A 14-Year-Old Male with a 10-Week History of Headaches

Luke Edmondson, MD; Jana E. Upshaw, MD; and Rachel E. Tuuri, MD

A 14-year-old previously healthy male presented to an outpatient clinic with a 10-week history of headaches and a 1-week history of emesis. He had initially been diagnosed with a concussion after a fall during soccer practice. After a transient improvement, he was diagnosed with migraine headaches; however, the patient had no personal or family history of headaches. He was subsequently evaluated in the primary care clinic on four separate occasions, with a documented normal neurologic examination at each of these visits. During the week before his final visit, the headaches had awakened the patient at night. On the day of this past clinic visit, the patient had an episode of emesis containing blood, which prompted him to seek care.

On physical examination, the patient was in distress, lying prone across two chairs. His heart rate was 52 beats per minute and his blood pressure was 127/78 mm Hg. His pupils were 6 mm bilaterally and were reactive to 4 mm equally. Additionally, the patient was unable to articulate thoughts or answer questions appropriately. His smile was asymmetric, with a right facial droop. The rest of his neurological exam was unremarkable.

The patient was transferred to the pediatric emergency department (PED). Upon arrival to the PED, a Glasgow coma scale (GCS) score of 12 was recorded. The patient’s heart rate was 70 beats per minute, respiratory rate was 40 breaths per minute, and blood pressure was 140/68 mm Hg. His pupils remained at 6 mm and reactive. Mannitol and boluses of normal saline were given emergently, with the patient’s GCS quickly improving to 14. A computed tomography (CT) scan of the head was ordered.

Case Challenge

Editor’s note: Each month, this department features a discussion of an unusual diagnosis. A description and images are presented, followed by the diagnosis and an explanation of how the diagnosis was determined. As always, your comments are welcome via email at pedann@Healio.com.

For diagnosis, see page 222

Figure 1. Large left frontal sub-acute subdural hematoma (clear arrow). 10-mm midline shift. Axial view.

Images courtesy of Rachel E. Tuuri, MD.
Diagnosis:

Chronic Subdural Hematoma due to Underlying Arachnoid Cyst

A head CT showed a large sub-acute subdural hematoma along the left frontal region causing significant mass-effect on the underlying brain parenchyma and ipsilateral lateral ventricle. A 10-mm midline shift to the contralateral right side was noted (Figure 1). There was also a left uncal herniation (Figure 2). A repeat CT scan performed at 2 weeks revealed a left anterior temporal arachnoid cyst (Figure 3). The cyst had not been visible on prior images because of compression by the overlying hematoma.

DISCUSSION

Subdural hematoma secondary to sports-related injury is rare in pediatric patients, but when present is commonly associated with an arachnoid cyst.\(^1\)\(^,\)\(^3\) Arachnoid cysts are congenital collections of duplicated arachnoid membrane filled with cerebrospinal fluid (CSF) that theoretically arise as an error in meningeal development.\(^4\) Their incidence within the general population is estimated to be 0.2% to 1.7%.\(^5\)\(^,\)\(^7\)

Most cysts are asymptomatic and diagnosis is usually made incidentally when patients undergo CT or magnetic resonance imaging. Most cysts remain stable in size, with only an estimated 10% increasing in size. The proposed mechanism for cyst enlargement is ongoing CSF secretion within the cyst, CSF entrapment by a ball valve mechanism, or enlargement by an osmotic gradient across the cyst walls.\(^4\)\(^,\)\(^8\)

Arachnoid cysts may occur at any site in the central nervous system but most commonly arise within the middle cranial fossa and with a left predominance.\(^3\)\(^,\)\(^8\)\(^,\)\(^9\) They occur two to four times as often in males compared with females,\(^4\)\(^,\)\(^8\) and they are usually singular. Bitemporal cysts are often present in glutaric aciduria type I.\(^8\) Arachnoid cysts also occur with greater incidence in neurofibromatosis, Down syndrome, mucopolysaccharidosis, and schizencephaly.\(^8\)

Although most are incidental, large or expanding cysts may become symptomatic if they compress adjacent structures or impede CSF flow.\(^4\)\(^,\)\(^5\) Cysts may cause macrocephaly, hydrocephalus, cranial nerve deficits, seizures, headache, developmental delay, hemiparesis, or cerebellar symptoms.\(^3\)\(^-\)\(^5\)\(^,\)\(^10\) The most common symptoms are headache and seizure.\(^8\)

Asymptomatic arachnoid cysts may be managed conservatively; interventions are typically reserved for cysts with severe symptoms that are clearly linked to the presence of the cyst. Surgical management strategies include endoscopic fenestration, fenestration by craniotomy, or cystoperitoneal shunt placement. All interventions carry the risk of significant complications that are similar to those produced by the cyst itself.\(^4\)\(^,\)\(^9\)\(^,\)\(^11\)

Subdural hemorrhage, subdural hygroma formation, and intracystic hemorrhage are established complications of arachnoid cysts after a minor head injury; middle cranial fossa cysts appear most prone to these bleeding events.\(^1\)\(^,\)\(^4\)\(^-\)\(^6\) This patient’s subdural bleed was attributed to his earlier fall during soccer practice. Cyst rupture may also occur spontaneously, although this is less common.\(^5\)\(^,\)\(^9\)

There are multiple case reports in the literature of pediatric patients with subdural hematomas as the result of a head injury incurred while playing a sport, and notably, there are a few that specifically report on soccer players with no known
is no intervention for the cyst as the two entities are anatomically separate and intervention for the cyst is not necessarily curative. This patient received no intervention for his cyst.

Finally, it is unclear if children with known asymptomatic arachnoid cysts should avoid contact sports. The risk of a subdural hematoma is small, but present. Some argue that sports with potential for “heading” or collision should be avoided altogether, whereas others advocate for uniform use of protective headgear. Others argue that given the rarity of rupture as well as unlikely morbidity and mortality, the decision to engage in sports activities should be made on an individualized basis in consultation with a neurosurgeon. The patient in this case was placed on a sports restriction until resolution of his subdural hematoma.

CONCLUSION

Arachnoid cysts are common meningeal abnormalities that usually remain asymptomatic. Large or expanding cysts may cause headaches, hydrocephalus, or focal neurologic findings. Arachnoid cysts, particularly large cysts, may bleed after minor head trauma, although this is also infrequent. Patients with known arachnoid cysts should be monitored by a neurosurgeon, and the decision to engage in sports participation with an asymptomatic arachnoid cyst remains controversial.

REFERENCES


