Is cartilage-perichondrium composite graft tympanoplasty the ideal treatment for revision tympanoplasty

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ABSTRACT

Background: The objective of the study was to evaluate the anatomical and audiological outcomes of cartilage-perichondrium composite graft tympanoplasty by underlay technique in revision tympanoplasties.

Methods: A series of 55 patients who underwent revision tympanoplasty with cartilage-perichondrium composite Island graft, at the department of Otorhinolaryngology, Harsh ENT Hospital, Ghaziabad. Tympanoplasty with cartilage-perichondrium composite island graft was done using underlay technique after slicing the cartilage with help of slicer. Ossiculoplasty was performed as and when needed.

Results: Graft uptake rate was found to be 96.36% (53 of the 55 cases) in our study without any serious complications. Audiological outcomes with closure of 94.55% air bone gap within 0 to 30 dB was achieved (p <0.05).

Conclusions: Nearly 97% success rate can be achieved with cartilage-perichondrium composite graft tympanoplasty for Revision tympanoplasty.

Keywords: CSOM, Revision tympanoplasty, Cartilage-perichondrium- composite graft

INTRODUCTION

Tympanoplasty has undergone tremendous evolution since it was first described by by Wullstein in 1952 and Zoellner in 1955.¹² Over the decades various autologus (temporalis fascia, fascia lata, periosteum, perichondrium, cartilage with or without peri-chondrium, veins, fatty tissue, and skin) and homologus (dura mater, pericardium, cartilage, amniotic membrane, skin, cornea, peritoneum, veins, and aortic valve) grafting materials and techniques were used in tympanoplasty operations.³ Temporalis fascia remains the most commonly used material for tympanic membrane reconstruction, with a success rate of 93% to 97% in primary tympanoplasties.⁴ In high risk situations such as the subtotal perforation, atelectatic ear, cholesteatoma, and revision tympanoplasty, the results have not been found to be commendable. In these situations, fascia and perichondrium have shown to undergo atrophy and subsequent failure in post-operative period.⁵ Heerman claimed to have used the cartilage palisade technique for middle ear and mastoid cavity reconstruction since 1960, in over 13,000 cases. Reconstruction of tympanic membrane with cartilage counteracts the tendency to retraction of soft autologus materials like temporalis fascia or perichondrium. Because of its low turn-over rate, cartilage is more resistant to infection.⁶

METHODS

55 patients who underwent revision tympanoplasty were taken from the department of Otorhinolaryngology, Harsh ENT Hospital, Ghaziabad. Data were collected from the record section and analysed in various aspects. A retrospective chart review was performed of all patients who underwent cartilage composite graft revision tympanoplasty. All the cases were thoroughly examined and investigated before taking them for surgery, findings
were recorded in the proforma. A detailed history regarding presenting complaints, history of present illness, past history and family history was taken.

A detailed otologic examination was performed. The amount, colour, consistency, smell and other characteristics of the discharge were noted. Tympanic membrane was examined for perforation, retraction pocket, granulation, cholesteatoma and polyp. The condition of middle ear mucosa and ossicular status was noted. Tuning fork test- Rinne, Weber and Absolute bone conduction tests carried out using 256, 512, 1024 Hz tuning fork. X-ray Mastoid done to assess the cellularity of mastoid bone and to rule out presence of cavity. The presence of dural plate and sinus plate was noted. Computed Tomography scanning was performed in selected cases which had doubt about the presence of cholesteatoma. Tympanoplasty was done on patients who had chronic suppurative otitis media with recurrent perforation of tympanic membrane and a preoperative conductive deafness. In adult, tympanoplasty was done in local anesthesia while in children general anesthesia was preferred. Tympanoplasty with cartilage-perichondrium composite island graft was done using underlay technique after slicing the cartilage with help of cartilage slicer. Ossiculoplasty was performed as and when needed.

Postoperatively patients were kept on broad-spectrum I.V antibiotic, systemic decongestants, analgesics and vitamins. Patients were advised to keep the operated ear up, avoid forceful blowing of their nose, jerky and sudden movements of head and avoid water over dressing. Mastoid dressing was removed on 8th postoperative day. Patient was thoroughly instructed to follow all precautions and to come immediately on follow-up in case of any discomfort and URTI.

Figure 1: Cartilage slicer.

Figure 2: Composite island graft.

Table 1: Number of patients underwent tympanoplasty.

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<th>Total revision tympanoplasty</th>
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Postoperative pure tone audiometry was done at 6 months after surgery. Closure of air-bone gap in different types of tympanoplasty was recorded and documented and compared with preoperative pure tone audiograms.

After a postoperative period of 6 months on re-evaluating the hearing profile of the patients we found that 18 cases (32.72%) achieved excellent post-op hearing results, 20 cases (36.36%) achieved comparatively good hearing level and 14 cases (25.45%) achieved moderately better hearing level as compared to their pre-operative hearing levels. Audiological outcomes with closure of 94.55% air bone gap within 0 to 30 dB was achieved (p <0.05).

Figure 3: Postoperative photograph.

The observations were recorded on 3 months, 6 months and 9 months follow-up. Postoperative pure tone audiometry was done after 6 months. Postoperative photographs were taken with video-otoendoscopy on subsequent postoperative OPD visits.

RESULTS

The study comprised of 55 patients, of which 32 were male and 23 were females. The age of the patients varied from 9 to 58 years. All the patients underwent revision tympanoplasty with cartilage-perichondrium composite island graft, done using underlay technique after slicing the cartilage with help of cartilage slicer. Ossiculoplasty was performed as and when needed.
In this study male cases (58.18%) were found to be more than female (41.82%) cases. Deafness (94.18%) was the most common complaint followed by Otorrhea (90.72%).

In this study 94.55% cases were found to have closure of air bone gap within 0 to 30 dB, 32.72% within 10 dB and 36.36% within 20 dB and 25.45% had closure within 30 dB, 5.45% cases had >30 dB hearing gap. The main advantage of the cartilage graft has been thought to be its very low metabolic rate. It receives its nutrients by diffusion, is easy to work with because it is pliable, and it can resist deformation from pressure variations. The perceived disadvantage of the cartilage graft is that it creates an opaque tympanic membrane, which could potentially hide a residual cholesteatoma.

The results of our study were found to be comparable with other studies done by various authors. Neumann et al reported a graft take rate of 100% in their palisade cartilage tympanoplasty study, and they did not observe resorption or recurrent defects of the rebuilt tympanic membrane. Khan et al used a shield-sliced tragal chartilage graft in 7.27% cases. In our study, perichondrium composite graft was done in 7.27% cases. In our study, 16.90% patients were having AB gap level >30 dB, 36.81% were having AB gap level 21-30 dB, 54.54% within 20 dB and 25.45% had closure of the tympanic membrane.

In our study middle ear mucosa was found normal in 60.9% cases. Pathologies, pathology of the malleus handle and stapes arch revision surgery, atelectasis, cholesteatoma, tympanosclerosis, large (>50% of total tympanic membrane diameter) and anterior perforations, tobacco smoke exposure, perforation drainage during surgery, and bilateral disease.12

All the patients underwent revision tympanoplasty with cartilage-perichondrium composite island graft, done using underlay technique after slicing the cartilage with help of cartilage slicer. Ossiculoplasty was performed as and when needed. Type I tympanoplasty was done in maximum number (47.27%) of cases, type II tympanoplasty was done in 25.45% cases and type III tympanoplasty in 20.0% cases. Type IV tympanoplasty was done in 7.27% cases. In our study, graft take-up rate was 96.36% (53 of the 55 cases).

In our study 96.36% for closure of the tympanic membrane. Causes of tympanoplasty failure using a temporal muscle fascia graft included severe ear pathologies, pathology of the malleus handle and stapes arch revision surgery, atelectasis, cholesteatoma, tympanosclerosis, large (>50% of total tympanic membrane diameter) and anterior perforations, tobacco smoke exposure, perforation drainage during surgery, and bilateral disease.12

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cartilage-perichondrium composite graft, and their success rate was 97.67%.13 Sismanis et al reported their revision tympanoplasty cases, and their success rate was 93.5%.14 Dornhoffer et al, also reported 100% uptake rate.8 Adonis et al found in their study a graft uptake rate of 98.4%.10 Chopra et al and Desarda et al found an uptake rate of 95% and 96% respectively.9,11 Authors have suggested that cartilage tympanoplasty provides sufficient structural stability during times of negative middle ear pressure and readily resists continued eustachian tube dysfunction.15 Since its introduction approximately 50 years ago, cartilage tympanoplasty has been used in many challenging circumstances. The use of cartilage in cases of cholesteatoma and retraction has been known to give good results. Many authors have advocated its use in cases of recurrent perforations, bilateral perforations, and craniofacial abnormalities predisposing to eustachian tube dysfunction.16

**CONCLUSION**

Cartilage-perichondrium composite graft tympanoplasty is an effective procedure for all types of revision tympanoplasty patients. It provides better graft up-take and hearing results. The postoperative closure rate of tympanic membrane perforations was significantly high and the audiologic improvement was socially acceptable and satisfactory with cartilage-perichondrium composite graft. Hence we can conclude that cartilage-perichondrium composite graft can be preferred in reconstruction of persistent tympanic membrane perforation because of its more rigid, and more resorption-resistant and retraction-resistant nature. It gives excellent result and success rate and the procedure is very effective in cases of recurrent perforations, total perforations, atelectasis and revision tympanoplasties.

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**REFERENCES**


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