

Endoscopic Transpterygoid Eustachian Tube Management Impact on Long-Term Hearing Outcomes <u>Rita Snyder, MD<sup>1</sup></u>; Sophie Peeters, MD<sup>1</sup>; Shirley Su, MD<sup>1</sup>; Ehab Hanna, MD<sup>1</sup>; Franco DeMonte, MD<sup>1</sup>; Shaan M. Raza, MD<sup>1</sup> <sup>1</sup>The University of Texas, MD Anderson Cancer Center



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# Abstract

**Background:** The eustachian tube must be mobilized or resected to gain full access to the petrous apex (Fig. 1) via an endoscopic transpterygoid approach (EPTA).<sup>1</sup> However, its removal may theoretically result in long-term conductive hearing loss due to subsequent chronic fluid accumulation in the middle ear, recurrent infections, and scarring.<sup>2</sup> Translocation and preservation of the eustachian tube may potentially decrease hearing morbidity, however, this modification may also reduce exposure and increase operative time. Additionally, many patients with petroclival malignancies who undergo ETPA receive adjuvant radiotherapy, which can cause secondary sensorineural hearing impairment, thus nullifying attempts to mitigate hearing morbidity by preserving this structure.<sup>3,4</sup> We sought to compare the hearing outcomes of patients who undergo open resection of petroclival region malignancies with ETPA [CPK classification type E] approaches accessing the petrous apex, to determine whether a significant difference in hearing outcome exists that could justify further investigation into eustachian tube preservation.

**Table 1.** Comparison of Matched Open and ETPA Class E Cohorts and Hearing Morbidity

Variables	Open (N=31)	EPTA Class E	P-value
Dre	oporativo	(N=31)	
Gender	eoperative		
Male	16 (52%)	17 (55%)	0.80
Female	15	14	
Age (mean & SD)	47 (20.1)	49 (16.0)	0.72
Chondrosarcoma	19	14	
Chordoma	8	13	
Nasopharyngeal carcinoma	0	2	
Sinonasal carcinoma	0	1	
Adenoid cystic carcinoma	0	1	
Rhabdomyosarcoma	1	0	
Prior Surgery			
Endoscopic endonasal	4 (13%)	13 (42%)	0.01
Open	11 (35%)	11 (35%)	1.00
Prior XRT	7 (26%)	5 (16%)	0.52
Prior chemotherapy	5 (16%)	4 (13%)	0.72
Prior subjective hearing loss	17 (55%)	15 (48%)	0.61
Prior mitigation	3 (10%)	4 (13%)	0.69
Myringotomy Hearing aid	1	3	
Extent of resection			
GTR	4 (13%)	17 (55%)	<u>&lt;0.001</u>
NTR	3 (10%)	9 (29%)	
STR	24 (77%)	5 (16%)	4.00
Adjuvant XR I	27 (87%)	27 (87%)	1.00
	19	20	
IMPT/VMAT	0	2	
SRS	2	2	
Adjuvant chemotherapy	7 (23%)	5 (16%)	0.52
Presence of mastoid effusion		40 (400()	0.00
New Postonerative	11 (35%)	13 (42%)	0.60
Mean follow-up time	7.3 years	2.8 years	<0.001
Hearing Outcomes			
Hearing Outcomes			
New hearing loss	22 (71%)	24 (77%)	0.56
Persistent hearing loss	21 (68%)	24(11%) 13(12%)	0.39
Conductive	1	5	0.01
Sensorineural	0	0	
Mixed	2	6	
Unknown Bilotorol	1	2	0 1 2
Conductive	0	0	0.13
Sensorineural	6	0	
Mixed	2	2	
Combination	7	8	
Unknown Now mitigating strategy		1	0 1 2
Unilateral new myringotomy	14 (43%) 4	21 (00%) 5	0.13
Bilateral new myringotomy	0	3	
Unilateral new hearing aid	3	5	
Bilateral new hearing aid	5	5	
Myringotomy & hearing aid(s)		3	
Audiometric data available New postoperative bearing los	20 (05%) S 6 (30%) *	17 (55%) 9 (53%) *	0 16
Within 30 days	1	2	0.10
3 months	0	4	
6 months	0	2	
1 vear	5	1	

**Methods:** A single-center retrospective review was performed. Two cohorts of patients were selected: those who previously underwent resection of a petroclival region malignant pathology via an open approach, and patients who underwent an ETPA where the eustachian tube was resected/translocated to access malignancy within the petrous apex. Cases involving obliteration of the labyrinth, cochlea, or ear canal were excluded. Demographic variables, baseline hearing function, preoperative and postoperative audiometric data, and rates of mitigating strategies for hearing loss (myringotomy/tympanostomy, hearing aid) were collected. All statistical analysis was performed in SPSS 29 (IBM Corp, NY, USA).

**Results:** 31 patients (52% male, mean age 47 years) who underwent open resection of a petroclival region malignancy were included in Group 1. Group 2 consisted of 31 patients (55% male, mean age 49 years) who underwent ETPA with either mobilization or transection of the eustachian tube to access the petrous apex (class E approach). Rates of all new persistent hearing loss were not significantly different between the two groups, both with subjective hearing loss (P=0.39) and available audiometric data (P=0.16). Rate of new postoperative mastoid effusion was also equivocal (P=1.00); however, hearing loss was more likely to be unilateral in the endoscopic cohort (P=0.01). Rates of mitigating strategies (myringotomy/tympanostomy and hearing aid device) were not statistically different between open and endoscopic approaches (P=0.13). Gross total resection was more likely in the endoscopic cohort (52% vs. 19%, P<0.001).

**Conclusion:** The ETPA approach was not associated with a higher rate of new posttreatment hearing loss, while yielding significantly higher rates of gross total resection compared to open surgery. Further study with larger cohorts of pooled data may help to further characterize the incidence and time course of postoperative hearing morbidity following eustachian tube manipulation.



**Figure 1.** Intraoperative view of exposure afforded by EPTA Class E approach with mobilization of the eustachian tube. Left: Contents of the pterygopalatine fossa (asterisk). Right: Following mobilization of the pterygopalatine fossa contents and eustachian tube, the petrous apex (arrow) is accessible.

## Conclusions

The ETPA approach was not associated with a higher rate of new post-treatment hearing loss compared to open surgery, while yielding significantly higher rates of gross total resection. Further study with larger cohorts of pooled data may help to further characterize the incidence and time course of postoperative hearing morbidity following eustachian tube

manipulation.

#### 2 years

\*Percentage of available data

### Contact

Rita Snyder, MD MD Anderson Cancer Center 1515 Holcombe Blvd, Houston TX, 77030 rsnyder1@mdanderson.org

### References

 Kasemsiri, P., Solares, C. A., Carrau, R. L., Prosser, J. D., Prevedello, D. M., Otto, B. A., Old, M., & Kassam, A. B. (2013). Endoscopic endonasal transpterygoid approaches: Anatomical landmarks for planning the surgical corridor. *The Laryngoscope*, *123*(4), 811–815.

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- 2. Damante, M. A., Magill, S. T., Kreatsoulas, D., McGahan, B. G., Hardesty, D., Carrau, R. L., & Prevedello, D. M. (2024). Endoscopic Endonasal Transpterygoid Approach and the Need for Myringotomy. *The Laryngoscope*, *134*(3), 1203–1207.
- 3. Young, Y.-H., Lin, K.-L., & Ko, J.-Y. (1995). Otitis Media With Effusion in Patients With Nasopharyngeal Carcinoma, Postirradiation. *Archives of Otolaryngology--Head & Neck Surgery*, 121(7), 765–768.
- 4. Xu, Y.-D., Ou, Y.-K., Zheng, Y.-Q., Chen, Y., & Ji, S.-F. (2008). The Treatment for Postirradiation Otitis Media With Effusion: A Study of Three Methods. *The Laryngoscope*, *118*(11), 2040–2043.