Endoscopic Cartilage Shield T-tube Management of Chronic Tympanic Membrane Atelectasis

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Clinical Research Paper

Abstract

Objective: There are a variety of pressure equalization tubes (PET) designed to provide temporary middle ear ventilation in patients with chronic tympanic membrane (TM) atelectasis. However, in patients with significant atelectasis (grade III+), even PET’s designed to remain in for a longer duration of time are prone to early extrusion. Various techniques have been described to allow for prolonged middle ear ventilation, including cartilage tympanoplasty, cartilage-shield tympanoplasty, subannular and transossseous T-tube placement. Here we describe a novel endoscopic technique for cartilage shield T-tube placement in patients with history of grade III+ chronic TM atelectasis.

Methods: This is a retrospective case series in a tertiary referral center of patients with history of chronic TM atelectasis (grade III+) who underwent endoscopic TM reconstruction with a composite cartilage shield T-tube placement.

Results: Ten patients were identified mean age of 8.9 years (range 6-15 years old). Follow up was for a mean of 11.4 months (range 1-19 months). The overall retention rate was 92.8%. Pre- and post-op audiograms were performed in six patients and all patients (100%) showed stable or improved hearing.

Conclusion: The cartilage shield T-tube tympanoplasty can provide an effective treatment for chronic severe (grade III+) TM atelectasis and provide long term middle ear ventilation with improved symptoms. The endoscopic modification of this technique provides a lower risk of extrusion and allows for improved visualization with similar result in comparison to previous published studies. Long term follow-up of these patients is needed to monitor development of complication.

Surgical Technique

All patients were operated under general anesthesia. Transcanal endoscopic ear surgery (EES) technique was used for exploring the middle ear. Temporary cartilage tympanoplasty and postauricular subcutaneous incision was elevated carefully to avoid TM perforation. Auricular conchal bowl cartilage was harvested for the cartilage shield. A small 1cm incision was made in the posterior auricular skin overlying the conchal bowl. (Figure 1). Dissection was taken down to the perichondrium level. The perichondrium flap was then raised and a 3.5mm drill was then performed to harvest a circular cartilage with perichondrium intact on one surface. Hemostasis was then achieved using a bipolar cautery. The post auricular incision was then closed with 5-0 fast suture in running fashion. Tragal cartilage was then harvested using a curette. The incision was closed with 5-0 Vicryl suture. The cartilage shield was then inserted into the external auditory canal to anchor the tympanostomy tube. The incision to the cartilage was then closed with 5-0 Vicryl suture. (Figure 2). The cartilage shield was then fixed to the tympanic membrane with absorbable Vicryl sutures. (Figure 3). The cartilage shield was then fixed to the tympanic membrane with absorbable Vicryl sutures. (Figure 3).

Results

• Ten patients (age 6-15) with 14 total cartilage T-tubes were placed over a 19 months period. (Table 1).
• Four patients received bilateral cartilage shield T-tube with 3 of them receiving the tubes during the same surgery.
• 13 out of 14 cartilage shield t-tube were functional at the time of the presentation (92.8%).
• One of the patient with bilateral cartilage t-tube has extrusion of 1 of the T-tube after 12 months. The ear with the extruded T-tube had grade I retraction and no middle ear effusion at 15 months follow up.
• Six patients with cartilage shield t-tube (64.3%) have pre-op and post-op audiogram with 100% stable or improved hearing. (Table 1).
• Two patients (20%) experienced recurrent otitis which was managed successfully with antibiotic otic drops.

Discussion

Cartilage graft or composite graft (cartilage/perichondrial) has been introduced since 1995 as a management option for atelectatic TM and Dornhoff reviewed his experience with 1000 tympanoplasties and 82 were performed for atelectasis. 2 Of the 98 patients, one patient had residual perforation. Eliru et al published their data on the feasibility of chronic TM atelectasis repair with anteriorly placed subannular T-tube. 6,7 PETs were placed during underlay fascia tympanoplasty procedure for a variety of reasons with the result including extruded PET, residual perforation, blocked PET, recurrent TM retraction with no anterior blunting at the site of the tube insertion. Most patients demonstrated an improvement in the air-bone gap. The benefit of the endoscopic approach is the shortened operating room time as reported by Dundar et al. 8 The patients experienced very limited post operative pain and were able to return to normal function in a shorter amount of time in comparison to the traditional post-aorticural approach patients who underwent tympanoplasty.

Conclusions

An endoscopic approach for cartilage shield t-tube placement is a safe and equally effective approach for treatment of chronic middle ear effusion and atelectasis in the pediatric population. The complication of obstruction of the tube is rare and we need to continue to evaluate these patients in order to find treatment to decrease the frequency of its occurrence. The complications associated with long term PET includes infections and perforations.

References


Table 1. Patient Data

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