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Introduction

Epidermoid cysts (EC) are rare, benign lesions arising from ectodermal inclusions during neural groove closure between the 3rd and 5th weeks of fetal development. They account for up to 1.8% of all intracranial tumors, with 40–50% located in the cerebellopontine angle (CPA), where they represent ~7% of CPA pathology. ECs grow insidiously and often present with headache or compressive cranial neuropathies. Microsurgical resection remains the gold standard management, but complete capsule removal can be limited by adherence to neurovascular structures, increasing the likelihood of recurrence. Because they tend to insinuate between adjacent spaces, CPA ECs are known to extend into the prepontine cistern, Meckel's cave, and the petrous apex. Lesions involving the petrous apex and Meckel's cave can be classically accessed via anterior petrosal or extended middle fossa approaches, but these can be time-consuming, often require significant temporal lobe retraction, and provide a narrow working corridor in the posterior fossa. Alternative strategies for resection of recurrent CPA epidermoid cysts with extension into Meckel's cave and the inferior brainstem are not well described.

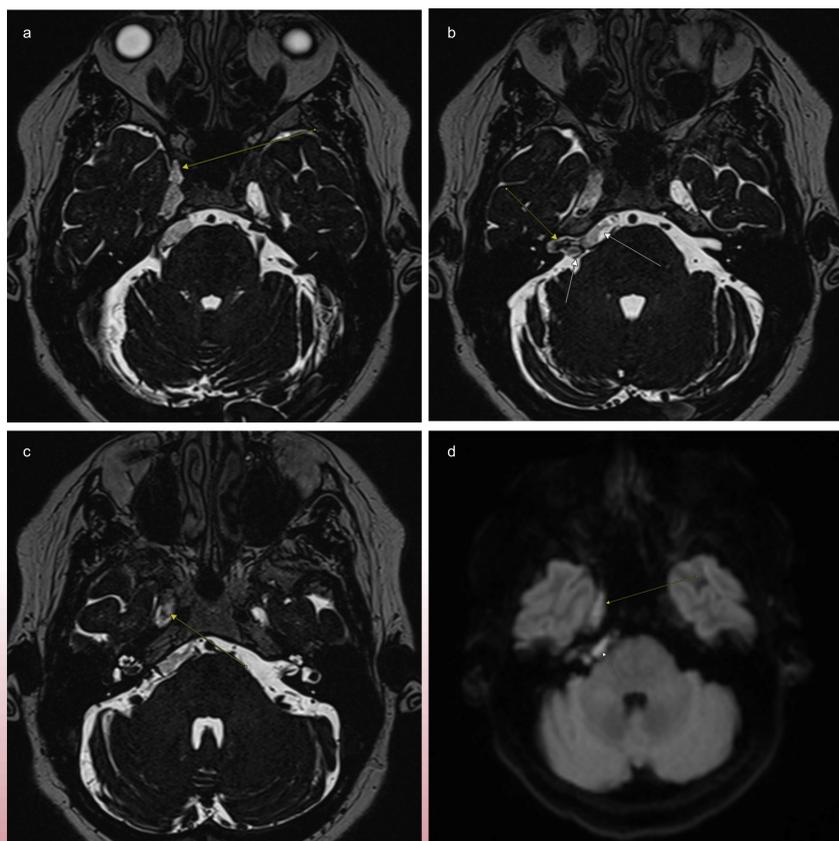


Figure 1. a–c. Pre-operative axial T2-SPACE magnetic resonance imaging (MRI) superior-to-inferior; d. Pre-operative axial diffusion-weighted (DWI)-TRACE imaging MRI

Case Description

A 67-year-old woman with a prior right retrosigmoid craniotomy for CPA EC presented with recurrent trigeminal neuralgia. Imaging demonstrated recurrent EC spanning the CPA, petrous apex, Meckel's cave, and internal auditory canal (IAC). Intraoperatively, the cyst extended inferiorly to the hypoglossal rootlets and distal vertebral artery, superiorly to the tentorium, and laterally to the petrous bone. The trigeminal dorsal root entry zone was also completely encased. After CPA debulking, the suprameatal tubercle and superior IAC wall were drilled intradurally, creating a posterior-to-anterior corridor to the middle fossa—termed the retrosigmoid intradural suprameatal approach (RISA). This extension permitted tumor removal from the petrous apex and inferior Meckel's cave. Small capsule remnants were deliberately left in the superior aspect of Meckel's cave and in the distal IAC to preserve trigeminal and auditory function.

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Results

Near-total resection was achieved. Intraoperative facial and trigeminal monitoring remained stable throughout. Trigeminal pain resolved postoperatively. At follow-up, the patient remained pain-free with preserved hearing, House-Brackmann grade I facial function, mild right facial numbness, mild taste disturbance, and transient diplopia that all resolved over time.

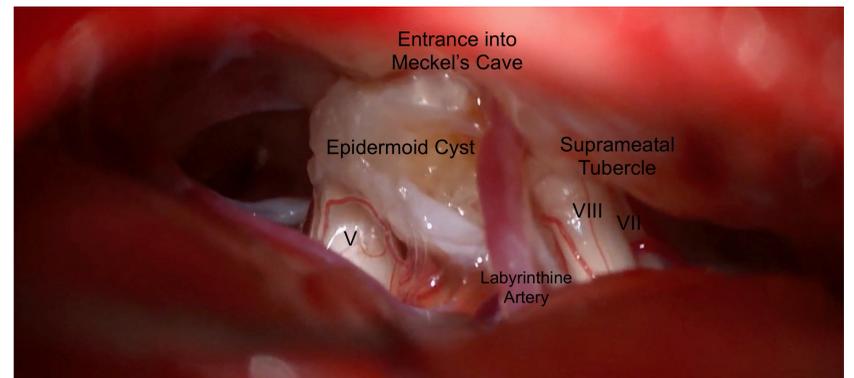


Figure 2. Epidermoid cyst (EC) causing mass effect on cranial nerves V, VII, and VIII entering Meckel's cave

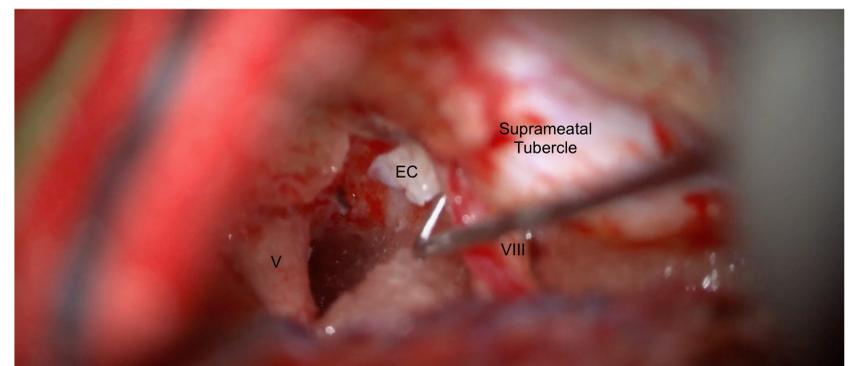


Figure 3. Most of the posterior fossa EC has been removed, the roof of Meckel's cave has been drilled, and the residual EC is carefully dissected out with a nerve hook

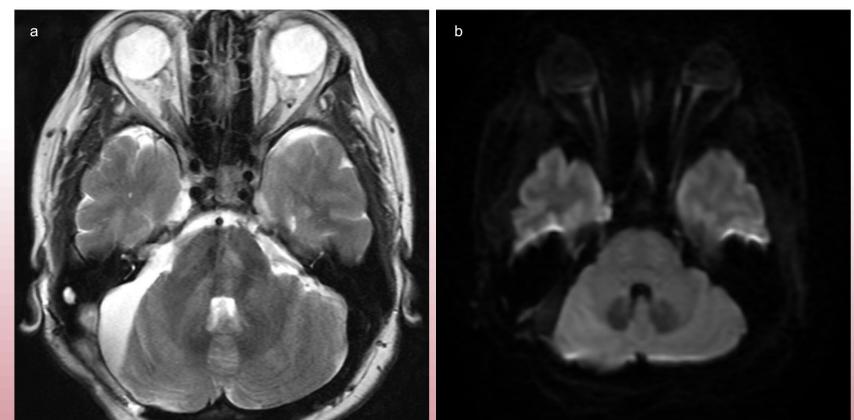


Figure 4. a. Three-month post-operative axial T2 MRI; b. Three-month post-operative axial DWI MRI

Conclusion

This case demonstrates the utility of the RISA approach for recurrent epidermoid disease extending anterior into Meckel's cave. Although the anterior approach offers greater operative freedom in certain circumstances, this advantage may be outweighed by its risks of temporal lobe retraction and cochlear or carotid injury—particularly in recurrent disease where a posterior corridor can provide comparable exposure to the target region with lower morbidity in selected cases. Beyond epidermoids, reverse petrosectomy may also be applicable for select trigeminal schwannomas, Meckel's cave meningiomas, and petrous apex cysts. Ultimately, careful selection between anterior and reverse petrosectomy should be guided by the primary site of the lesion, the surgeon's familiarity and comfort with each approach, prior interventions, and the principle of maximizing exposure while minimizing morbidity.

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