



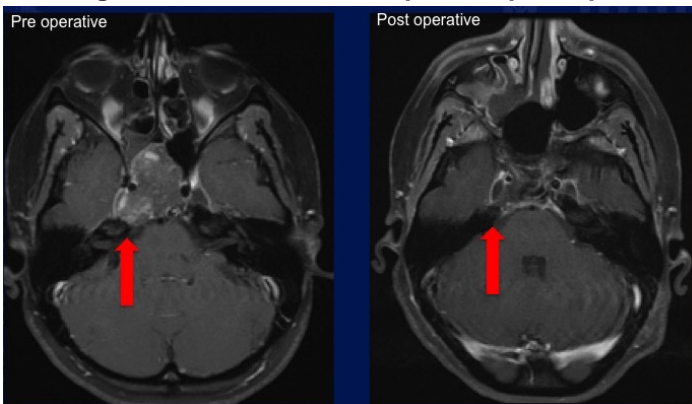
Introduction

The petrous apex is a challenging region to access. Endoscopic endonasal approaches (EEAs) to this region have been described and offer new treatment options compared to traditional open approaches that may risk auditory, vestibular and facial nerve function. We describe the outcomes of a large series of patients who underwent endoscopic endonasal surgery (EES) of the petrous apex for a variety of pathologies.

Methods

A retrospective review of the medical records was performed on EEAs for lesions involving the petrous apex between 2003 and 2014 at the University of Pittsburgh Medical Center.

T1 weighted MRI with contrast pre and post operative



Patient presented with a right abducens palsy that improved post operatively

Learning Objectives

Participants should be able to 1. Recognize that there are various surgical approaches to the petrous apex.

2. Discuss difficulties, risks, and benefits of various approaches to the petrous apex.

Cranial Nerve Outcomes

Patients	Cholesterol Granuloma	Chordoma	Chondrosarcoma	Meningioma	Pituitary adenoma	Total N=98
Pre-existing cranial neuropathy	2	15	14	10	1	44 (45.8%)
Improved post operatively (Improvement in CN VI)	1	7	7	2	0	17/44 (38.6%)
	1	7	4	0	0	12/17 (70.6%)
New or worsening cranial neuropathy	0	2 (9%) (VI)	4 (16.6%) (VI, IX, X, XII)	6 (33.3%) (III, VI, X, XII)	0	Worse- 5 (5.1%) New- 7 (7.1%)

Breakdown by pathologic entity

Results

Ninety-eight patients underwent EES for lesions involving the petrous apex. Pathologic diagnoses included cholesterol granuloma (29), chordoma (23), chondrosarcoma (24), meningioma (18) petrous apicitis (2), and pituitary adenoma (2). All patients with cholesterol granuloma were successfully treated. Gross total resection was obtained in 20/23 (86%) chordomas, and 19/24 (79.1%) chondrosarcomas. Five percent (1/18) of meningiomas underwent gross total and 44% (8/18) had near total resection. Forty-four patients overall presented with one or more cranial neuropathies, 31 of which were abducens nerve (VI) and 17 of which improved postoperatively (38.6%). New or worsened cranial neuropathies occurred postoperatively in 19 patients (19.3%), 17 of which were cranial nerve VI. Postoperative cerebrospinal fluid leak occurred in 13 patients (13%); 6 developed meningitis. One patient had a postoperative stroke. Two patients developed perioperative posterior circulation pseudoaneurysms without apparent intraoperative vascular injury, with delayed rupture and eventual death. One patient had an intraoperative internal carotid artery injury without sequelae. All deaths and neurologic morbidity occurred in tumors.

Conclusions

A medial approach to the petrous apex via EES offers an effective treatment option with high rates of resection for select tumors. There were no facial, auditory or vestibular injuries. The most common cranial nerve injury involved the abducens nerve.

References

- Cristante, L. and M.A. Puchner, A keyhole middle fossa approach to large cholesterol granulomas of the petrous apex. *Surg Neurol*, 2000. 53(1): p. 64-70; discussion 70-1.
- Eisenberg, M.B., G. Haddad, and O. Al-Mefty, Petrous apex cholesterol granulomas: evolution and management. *J Neurosurg*, 1997. 86(5): p. 822-9.
- Zanation, A.M., et al., Endoscopic endonasal surgery for petrous apex lesions. *Laryngoscope*, 2009. 119(1): p. 19-25.
- Dhanasekar, G. and N.S. Jones, Endoscopic trans-sphenoidal removal of cholesterol granuloma of the petrous apex: case report and literature review. *J Laryngol Otol*, 2011. 125(2): p. 169-72.
- Fucci, M.J., et al., Endoscopic management of a giant cholesterol cyst of the petrous apex. *Skull Base Surg*, 1994. 4(1): p. 52-8.
- Georgalas, C., et al., Endoscopic transsphenoidal surgery for cholesterol granulomas involving the petrous apex. *Clin Otolaryngol*, 2008. 33(1): p. 38-42.
- Jaberoo, M.C., et al., Endoscopic endonasal approaches to management of cholesterol granuloma of the petrous apex. *Skull Base*, 2010. 20(5): p. 375-9.
- Montgomery, W.W., Cystic lesions of the petrous apex: transsphenoid approach. *Ann Otol Rhinol Laryngol*, 1977. 86(4 Pt 1): p. 429-35.
- Oyama, K., et al., Petrous apex cholesterol granuloma treated via the endoscopic transsphenoidal approach. *Acta Neurochir (Wien)*, 2007. 149(3): p. 299-302; discussion 302.
- Paluzzi, A., et al., Endoscopic endonasal approach to cholesterol granulomas of the petrous apex: a series of 17 patients: clinical article. *J Neurosurg*, 2012. 116(4): p. 792-8.
- Prabhu, K., M. Kurien, and A.G. Chacko, Endoscopic transsphenoidal approach to petrous apex cholesterol granulomas. *Br J Neurosurg*, 2010. 24(6): p. 688-91.
- Presutti, L., et al., Combined lateral microscopic/endoscopic approaches to petrous apex lesions: pilot clinical experiences. *Ann Otol Rhinol Laryngol*, 2014. 123(8): p. 550-9.