of CSF leaks in patients with headaches can lead to prompt resolution by placement of an epidural blood patch at the site of the leak.

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