

Endoscopic endonasal resection of cholesterol granuloma of the petrous apex

Volume 7 Issue 6 - 2017

Introduction

The petrous apex is one of the most inaccessible areas in the skull base. The most common type of lesion is cholesterol granuloma.¹ The cause of these lesions still remains unknown and small lesions can be asymptomatic. Historically, surgery to the petrous apex has been addressed via craniotomy and open microscopic anterior petrosectomy.² The endoscopic endonasal approach offers a minimally invasive alternative to traditional surgical approaches in the treatment of cholesterol granulomas of the petrous apex. The indications and applicability of endoscopic skull base surgery have rapidly advanced over the last decades from resection of benign lesions in the nasal and pituitary tumours to the resection of lesions involving the cribriform plate to the upper cervical vertebrae and extending to the petrous apex and infra-temporal fossa.³ The purpose of this study is to describe how we performed the endoscopic resection of cholesterol granuloma of the petrous apex using a unilateral approach. Recently, the nasoseptal flap has been used to permit long-term patency of the drainage site.⁴

Material and methods

A 43-year-old man presented with a 6-month history of intermittent right hemicranial headache and ipsilateral conductive hearing loss. The patient had no history of head trauma. The MRI demonstrated a large and expansile right petrous apex lesion hyperintense on both T1- and T2-weighted scans, without diffusion restriction or internal contrast enhancement. The CT scan showed an expansile and lytic lesion with surrounding bony erosion (Figures 1-4).

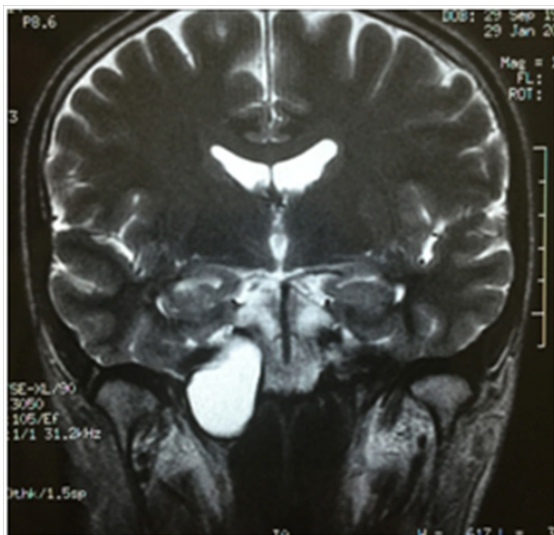


Figure 1 A large expansile lesion is noted in the right petrous apex, hyperintense on both T1- and T2-weighted scans, without diffusion restriction or internal contrast enhancement.

Surgical technique

A medial and unilateral trans sphenoidal trans clival

approach with internal carotid artery lateralization combined with transpterygoid infrapetrous approach was indicated because of the location of the lesion. Team surgery is mandatory when there is manipulation of the internal carotid artery and a risk of vascular injury.⁵ Bilateral sphenoidotomies provide more room for instrumentation and allow four-hand surgery by a team of surgeons, an otolaryngologist and a neurosurgeon, however a unilateral sphenoidotomy approach can be a viable option and less invasive alternative. The sinonasal mucosa was decongested with topical epinephrine 1:2000. The partial inferior turbinectomy was done to facilitate visualization. The maxillary antrostomy and ethmoidectomy was performed; the posterior wall of the maxillary sinus was removed, exposing the contents of the pterygopalatine fossa. The sphenopalatine artery was isolated, cauterized, and transected to fully expose the base of the pterygoids. Medially, the palatovaginal artery, a terminal branch of the maxillary artery, was transected, and soft tissue of the pterygopalatine fossa was mobilized laterally to facilitate identification of the vidian nerve and artery.⁶ The pterygoid base was drilled out using a diamond burr 3.2mm, preserving the vidian nerve, until the foramen lacerum soft tissue and anterior genu of the internal carotid artery were reached.⁶ The course and location of the ICA are confirmed with a neuronavigation system. The bone between the horizontal petrous ICA and Eustachian tube was drilled out.

The Eustachian tube is transected and the petrous carotid canal is drilled out. The inferior surface of the PA is reached by drilling the bone between the horizontal segment of the petrous internal carotid artery and the Eustachian tube, medial to the third division of the trigeminal nerve.⁵ The anterior and medial wall of the cyst is opened and the cyst contents are removed with suction, irrigation, and curettes. The cholesterol granuloma is drained and the cyst wall is marsupialized. A wide opening is mandatory. A silastic tube (6-mm pediatric endotracheal T-tube) is placed in the new cavity to maintain patency during the healing process.

Correspondence: Juliano Colonetti, Otorhinolaryngologist, Brazil, Email: julianocolonetti@hotmail.com

Received: November 07, 2017 | **Published:** June 23, 2017

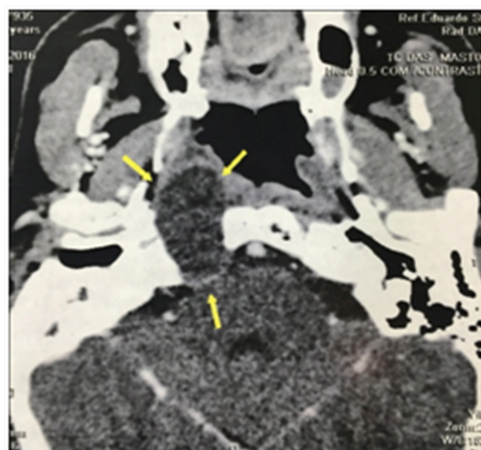


Figure 2 Preoperative axial contrast CT with a right expansile and lytic petrous apex lesion with bony erosion.

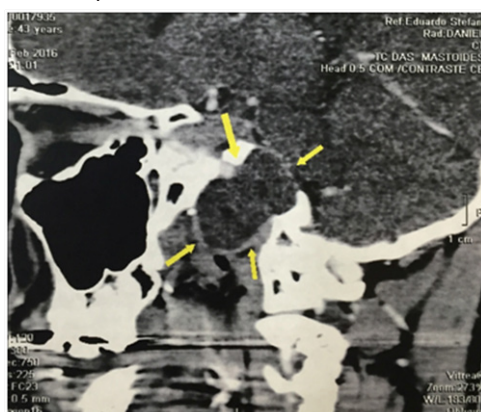


Figure 3 Preoperative sagittal contrast CT Scan with a right expansile petrous apex lesion.

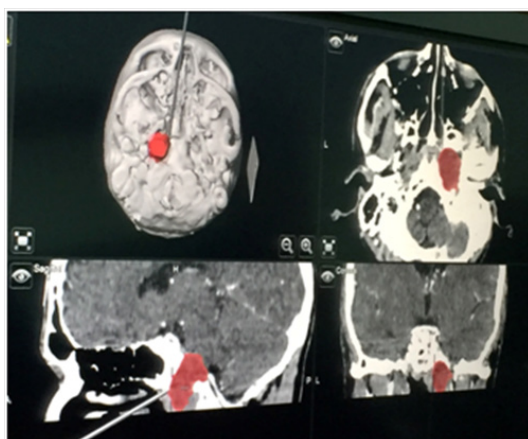


Figure 4 Image Guidance screen shot showing right petrous apex lesion.

Results

The patient was discharged 5 days post-operatively and at 2-month follow-up the silastic tube was removed under endoscopic visualization at the office. The patient demonstrated significant improvement of pre-operatively symptoms including resolution of headaches and improvement on his hearing loss.

Discussion

With the recent advances in minimally invasive surgery and intraoperatively image guidance systems, skull base endoscopy has led to new treatment options for petrous Apex lesions.⁸ Most lesions are clinically silent until they adhere to cranial nerves, further this lesion can present with headaches, hearing loss, imbalance, facial weakness and/or diplopia.⁸ Principal treatment is surgical drainage and permanent aeration to prevent recurrence.⁵ The treatment strategies depend on the location and size of the lesion, based on drainage or complete excision of the capsule or cyst drainage. Recently, petrous apex cholesterol granulomas have been treated via endonasal transsphenoidal approach using silicone tube to create drainage, prevent route occlusion. Obstruction of the drainager out chasled to problem with recurrence.⁹ The endoscopic endonasal approach provides a minimally invasive approach with wide operation field direct access to the midline and potential to extend approach to the superior and inferior PA.

Others advantages of the endoscopic endonasal approach include wide drainage window into the petrous apex connected with the natural corridor and sinonasal mucociliary system and postoperatively endoscopic surveillance in the office.¹⁰ The internal carotid artery is of critical importance for endoscopic endonasal approaches to the petrous apex, and it is useful to categorize these approaches based on the relationship to the internal carotid artery.⁵ The use of high speed drills with a diamond burr and image guidance allow precise removal of bone over the internal carotid artery and cyst wall.¹¹

Conclusion

The endoscopic endonasal approach to petrous apex lesions is a safe and minimally invasive technique for adequately selected patients. This approach provides wide access to the cyst, out-patient follow-up in office and if necessary, reopening with little morbidity in cases of recurrence. This approach is significantly less invasive than traditional transcranial procedures with overall reduced morbidity, shortened procedure time, reduced hospital stay and better cosmetic results and lower recurrence rates.

Acknowledgments

None.

Conflicts of interest

Author declares there are no conflicts of interest.

Funding

None.

References

- Lo WW, Solti-Bohman LG, Brackmann DE, et al. Cholesterol granuloma of the petrous Apex: CT diagnosis. *Radiology*. 1984;153(3):705–711.
- Van Gompel JJ, Alikhani P, Tabor MH, et al. Anterior inferior petrosectomy: defining the role of endonasal endoscopic techniques for petrous Apex approaches. *J Neurosurg*. 2014;120(6): 1321–1325.
- Chaaban MR, Chaudhry A, Riley KO, et al. Simultaneous Pericranial and Nasoseptal Flap Reconstruction of Anterior Skull Base defects following endoscopic-assisted craniofacial resection. *Laryngoscope*. 2013;123(10):2383–2386.
- Karligkiotis A, Bignami M, Terranova P, et al. Use of the pedicled nasoseptal flap in the endoscopic management of cholesterol granulomas of the petrous Apex. *Int Forum Allergy Rhinology*. 2015;8:747–753.

5. Zanation AM, Snyderman CH, Carrau RL, et al. Endoscopic endonasal surgery for petrous Apex lesions. *Laryngoscope*. 2009;119(1):19–25.
6. Prevedello DM, Pinheiro Neto CD, Fernandez Miranda JC, et al. Vidian nerve transposition for endoscopic endonasal middle fossa approaches. *Neurosurgery*. 2010;67(2 Suppl):478–484.
7. Griffith AJ, Terrell JE. Trans sphenoid endoscopic management of petrous Apex cholesterol granuloma. *Otolaryngology Head Neck Surgery*. 1996;114: 91–94.
8. Isaacson B. Cholesterol granuloma and other petrous Apex lesions. *Otolaryngol Clin North Am*. 2015;48(2):361–373.
9. Shibus S, Toda M, Tomita T, et al. Petrous Apex cholesterol granuloma: importance of pedicled nasoseptal flap in addition to silicone T-tube for prevention of occlusion of drainage route in transsphenoidal approach: a technical note. *Neurol Med Chir (Tokyo)*. 2015;55(4):351–355.
10. Chatrath P, Nouraei SA, De Cordova J, et al. Endonasal endoscopic approach to the petrous Apex: an image-guided quantitative anatomical study. *Clinical Otolaryngology*. 2007;32(4):255–260.
11. Scopel TF1, Fernandez Miranda JC, Pinheiro-Neto CD, et al. Petrous Apex Cholesterol Granulomas: Endonasal versus Infracochlear Approach. *Laryngoscope*. 2012;122(4):751–761.