Abstract

**Educational Objective:** At the conclusion of the presentation, the participants should recognize the advantages of ultrasonic energy as a tool in skull base surgery. They should understand the differential diagnosis, management, and workup of petrous apex lesions.

**Objectives:** The ultrasonic bone aspirator uses high frequency ultrasonic waves to emulsify bone with concurrent irrigation and suction. Its non-rotational oscillating tip may allow for fine dissection in skull base surgery with less potential for damage of vital neurovascular structures. We describe the case of a patient with an expansive right petrous apex lesion treated using this technology.

**Study Design:** Case report and literature review.

**Methods:** The electronic medical record and imaging of the patient were reviewed, and a PubMed literature search was performed.

**Results:**

- A 59-year-old male was referred to our rhinology clinic with right retro-orbital headache, conductive hearing loss, and dizziness. MRI and CT imaging revealed an expansive right petrous apex lesion with bony dehiscence of the clivus and horizontal petrous internal carotid artery. Access via the lateral temporal bone was not recommended due to potential for facial nerve compromise. The patient underwent an endoscopic endonasal approach to the petrous apex using the ultrasonic bone aspirator. The diagnosis on intraoperative clinical and pathologic evaluation was consistent with a mucocele.

**Conclusions:** The ultrasonic bone aspirator is a useful tool for access to the petrous apex. A mucocele should be included in the differential diagnosis of any patient with a petrous apex lesion and symptoms consistent with petrous apicitis.

Introduction

- **DX** of a petrous apex lesion includes cholesterol granuloma, cholesteatomatous mucocele, primary or metastatic tumor, vascular anomaly, and asymmetric pneumatization.
- The Sonopet ultrasonic bone aspirator (UBA) (Stryker, Inc., Kalamazoo, MI) uses high frequency ultrasonic waves to emulsify bone with concurrent irrigation and suction.
- This patient’s lesion had associated bony dehiscence of the clivus and horizontal portion of the petrous ICA (Figure A).

Methods

**B**

**C**

**D**

**Results**

- The petrous apex was entered using the ultrasonic bone aspirator to minimize the risk of neurovascular injury (Figure B). Intussuscepted mucus was aspirated (Figure C). The petrous apex was opened to ~5 mm diameter, and a 4 mm Parell stent (Medtronic, Jacksonville, FL) was placed.
- The patient had resolution of his retro-orbital pain, dizziness, and conductive hearing loss after marsupialization of the mucocele.
- During his postoperative evaluation there was persistent edema and low-grade infection around the Parell stent (Figure D).
- The decision was made to remove the stent at two months postoperatively due to the theoretical risk of the stent causing injury to the dehiscent ICA or brain.
- At three-month follow-up, the opening to the right petrous apex cavity had closed due to soft tissue scarring.
- We returned to the operating room to open the cavity to ~6 mm diameter. NasoPore Sinus bioresorbable dressing (Polyganics, The Netherlands) impregnated with 2 mL of triamcinolone 40 mg/mL was placed in the opening to reduce the risk of scarring.
- At 6 weeks, the patient remains asymptomatic and nasal endoscopy demonstrated a widely patent petrous apex cavity (Figure E).

Discussion

- A mucocele should be included in the differential diagnosis of any patient with a space occupying petrous apex lesion and symptoms consistent with petrous apicitis.
- The ultrasonic bone aspirator will primarily dissect bone and decreases the risk of collateral thermal damage and potential for injury to the ICA or adjacent soft tissue structures via concurrent suction and irrigation.
- The specialized hand-piece dissection probe allows for improved precision and the translucent tip allows for visualization throughout the dissection process, as compared to endonasal drill.
- Cost is a major disadvantage, but this may be shared across surgical departments.

Conclusion

The ultrasonic bone aspirator is a useful tool for transnasal access to the petrous apex and may demonstrate less potential for damage of vital neurovascular structures.

References