Abstract

Background: Arachnoid granulations (AGs) are growths of the arachnoid membrane that function as passive filters through which cerebrospinal fluid (CSF) drains into the dural venous sinuses. For an unknown reason, during development, some AGs do not terminate normally and continue to drain into the posterior fossa. These so-called “presumed” AGs can erode skull bone and present as focal erosions of the temporal bone. These lesions are rare and may be mistaken for various aggressive neoplasms. A comprehensive literature review was performed including the histology and pathology of presumed AGs, their prevalence and imaging appearance in the posterior temporal bone and the differential diagnosis.

Objective: Present a case series of posterior temporal bone arachnoid granulations, including two pathologically or surgically proven cases. Review the characteristic imaging findings of posterior temporal bone arachnoid granulations and their differentiating features from other posterior temporal bone pathologies, especially endolymphatic sac tumors.

Methods: Diagnostic imaging studies, including CT and MRI, were retrospectively analyzed in patients with presumed posterior temporal bone arachnoid granulations and in two patients with surgically or pathologically proven arachnoid granulations. A comprehensive literature review was performed including the histology and pathology of arachnoid granulations, their prevalence and imaging appearance in the posterior temporal bone and the differential diagnosis.

Results: The radiologic appearance of arachnoid granulations in typical locations is well established and is commonly mistaken for other pathologies. When seen in atypical locations, however, arachnoid granulations can be a source of diagnostic and therapeutic confusion. Rarely, presumed arachnoid granulations have been reported to involve the posterior temporal bone, where they present as focal erosions of the posterior petrous bone. These can be mistaken for various aggressive neoplasms including endolymphatic sac tumor, parangangioma, chordoma, chondrosarcoma, and metastases. Although described previously in the literature, the characteristic appearances of arachnoid granulations are usually presumed without requiring pathological correlation. We demonstrate two cases which are surgically or pathologically proven, supporting prior hypotheses in the literature that these represent arachnoid granulations.

Conclusions: The posterior temporal bone is an atypical location for arachnoid granulations and can lead to diagnostic confusion. Familiarity with the characteristic imaging appearance of arachnoid granulations in this location can help prevent misinterpretation of a more aggressive pathology.

Case #1

A 55-year-old healthy female presented with new onset recurrent bouts of vertigo. An MRI showed a nonenhancing, multiloculated, extra-axial cystic mass which is isointense to CSF within the lateral aspect of the cerebellopontine angle cistern and associated with extension through the posterior cortex of the petrous portion of the right temporal bone (Figure 1). No restricted diffusion was present to suggest epidermoid (not shown). The recommendation for surgical removal was made in order to prevent further complications such as CSF leak and also to potentially alleviate any impact the lesion might be having on the endolymphatic sac which could be leading to her dizziness. A right retrosigmoid approach cranotomy was performed and a cystic lesion lined with pathologically-confirmed arachnoid tissue eroding into the right temporal bone was found. The lesion was resected, and the CSF leak was sealed. The postoperative course was uneventful.

Case #2

A 36-year-old healthy female with a history of papillary thyroid cancer presented with a history of right ear fullness associated with the feeling of “sloshing” in her ear of several months duration. She denied hearing loss, vertigo, otalgia, otitis, and facial nerve weakness. Audiodiagram was normal. An MRI showed a lesion involving the posterior aspect of the right petrous ridge at the expected location of the endolymphatic sac (Figure 2). The mass was isointense on T1- and T2-weighted images and enhanced only minimally along the rim of the lesion. There was evidence of fluid or membrane thickening in several right mastoid air cells. High-resolution CT scan of the temporal bones showed a focal lytic lesion centered on the posterior petrous ridge where the cortical margin was eroded. Although arachnoid granulation was suspected, the patient preferred to undergo surgery instead of observation because of her cancer history and to prevent complications from a CSF leak. A mastoidectomy was performed and drainage of CSF was noted during the operation. Characteristically appearing arachnoid granulation was identified eroding through the posterior fosa dural plate approximately 4 mm inferior to the superior petrosal sinus. Using a diamond burr, the rest of the bone around the defect was taken down to the bone just over the dura. Using a Schindler elevator, retrograde dissection around the lesion was done until we were confident that this was indeed benign arachnoid granulation. The defect was then repaired with muscle and fascia.

Differential Diagnosis

The chief differential is an endolymphatic sac tumor (Figure 3). Other considerations include parangangiomas, chordomas, chondrosarcomas, and metastases.

References