e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2026; 17(9); 173-176

Original Research Article

A Comparative Study- Results of Using Cartilage and Temporalis Fascia in Tympanoplasty Surgery of Patients with COM

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Received: 25-06-2026 / Revised: 23-07-2026 / Accepted: 28-08-2026
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Conflict of interest: Nil

Abstract:

Objectives: Results of type I tympanoplasty done with either temporalis fascia or perichondrium and cartilage island flap, in patients with bilateral chronic otitis media are compared in this study.

Materials and Methods: This study has included primary tympanoplasty with a subtotal perforation cases and an intact ossicular chain, minimum 1 month dry and middle ear mucosa normal. Temporalis fascia tympanoplasty was undertaken in 35 patients, and cartilage tympanoplasty in 29 patients.

Results: The graft success rate was 35 percent for the fascia group and 92.3 per cent for the cartilage group. Post-operatively, the mean ± standard deviation air conduction threshold was 28.54 ± 14.20 dB for the fascia group and 22.97 ± 8.37 dB for the cartilage group, while the mean ± standard deviation bone conduction threshold was 11.71 ± 8.50 dB for the fascia group and 7.15 ± 5.56 dB for the cartilage group.

Conclusion: In patients with bilateral chronic otitis media, cartilage tympanoplasty seems to provide better hearing results and graft success rates.

DOI: 10.25258/ijpqa.17.9.26

Introduction

The insertion of membranous materials such as fascia and perichondrium results in successful tympanic membrane closure in 90 per cent of normally ventilated middle ears. The goals of tympanoplasty are reconstruction of a healthy middle-ear cavity, closure of the perforation

and optimal restoration of hearing. However, the prognosis is poorer in cases with tubal dysfunction, adhesive processes, infection, tympanic fibrosis and defects of the entire tympanic membrane.[1,2] In these cases, some authors have reported better results for cartilage tympanoplasty techniques, probably due to this material's resistance to infection and higher mechanical stability under negative pressure changes within the middle ear.[3,4] This inference, although not proven in an evidence-basedmanner, influences surgeons to use cartilage grafting in patients with bilateral chronic otitis media, due to implied poor eustachian tube function. Tympanoplasty graft healing in patientswith contralateral tympanic membrane perforation is a controversial topic. Such contralateral perforation may indicate Eustachian tube dysfunction as well as severe, prolonged middle-ear infection, leading to bilateral perforation.

It is commonly accepted that eustachian tube function is one of the leading factors determining the success of tympanoplasty.[4] Although this assumption is still debated, many surgeons still prefer not to repair paediatric tympanic membrane perforations associated with minimal hearing loss until the child is six or seven years old, in the hope that eustachian tube function will be adequate at that point to maintain an air-filled middle-ear space post-operatively, with normal hearing. The status of the contralateral ear may give some indication of the function of the involved ear; however, it is not a universally accepted predictor. The association between contralateral ear status and tympanoplasty outcome has not previously been thoroughly assessed. The present study aimed to examine both graft success rates and hearing results after primary type I tympanoplasty using either a temporalis muscle fascia graft or a perichondrium and cartilage island flap, in patients with bilateral chronic otitis media.

Materials and methods

Study Design: This study study was conducted to assess the anatomical and functional results of patients with bilateral chronic otitis media who had

undergone type I tympanoplasty in a medical college from June 2025 to May 2026 in the department of otorhinolaryngology and also the patients from department of orthopaedics who had nasal bone fracture with un displaced distal radius fracture which was managed conservatively by below elbow post cast application were considered. This study includes a homogeneous group of patients with bilateral chronic otitis media, in order to facilitate accurate comparisons. Here we have included in the study the primary tympanoplasty cases with a subtotal perforation (on the operated side), an intact ossicular chain, a dry ear for at least 1 month and normal middle-ear mucosa, together with bilateral chronic otitis media and contralateral tympanic membrane perforation.

Here we have excluded the patients younger than 10 years of age, those requiring concomitant mastoidectomy, ossiculoplasty or atelectasis procedures, and those with cholesteatoma, syndromic patients or previous ear surgeries. 35 in the fascia group and 29 in the cartilage group. We have recorded information on these patients' graft success rate, and on their pre- and post-operative air conduction pure tone average pure tone audiometry, bone conduction PTA, and air–bone gap (ABG).

Surgical Procedures: All procedures were performed under general anaesthesia, and surgeries are done by postauricular approach. Graft material used was either temporalis muscle fascia or a perichondrium and cartilage island flap, harvested from the tragus and conchal cartilage and placed in an by underlay technique. A complete strip of cartilage 2 mm in width was removed vertically from the centre of the cartilage, to accommodate the malleus handle. Patients included in this study had a mobile, intact ossicular chain at the time of surgery, and no patient required ossicular chain reconstruction. Outcome measures Graft success was defined as full healing of the grafted tympanic membrane, without perforation, retraction or lateralisation, for at least 12 months postoperatively. The main outcome measures used were graft success rate and hearing improvement level. Patients received regular pure tone audiometric evaluation every 3 months for the first post-operative year and then every yearly.

Hearing outcomes were calculated from the most recent audiogram available, by comparing the pre- and post-operative air conduction and bone conduction PTAs at 0.5, 1, 2 and 3 kHz. The ABG was calculated from this information. Hearing gain was defined as the difference between the pre- and post-operative ABG.

Statistical Analysis: Statistical Comparisons were made using one-way analysis of variance, the chi-square test, and the t-test for independent samples. The results were assessed within a 95 per cent reliance and at a significance level of $p<0.05$.

Results

35 patients (27 female, 8 male) underwent fascia tympanoplasty, while 29 patients (20 female, 9 male) underwent perichondrium-cartilage tympanoplasty. The indication for surgery in all cases was chronic otitis media with perforation. The mean± standard deviation (SD) age was 29.5 ±11.5 years (range, 16 to 63 years) in the fascia group and 31.9±12.8

years (range, 16 to 65 years) in the cartilage group; the difference in mean age was not statistically significant ($p =0.392$). All patients were followed up for at least one year after surgical intervention. The mean± SD follow-up period was 24.9 ±13.4 months in the fascia group and 20.9± 9.3 months in the cartilage group; the difference in mean follow up was not statistically significant ($p =0.134$). The overall graft success rate was 78.8 per cent (63/ 80). The incidence of graft success was 65.9 per cent (27/41) in the fascia group and 92.3 per cent (36/ 39) in the cartilage group; this difference was statistically significant ($p =0.005$). There were no statistically significant differences between the fascia and cartilage groups regarding preoperative air and bone conduction PTA. However, there were statistically significant differences between the two groups regarding post-operative air and bone conduction PTA. Both groups showed a significant post-operative improvement in air conduction thresholds, compared with pre-operative values ($p=0.001$ for both groups). For all patients combined,

the mean±SD air conduction PTA was 41.20± 11.30 dB pre-operatively and 25.82±11.98 dB postoperatively ($p=0.001$). There were no statistically significant differences between the two groups regarding either pre- or postoperative ABG. Table III shows postoperative ABG results by graft material. A post-operative ABG of 20 dB or better was identified in 75.6 per cent (n= 31) of the temporalis fascia graft ears and in 82 per cent (n= 32) of the cartilage graft ears. Postoperative ABGs were significantly improved in both groups, compared with pre-operative values ($p=0.001$for both groups). For all patients combined, the mean± SD ABG was 29.59±9.88 dB pre-operatively and 16.56±9.30 dB post-operatively ($p =0.001$). There was no statistically significant difference in post-operative hearing gain between the two groups .

Discussion

This may be attributed to various otological, surgical and patient-related factors, including the type of tympanoplasty graft material.[5,6] Gerber et al. compared temporalis fascia versus cartilage

tympanoplasty in patients undergoing primary surgery, and found no significant

difference in hearing outcomes.[8] Tympanoplasty failure is associated with severe middle-ear disorders (including a chronic discharging ear with irreversible mucosal disease), pathology of the malleus handle and stapes arch, revision surgery, atelectasis, cholesteatoma, tympanosclerosis, and Reported tympanoplasty success rates vary. Roger et al. compared

limited posterior cartilage reinforcement and subtotal tympanic reinforcement, and found no post-operative hearing differences.[9] Kazikdas et al. found a 95.7 percent graft success rate for palisade cartilage grafts, compared with 75 per cent for temporalis fascia grafts.1 Finally, in contrast to other authors, Harner reported poorer, but still acceptable, post-operative hearing

levels after chondro-perichondrial grafting.[10] It is important to emphasise that these results relate to cases in which bilaterality of disease was not taken into consideration. In the current study, graft success and hearing results were assessed in patients with bilateral chronic otitis media, a poor prognostic factor for tympanoplasty outcome. At the final clinic visit, 78.75 per cent of ears had healed grafts (65.9 per cent in the fascia group and 92.3 per cent in the cartilage group). Good post-operative hearing was observed for the majority of patients in the cartilage group. This result is somewhat surprising, given that the rigidity and thickness of the cartilage graft could be expected to adversely affect sound conduction through the tympanic membrane. The status of the opposite ear has been widely studied as a prognostic factor for tympanoplasty success. Because eustachian tube function is usually symmetrical, the status of the contralateral ear may predict success when localised mucosal disease is not present.4 Chandrasekhar et al. found no effect of abnormal contralateral ears on healing rates, in a study of 318 tympanoplasties.[11] Similarly, Koch et al. reported no correlation between an abnormal contralateral ear and surgical success, in a limited patient group involving 64 tympanoplasties.[12] Gianoli et al. identified no statistically significant difference, comparing an even smaller group of nine abnormal contralateral ears.[13] However, other investigators have reported that an abnormal contralateral ear represents a negative prognostic factor for tympanoplasty patients. Adkins and White identified a higher tympanoplasty failure rate

in patients with bilateral perforations; in their small group of eight children, three of the four tympanoplasty failures had bilateral perforations.[14] Kessler et al. identified more post-tympanoplasty re-perforations in patients with an abnormal contralateral ear.[15] Caylan et al., Collins et al. and Merenda et al. all reported that contralateral disease was associated with a lower tympanoplasty success rate.[16–18] One of our group's previous studies also indicated that the status of the opposite ear was a negative prognostic factor for tympanoplasty, in a non-homogeneous group of patients.6 On the basis of the present study findings, we believe that the status of the opposite ear may indicate the presence of ongoing bilateral eustachian tube dysfunction, which may lower the success rate of tympanoplasty

surgery performed with temporalis fascia grafting.

Conclusion

Tympanoplasty is not that beneficial in patients with bilateral CSOM; hence, CSOM in both the ears represents a not that good improvement. Whereas in the patients with bilateral CSOM, cartilage graft tympanoplasty seems to have better results, compared with temporalis fascia grafts.

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