Intracranial hypotension as a complication of lumbar puncture prior to elective aneurysm clipping

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INTRODUCTION

Intracranial hypotension is an uncommon, but well-described sequela of lumbar access procedures. Symptoms of persistent cerebrospinal leak from the access site range from transient orthostatic headache to cranial nerve palsies. We present a case of persistent intracranial hypotension that developed after craniotomy for clipping of an unruptured aneurysm preceded by a lumbar puncture 3 weeks earlier.
CASE REPORT

A 55-year-old female who began to experience severe headaches, dizziness, and nausea was admitted to an outside hospital for evaluation. During the course of these investigations, an unruptured left middle cerebral artery bifurcation aneurysm was discovered. The patient’s history includes multiple family members whose deaths resulted from ruptured cerebral aneurysms. The patient’s symptoms improved without intervention, except for her headache, which, although improved, remained severe.

After extensive consideration with the patient, she presented 3 weeks later for craniotomy for clipping of her aneurysm at our institution. The procedure proceeded uneventfully, and the aneurysm was successfully clipped. Postoperatively, the patient was extremely lethargic and was unable to follow commands or be safely extubated. The patient was taken to the neurocritical care unit and closely monitored for improvement. During this time, the patient’s examination slowly improved and initial plans for emergent imaging were postponed. Approximately 5 h after surgery, however, the patient was noted to no longer be following commands and had developed a left lateral and inferior gaze deviation.

A computed tomography (CT) scan of the brain showed significant pneumocephalus [Figure 1]. The patient was immediately placed in the Trendelenburg position and 100% oxygen was administered via her ventilator. The patient’s family indicated that the initial workup at the outside facility included a diagnostic lumbar puncture. The patient’s neurological status improved overnight, and by the morning she was once again able to follow commands and had resolution of her gaze deviation. Subsequent attempts to slowly raise the patient to a seated position, however, were unsuccessful, with a rapid decline in the patient’s mental status each time her head was raised. A repeat CT showed near-complete resolution of her pneumocephalus [Figure 2], but her persistent symptoms prompted us to use magnetic resonance imaging (MRI) of her cervical, thoracic, and lumbar spine to assess whether she had a cerebrospinal fluid leak [Figure 3]. No leak was readily identified on these studies, but, because of the high level of clinical suspicion for a persistent lumbar dural defect, a blood patch procedure was undertaken.

After the blood patch procedure, the patient’s neurological status improved dramatically, with extubation occurring the following morning and a return to her baseline neurological status within 24 h. The patient was subsequently discharged without any persistent deficits.
DISCUSSION

Persistent intracranial hypotension is a known complication of dural access procedures including lumbar puncture, lumbar drain placement, epidural steroid injections, and epidural catheter placement. Although it often presents only as postural headaches, serious complications including cranial nerve palsies, venous thrombosis, and spinal epidural hematomas have been reported. In our case, the patient’s family noted that she continued to have persistent headaches through the day of surgery following her lumbar puncture at the outside facility, but because her initial reason for presentation was headache, there was little suspicion of any relationship between this symptom and her lumbar puncture.

Management of intracranial hypotension is complicated by difficulties in diagnosis. Many patients, like ours, present with headaches, making a headache due to persistent cerebrospinal fluid leak more difficult to diagnose. Although imaging can be of assistance, findings such as dural thickening and cerebellar tonsil descent can be nonspecific, and the sensitivity and specificity of conventional MRI for discovering cerebrospinal fluid leak can be as low as 50%. A low index of suspicion for persistent intracranial hypotension can also lead to misdiagnosis of other, more widely known complications of dural access such as meningitis, thus delaying treatment. The frequent presence of postoperative pneumocephalus can also lead to the diagnosis of tension pneumocephalus in this population, especially since a persistent cerebrospinal leak can lead to the so-called “inverted bottle phenomenon,” resulting in greater than normal volumes of postoperative air in the cranial vault. The differentiation between these two diagnoses is especially important as the treatment for tension pneumocephalus—emergent burr hole and evacuation of trapped air—can exacerbate the effects of a cerebrospinal fluid leak.

Treatment for persistent intracranial hypotension due to cerebrospinal fluid leak is often conservative. Measures such as bed rest can allow the defect to close, while caffeine can ameliorate symptoms. When such measures fail, treatment with autologous epidural blood patch remains the initial invasive treatment of choice, although one with its own associated complications. In rare cases, surgery to repair persistent leaks with the assistance of myelography may be necessary.

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