



Research Paper

Results of pediatric endoscopic and endoscopically assisted tympanoplasty



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Abstract *Objectives:* To evaluate the success of pediatric endoscopic and endoscopically assisted transcanal cartilage inlay tympanoplasty.

Methods: Retrospective review of single surgeon experience.

Results: During a 3 year period, 30 children underwent 31 endoscopic or endoscopically assisted transcanal tympanoplasties by the senior surgeon using tragal cartilage/perichondrial inlay grafts. There were 22 boys and 8 girls, ranging in age from 3.5 to 17 years (median 6 years). All tragal cartilage grafts (31/31; 100%) survived. Twenty-seven surgeries (27/31; 82%) resulted in an intact drum (17/31; 55%) or a microperforation (10/31; 32%). In four cases (4/31; 13%) significant perforations formed in previously unaffected portions of the drum.

Conclusion: Transcanal endoscopic cartilage inlay tympanoplasty offers a practical, minimally invasive approach to tympanoplasty for children of any age. It avoids postauricular or endaural incisions, tympanomeatal flap elevation, and canalplasty. Graft survival is uniform. Microperforation at the graft margins remained in 1/3 of children. Technical modifications may lead to higher rates of tympanic closure.

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Introduction

Pediatric tympanic membrane perforations commonly arise as sequelae of chronic middle ear infections and as a complication of the tympanostomy tubes use to treat otitis media.¹ While many perforations heal spontaneously or close after freshening the edges of the perforation, formal tympanoplasty is often needed. Repair of chronic perforations usually requires the placement of a mesothelial derived graft under, over, or into the perforation. In children with small ear canals, this classically required a postauricular incision, graft harvest, and elevation of the tympanic membrane for access. Success rates range from 60% to 90% in large series.²

The development of high-resolution, small diameter endoscopes allows a direct transcanal approach even in children with small ear canals. Transcanal cartilage inlay tympanoplasty has been popularized as a minimally invasive technique for repair of previously inaccessible anterior tympanic perforations.^{3,4} It is performed through the ear canal without creating a tympanomeatal flap. Tragal cartilage is harvested with minimal donor site morbidity. Such surgery is more appealing to the families as it avoids a classic postauricular approach with its associated morbidities. Very high success rates (94%–96%) are claimed in small series.^{5–7} Our experience confirmed the advantages of the endoscopic approach, but careful post-operative follow-up suggested a lower rate of permanent tympanic closure than claimed by endoscopic ear surgery enthusiasts.

In this paper, we review our experience with endoscopic and endoscopically assisted transcanal tympanoplasties in children using cartilage inlay grafts.

Methods

Data collection

After receiving approval from the Temple University Institution Review Board (protocol 24276), a computerized collection of patient office notes, photographs and operative reports was queried using the Microsoft Word “find” feature. The data collection was done in a manner that protects patient identity and privacy. All children who had undergone transcanal endoscopic and endoscopically assisted tympanic membrane tragal grafting were identified using the search term “tragal”. Patient age and gender, perforation size, method of grafting, graft survival and extent of tympanic membrane closure were assessed for each.

Surgical method

An operating microscope and 3 mm, 0° and 30° rigid endoscopes (7220 AA, BA, Karl Storz™ Tuttlingen, Germany) were available in each case. Images were recorded with a Karl Storz high-definition camera and AIDA™ recording system. The operating microscope was used for canal injection with local anesthetic, for tragal graft harvest, and

during fashioning of the graft. Freshening of the margins of the perforation, placement of Gelfoam in the middle ear and graft positioning were done exclusively with endoscopic visualization for anterior perforation with narrow ear canals (most cases). These cases would be classified as Class 2b (more than 50% of procedure done endoscopically) under the American Academy of Otolaryngology – Head and Neck Surgery Foundation Endoscopic Ear Surgery working group system as well as the International Working Group on Endoscopic Ear Surgery system.^{8,9}

Similar technique was used for central and marginal perforations. The perforations were freshened by creating tiny holes 1 mm from the margin with a curved pick, then sweeping the pick to join the holes. This created a rim of fresh tissue that was removed with cup forceps. Adjacent tympanosclerotic plaques were not removed. The tympanic annulus was left intact and not elevated when the perforation extended to the margin.

The entire tragal cartilage was harvested with investing perichondrium on both surfaces (Fig. 1). The cartilage component of the graft was carved to match the tympanic perforation, leaving large perichondrial flaps for placement medial and lateral to the perforation (Fig. 2). The graft was positioned with the medial perichondrium resting on a bed of saline soaked Gelfoam. The lateral perichondrial flap supported the graft and was secured with a layer of Gelfoam (Fig. 3). Bacitracin ointment filled the ear canal. The tragal donor site was closed with absorbable sutures.

Follow-up

Children were seen at 1 week, 4 weeks and 3 months after surgery. Status of the graft and tympanic closure were assessed at each visit and confirmed by tympanometry at the 3 month visit. Children with residual perforations were followed at 6 month intervals and were offered revision surgery if the residual perforation had not closed by 1 year following the original tympanoplasty.



Fig. 1 Tragal cartilage harvest.

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