Abstract

Objectives: To describe a rare case of symptomatic arachnoid cyst in the petrous apex and discuss the diagnostic and management options for this pathology.

Setting: A 41-year-old female presented with gradual progressive unilateral facial dysesthesia and was found to have a homogenous mass of the petrous apex with MRI appearance including hypointense signal on T1 and hyperintense signal on T2. Hypointense fluid-enhanced inversion recovery (FLAIR) signal and low signal on diffusion-weighted imaging (DWI) was possible to differentiate this as an arachnoid cyst versus an epidermoid cyst. An endoscopic transphenoidal surgical approach was taken to drain the lesion when the mass was found to be filled with cerebrospinal fluid. Postoperatively, the patient had resolution of symptoms without evidence of complications.

Conclusion: Arachnoid cysts of the petrous apex are rare entities but should remain in the differential diagnosis of petrous apex lesions. MRI is necessary to diagnose petrous apex lesions and FLAIR and DWI are helpful to differentiate intracranial epidermoids cysts from arachnoid cysts. An endoscopic transphenoidal approach to petrous apex arachnoid cysts is a safe and efficacious method to treat select symptomatic petrous apex arachnoid cysts.

Introduction

Lesions of the petrous apex, though rare, can present a significant challenge in skull base surgery. Petrous apex arachnoid cysts are most often diagnosed intraoperatively after exploration of a lesion reveals an intact arachnoid sac with CSF contents. These patients are typically diagnosed with an epidermoid cyst preoperatively due to the similarities in MRI findings between these two entities and the rarity of arachnoid cysts in this location.

The most common approaches to lesions of the petrous apex utilize skull base exposures. The typical findings of different petrous apex lesions are shown in Table 1. Both FLAIR and DWI are helpful to differentiate intracranial epidermoid cysts from arachnoid cysts. An endoscopic transphenoidal approach to petrous apex arachnoid cysts is a safe and efficacious method to treat select symptomatic petrous apex arachnoid cysts.

Case Presentation

A 41-year-old right-handed female with hypertension presented with a 3-year history of progressive left-sided facial pain. The pain was constant and dull in nature, and it involved the entirety of the left face, most pronounced in the V2-V3 region. She had no headache or hearing loss, but did report fullness of the left ear. She was neurologically intact, with preserved facial sensation and corneal reflexes.

MRI demonstrated a mass within the left petrous apex that was non-enhancing, hypointense on T1, and hyperintense on T2 (Figure 1). Due to the imaging findings and presenting symptoms, there was concern that this lesion was a petrous apex epidermoid causing compression of the trigeminal nerve.

Lesion

<table>
<thead>
<tr>
<th>CT</th>
<th>MRI-T1</th>
<th>MRI-T2</th>
<th>MRI-T1 with contrast</th>
<th>FLAIR</th>
<th>DWI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol Grainomas</td>
<td>Hypointense to isointense, homogenous</td>
<td>Hypointense</td>
<td>Hypointense</td>
<td>No enhancement</td>
<td></td>
</tr>
<tr>
<td>Epidermoid Cyst (aka localization 9%)</td>
<td>Hypointense to isointense to CSF, homogenous</td>
<td>Hypointense</td>
<td>Hypointense</td>
<td>No enhancement</td>
<td>High</td>
</tr>
<tr>
<td>Arachnoid Cyst unknown %</td>
<td>Hypointense to isointense to CSF, homogenous, commonly extends into Meckel’s cave</td>
<td>Hypointense</td>
<td>Hypointense</td>
<td>No enhancement</td>
<td>Low</td>
</tr>
<tr>
<td>Asymptomatic Pneumatization</td>
<td>No air cells</td>
<td>Hypointense</td>
<td>Hypointense</td>
<td>No enhancement</td>
<td></td>
</tr>
<tr>
<td>Mucosal 9%</td>
<td>Hypointense</td>
<td>Hypointense</td>
<td>Hypointense</td>
<td>Slim enhancement</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Imaging characteristics and prevalence of petrous apex lesions

Operative Course

A standard endoscopic transcranial approach to the clivus was performed. The bone of the clivus and floor of the sphenoid sinus were entirely drilled out, allowing the angulation required to dissect the retro-carotid corridor (Figure 2, Figure 3). The posterior fossa dura was exposed and the discal portion of the bone overlying the carotid artery was gently dissected. The internal carotid location was identified using both stereotactic navigation and Doppler flow signal (Figure 3). This allowed access to the left petrous apex mass. The petrous apex mass was encountered as a soft bollable mass and was entered using a combination of sharp and blunt dissection.

Once the mass was entered, brisk flow of CSF was encountered, underlying a thin arachnoid wall without overlying dura (Figure 2A). The cavity was explored and it appeared to be an entirely intra-arachnoid cyst of the petrous bone.

With a clinical confirmation of the diagnosis the cavity of the cyst was obliterated using abdominal fat graft, and the defect closed with alloderm, and a pedicled nasoseptal flap (Figure 2B,C).

Discussion

Presentation: The clinical presentation of petrous apex cephaloceles can vary from an asymptomatic incidental imaging findings to tinnitus, hearing loss, headaches, vertigo, trigeminal neuralgia, trigeminal hypotension, or transcal CSF leak.

Imaging: Magnetic resonance imaging is the mainstay of petrous apex lesion diagnosis. The typical findings of different petrous apex lesions are shown in Table 1. Both epidermoid cysts and arachnoid cysts show hypointensity on T1 and hyperintensity on T2 and show mild peripheral enhancement with gadolinium contrast. Due to the similar appearance of arachnoid cysts and epidermoid cysts, it is recommended to use FLAIR and DWI to differentiate between the two entities. The differentiation is important since epidermoid cyst cavities should have the entire cyst wall removed to prevent recurrence while arachnoid cysts fare well with simple fenestration.

Management: Dependent upon the clinical picture. Watchful waiting has been recommended for asymptomatic petrous apex lesions; symptomatic lesions have had favorable outcomes with surgical management in two-thirds of patients with no reported difference between fenestration and shunting techniques.

Conclusions

Arachnoid cysts of the petrous apex are rare entities but should remain in the differential diagnosis of petrous apex lesions. FLAIR and DWI are helpful to differentiate intracranial epidermoid cysts from arachnoid cysts. An endoscopic transphenoidal approach to petrous apex arachnoid cysts is a safe and efficacious method to treat select symptomatic petrous apex arachnoid cysts.

References


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Image: MRI of Petrous Apex Lesion

Figure 2. Intraoperative photographs A. Petrous apex cyst fenestration demonstrated a CSF-filled cavity B. Abdominal fat graft placement C. Alloderm used to fill defect D. Nasoseptal flap in place

Figure 3. Intraoperative navigation of petrous apex lesion during draining