

mastoidectomy for the management of attic cholesteatoma in the private tertiary setting was undertaken. Indirect and future costs were excluded.

*Methods:* A cost comparison of anaesthetic set up and resources, operative set up and resources, average cost of running an operating theatre and cost of overnight admission was performed between the two techniques.

*Results:* TEES has a mean reduction of AUD\$2998.63 per operation from the hospital perspective when compared to an open procedure for attic cholesteatoma.

*Conclusion:* Once the learning curve is achieved, TEES is more cost effective from a hospital perspective, than canal wall up mastoidectomy for attic cholesteatoma. When indirect and future costs are considered as well, the economic gain of managing attic cholesteatoma endoscopically could possibly be even greater.

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## Endoscopic Ear Surgery: Concept and Technique (1) (V777)

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### Protympanum: Endoscopic Anatomy, Variations and Applications

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*Learning Objectives:*

The protympanum is a middle ear space lying anterior to the mesotympanum. Historically, the region has often been overlooked due to its difficulty to visualize microscopically, despite optimum tissue and bone removal. Angled endoscopes with attached high definition cameras have meant that this region is now able to be fully appreciated.

This presentation will revisit the anatomical boundaries of this region, which will be demonstrated using endoscopic visualization. It will also detail and explain the newly defined classification systems for the region, including: (1) the protympanum conformation; (2) the protiniculum, a bony ridge from the promontory to the medial wall, separating the hypotympanum from protympanum; and (3) the sub-tensor recess, an area of pneumatization inferomedial to the tensor tympani canal.

The presentation will utilise high definition endoscopic video and photographs taken during human cadaveric and live surgery. Normal anatomy will be demonstrated, as well as management of pathology in the area. Particular emphasis will be given to relevance of the region in both the development and surgical management of cholesteatoma.

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## Endoscopic Ear Surgery: Concept and Technique (1) (V777)

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### Transcanal Endoscopic Ear Surgery for Pediatric Population with a Narrow External Auditory Canal

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*Learning Objectives:* To confirm that TEES with optional transcanal atticoantrotomy can be used for pediatric patients with a narrow EAC.

*Introduction:* Transcanal endoscopic ear surgery (TEES) is less invasive and functional procedure that offers the wide angle view of surgical field, higher magnification of fine anatomical structures and better visualization of hidden anatomical areas. We demonstrated the feasibility of TEES for the pediatric population with a narrow external auditory canal (EAC).

*Methods:* Thirty-nine patients ranging in age from 2 to 14 years old (median: 7.9 yrs) underwent TEES between November 2011 and March 2015. Twenty-one of these patients had surgery for cholesteatomas; fifteen for chronic otitis media; and five for malformation of the middle ear. A preoperative CT scan was performed to evaluate the middle ear disease. We evaluated the bony EAC retrospectively using ImageJ as the image processing program. The EAC bony portion was defined as the bone which surrounds the canal in sagittal CT images. The minimum and maximum Feret diameters were used as the EAC minor and major axis respectively. Transcanal endoscopic tympanoplasty was performed with a rigid endoscope with an outer diameter of 2.7 mm coupled to the full HD system. Transcanal atticoantrotomy was also performed, as necessary, on some patients to remove cholesteatomas in the antrum. We will show a video of the surgical procedure for cholesteatomas.

*Results:* The minor axis ranged from 3.2 to 5.9 mm (mean: 4.7 mm), while the major axis ranged from 4.8 to 10.2 mm (mean: 7.8 mm). TEES was successfully performed on each patient without having to make a retroauricular incision. Postoperative hearing levels and air-bone gap fell into an acceptable range and are comparable to those results obtained by microscopic ear surgery.

*Conclusions:* TEES is feasible using rigid endoscopes with an outer diameter of 2.7 mm and is effective and less invasive for pediatric patients with a narrow EAC.