

Original Research Article

A COMPARATIVE STUDY OF THE OUTCOMES OF HALF SLICED CONCHAL CARTILAGE VERSUS TEMPORALIS FASCIA GRAFT IN TYPE 1 TYMPANOPLASTY

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ABSTRACT

Background: Tympanoplasty is a surgical procedure established decades ago to restore middle ear function by reconstructing the tympanic membrane. Various graft materials have been used for tympanic membrane repair. Although the temporalis fascia graft is generally preferred, it carries a risk of graft medialization and shrinkage. In comparison, cartilage has been shown to be a more stable and durable material than fascia or perichondrium alone. The aim of this study was to evaluate the graft take-up rate and hearing outcomes between temporalis fascia and conchal cartilage grafts in Type I tympanoplasty.

Materials and Methods: This prospective interventional study was conducted between May 2024 and April 2025 and included 70 patients diagnosed with chronic otitis media (COM), safe type. The patients were divided into two groups: Group A received an autologous temporalis fascia graft, and Group B received a conchal cartilage graft. Postoperative graft integrity and hearing outcomes were assessed and compared.

Results: The differences in postoperative graft survival and hearing improvement between the temporalis fascia and cartilage groups were not statistically significant at any time point.

Conclusion: Both temporalis fascia and half-sliced conchal cartilage grafts are effective and reliable materials for tympanoplasty. However, conchal cartilage grafts may be considered a valuable alternative due to their superior stability and resistance to retraction and medialization.

Keywords: Tympanoplasty, Temporalis fascia, Conchal cartilage, Graft uptake, Hearing outcomes, Chronic otitis media.

INTRODUCTION

Chronic otitis media (COM) is the chronic inflammation of the mucoperiosteal lining of the middle ear cleft. COM is a common cause of morbidity among patients which leads to ear discharge and hearing loss.^[1,2]

Wullstein in 1952 introduced the term tympanoplasty for the first time.^[3]

Tympanoplasty is the surgical procedure which was established since a decades done to restore the

middle ear function by reconstructing the tympanic membrane. Different types of graft materials have been used for tympanic membrane repair such as conchal cartilage, vein, temporalis fascia, tragal cartilage and perichondrium, duramater, ear lobe fat, cadaveric tympanic membrane etc.^[2,4]

Temporalis fascia graft generally preferred because of its easy availability at the site of incision thickness comparable to that of the tympanic membrane, low metabolic rate and a better post-operative compliance of the neo-tympanum. The drawbacks of the Temporalis fascia are the

possibility of graft medialisation and shrinkage in response to negative middle ear pressure and it leads to residual perforation.^[5,6,14]



Figure 1: Harvested temporalis fascia graft.



Figure 2: Sliced conchal cartilage graft.

To overcome the problem of medialisation and shrinking of temporalis fascia graft in large and subtotal perforation, in which cartilage was used to repair the tympanic membrane more useful material in comparison to tympanic membrane fascia, perichondrium alone etc.^[5,6,7]

The aim of this study is to evaluate the graft take-up in Type 1 tympanoplasty using temporalis fascia and conchal cartilage grafts. The objectives include comparing the graft take-up rate between temporalis fascia and conchal cartilage grafts, assessing the hearing outcomes in both groups.

MATERIALS AND METHODS

This hospital-based study will be conducted in the Department of Otorhinolaryngology at Varun Arjun Medical College and Rohilkhand Hospital, Shahjahanpur, Uttar Pradesh. It is designed as a prospective randomized controlled trial and will include consenting patients with chronic otitis media (mucosal type) presenting to the ENT outpatient department and undergoing Type 1 tympanoplasty from May 2024 to April 2025. The study will be conducted over a period of 12 months after obtaining approval from the Institutional Ethics

Committee. A total of 70 patients will be included and randomly divided into two groups, with 35 patients in each group.

A simple random sampling method will be used. The inclusion criteria consist of patients aged 12–60 years with chronic otitis media (mucosal type), conductive hearing loss of less than 40 dB, and a dry ear for at least six weeks. Exclusion criteria include patients with uncontrolled diabetes mellitus, systemic hypertension, bleeding diathesis, coronary artery disease, mixed hearing loss and Revision surgery.

For all selected patients, after obtaining written informed consent, a detailed history will be taken, followed by a complete clinical examination. Routine investigations such as biochemical and haematological tests, pure tone audiometry (PTA), and X-ray bilateral mastoids (Schuller's view) will be conducted for all patients. Special investigations, including otoendoscopy, will be performed in all cases. Any associated medical conditions such as hypertension, diabetes, or anemia will be managed before surgery in consultation with a physician. Patients will then be randomly assigned to Group A (temporalis fascia graft) or Group B (conchal cartilage graft). They will be monitored from the time of admission until discharge and followed up in the outpatient department. Various parameters, including age, sex, hearing loss, and tympanic membrane perforation size, will be analysed. The surgical procedure involves Type 1 tympanoplasty using the underlay technique. Group A will receive an autologous temporalis fascia graft, while Group B will receive a conchal cartilage graft. Surgery will be performed under general or local anaesthesia. Both groups will receive antibiotics as per departmental protocol. Follow-up assessments will be conducted at the 4th, 8th weeks and 12week, to evaluate graft uptake via otoendoscopy and hearing levels via PTA. Patients lost to follow-up will be contacted via phone, and additional patients will be recruited if necessary to meet the required sample size. Data will be collected using a structured proforma.

Data Analysis

Data will be collected and stored on a password-protected computer. Analysis will be performed using SPSS software version 27.0. Categorical variables such as gender, postoperative infection rate, and graft uptake will be presented as frequency and percentage, while age will be expressed as mean $\pm$ standard deviation and analysed using the independent Student's t-test. Continuous variables, including dry ear duration and perforation size, will be categorized and analysed using the Chi-square test. Statistical analysis will be conducted using SPSS 27.0, with a p-value < 0.05 considered significant.

RESULTS

Table 1: Demographics Profile of the patients

Parameter	Group A	Group B	P-value
Male	15	18	P= 0.47
Female	20	17	
Rural	20	22	P= 0.62
Urban	15	13	

The demographic characteristics were comparable between Group A and Group B. Group A included 15 males and 20 females, while Group B had 18 males and 17 females. The difference in gender distribution between the groups was not statistically significant (P = 0.47).

Regarding the place of residence, Group A had 20 patients from rural areas and 15 from urban areas, while Group B had 22 rural and 13 urban patients. This difference was also not statistically significant (P = 0.62).

Table 2: Clinical characteristics of the patients

		Group A	Group B	P-value
Perforation side	Right	16	14	P=0.89
	Left	12	13	
	Bilateral	7	8	
Perforation type	Central small	14	17	P=0.66
	Central medium	16	15	
	Central large	5	3	

The clinical characteristics of patients were similar in both groups. Regarding the side of tympanic membrane perforation, Group A had 16 right-sided, 12 left-sided, and 7 bilateral cases, while Group B had 14 right-sided, 13 left-sided, and 8 bilateral cases. The difference in perforation side distribution between the groups was not statistically significant (P = 0.89).

In terms of perforation type, Group A included 14 patients with small central perforations, 16 with medium, and 5 with large perforations. Group B included 17 small, 15 medium, and 3 large central perforations. There was no statistically significant difference in the distribution of perforation types between the groups (P = 0.66).

Table 3: Postoperative graft survival rates

Time post-operation	Group A	Group B	P-value
4 weeks	33	34	P = 0.56
8 weeks	32	34	P= 0.30
12 weeks	32	34	P= 0.30

Graft survival rates were high in both groups at all follow-up intervals. At 4 weeks postoperatively, graft uptake was observed in 33 patients in Group A and 34 patients in Group B (P = 0.56). At 8 weeks, the graft was intact in 32 patients in Group A and 34

in Group B (P = 0.30). The same rates were maintained at 12 weeks (P = 0.30).

These results indicate that the differences in postoperative graft survival between Group A and Group B were not statistically significant at any time point.

Table 4: Comparison between pre-operative and post-operative AB Gap in both the groups

Tympanoplasty	N	Mean preoperative AB Gap (dB)	Mean postoperative AB gap (dB) at 12 th week	Mean audio logical gain (dB) at 12 th week	P-Value
Group A	35	32.30± 2.64	15.80±2.12	16.50±2.12	P= 0.06
Group B	35	30.20±1.48	15.30±1.25	14.90±1.45	

The mean preoperative air-bone gap (ABG) in Group A was 32.30 ± 2.64 dB, which improved to 15.80 ± 2.12 dB postoperatively at 12th week, yielding a mean audiological gain of 16.50 ± 2.12 dB. In Group B, the mean preoperative ABG was 30.20 ± 1.48 dB, which improved to 15.30 ± 1.25 dB postoperatively at 12th week, with a mean gain of 14.90 ± 1.45 dB.

Although both groups demonstrated significant improvement in hearing thresholds postoperatively,

the difference in audiological gain between Group A and Group B was not statistically significant (P = 0.06).

DISCUSSION

The present study aimed to compare the outcomes of half-sliced conchal cartilage versus temporalis fascia graft in Type 1 tympanoplasty, focusing on graft take-up rate and hearing improvement. Our

findings contribute to the ongoing debate regarding the ideal graft material for tympanic membrane reconstruction in chronic otitis media (COM), especially the mucosal (safe) type.

In our study, both graft materials showed high graft survival rates. At 12 weeks, graft uptake was observed in 32 patients (91.4%) in the temporalis fascia group (Group A) and 34 patients (97.1%) in the conchal cartilage group (Group B), a difference that was not statistically significant ($P = 0.30$). These results are consistent with earlier literature. Venkatesan et al. (2021), Iacovou et al., (2012) reported similar graft uptake rates for cartilage and temporalis fascia, suggesting that both are reliable materials for tympanic membrane repair in safe COM.^[2,11]

The slightly higher uptake seen with cartilage grafts in our study could be attributed to their greater resistance to middle ear pressure changes and reduced risk of shrinkage, as also highlighted by Chhapola et al (2012), who regarded cartilage-perichondrium as an ideal graft due to its structural resilience.^[10] This characteristic becomes particularly important in cases with large or subtotal perforations, where fascia may tend to retract or medialize postoperatively.^[1,2]

Regarding hearing outcomes, Group A demonstrated a mean audiological gain of 16.5 ± 2.12 dB, while Group B showed a gain of 14.9 ± 1.45 dB at 12th week. Although the improvement was slightly greater with temporalis fascia, the difference was not statistically significant ($P = 0.06$). This observation is consistent with the findings of Khan M.M. et al. (2015) and Onal K. et al. (2011), Lee JC et al (2012) who reported better hearing outcomes with temporalis fascia grafts, attributing it to the thinner and more compliant nature of the fascia, which more closely replicates the acoustic properties of the native tympanic membrane.^[6,13,15]

However, the concern with temporalis fascia remains its tendency to atrophy, medialize, or undergo fibrosis, particularly in cases with Eustachian tube dysfunction or negative middle ear pressure. This was observed in our study as well, where despite marginally better hearing outcomes, fascia showed a slightly lower graft retention rate than cartilage. Similar observations were made by Jain et al. (2018), who emphasized that cartilage, despite being thicker and slightly less acoustically favourable, offers long-term graft stability and is especially useful in revision cases or in ears with poor middle ear environment.^[3,7,12]

In addition, our results correlate with the study by Swuro et al. (2023), who evaluated reinforced sliced cartilage versus fascia and concluded that cartilage offered a higher success rate in anatomical integrity, while hearing gains were comparable.^[5] This further validates the use of half-sliced cartilage, as adopted in our study, to balance the acoustic advantages of thinner grafts with the structural advantages of cartilage.

Overall, our study suggests that both temporalis fascia and conchal cartilage grafts are effective in Type 1 tympanoplasty, with the fascia being slightly superior for hearing outcomes and cartilage providing better long-term graft integrity. Surgeons should make graft choices based on individual patient factors such as perforation size, Eustachian tube function, revision status, and middle ear pathology.

Limitations

One limitation of this study is the relatively short follow-up period. A longer duration would provide more insight into long-term graft survival and late complications such as retraction or re-perforation. Additionally, slicing thickness was standardized intraoperatively but may have introduced variability in the cartilage group. Future studies with larger sample sizes, longer follow-ups, and acoustic impedance measurements would further strengthen the evidence base.

CONCLUSION

This comparative study demonstrates that both temporalis fascia and half-sliced conchal cartilage grafts are effective and reliable materials for Type 1 tympanoplasty. While hearing outcomes were marginally better with temporalis fascia, the conchal cartilage graft showed a slightly higher, though statistically insignificant, graft uptake rate and structural stability. Therefore, conchal cartilage graft can be considered a valuable alternative, particularly in cases where structural integrity is paramount.

REFERENCES

1. Chhabra G, Saxena AK, Kumar S. Comparative study of temporalis fascia graft versus cartilage shield tympanoplasty. *International Journal of Otorhinolaryngology and Head and Neck Surgery*. 2018 Jun 23;4(4):951. doi:10.18203/issn.2454-5929.ijohns20182019.
2. Venkatesan D, Umamaheswaran P, Vellikannu R, Kannan S, Sivaraman A, Ramamurthy S. A comparative study of temporalis fascia graft and full thickness tragal island cartilage graft in type 1 tympanoplasty. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2021 Feb 19;74(S1):619–23. doi:10.1007/s12070-021-02459-2
3. Jain A, Samdani S, Sharma MP, Meena V. Island cartilage vs temporalis fascia in type 1 tympanoplasty: A prospective study. *Acta Otorrinolaringológica Española*. 2018 Nov;69(6):311–7. doi:10.1016/j.otorri.2017.10.004
4. Vashishth A, Mathur NN, Choudhary SR, Bhardwaj A. Clinical advantages of cartilage palisades over temporalis fascia in type I tympanoplasty. *Auris Nasus Larynx*. 2014 Oct;41(5):422–7. doi:10.1016/j.anl.2014.05.015
5. Swuro V, Aggarwal A, Bhagat S, Sahni D, Sharma D, Yadav V, et al. A comparative evaluation of graft uptake and audiological results of temporalis fascia graft vs reinforced sliced tragal cartilage in type 1 tympanoplasty. *International Journal of Otorhinolaryngology and Head and Neck Surgery*. 2023 Jun 26;9(7):556–60. doi:10.18203/issn.2454-5929.ijohns20231813
6. Khan MM, Parab SR. Comparative study of sliced tragal cartilage and temporalis fascia in type I tympanoplasty. *J Laryngol Otol*. 2015 Jan;129(1):16–22. doi:10.1017/S0022215114003132. Epub 2015 Jan 20. PMID: 25602596.

7. Jain A, Samdani S, Sharma MP, Meena V. Island cartilage vs temporalis fascia in type I tympanoplasty: A prospective study. *Acta Otorrinolaringol Esp (Engl Ed)*. 2018 Nov-Dec;69(6):311-317. English, Spanish. doi: 10.1016/j.otorri.2017.10.004. Epub 2018 Mar 22. PMID: 29576202.
8. Rathaur SK. Comparative study of outcomes of type-I tympanoplasty with temporalis fascia only and with cartilage slice reinforcement. *Int J Otorhinolaryngol Head Neck Surg* 2020;6:1162-6.
9. Vadiya S, Parikh V, Shah S, Pandya P, Kansara A. Comparison of Modified Cartilage Shield Tympanoplasty with Tympanoplasty Using Temporalis Fascia Only: Retrospective Analysis of 142 Cases. *Scientifica (Cairo)*. 2016;2016:8092328. doi: 10.1155/2016/8092328. Epub 2016 Jul 31. PMID: 27559489; PMCID: PMC4983392.
10. Chhapola S, Matta I. Cartilage-perichondrium: an ideal graft material? *Indian J Otolaryngol Head Neck Surg*. 2012 Sep;64(3):208-13. doi: 10.1007/s12070-011-0306-7. Epub 2011 Sep 4. PMID: 23998021; PMCID: PMC3431517.
11. Iacovou E, Vlastarakos PV, Papacharalampous G, Kyrodimos E, Nikolopoulos TP. Is cartilage better than temporalis muscle fascia in type I tympanoplasty? Implications for current surgical practice. *Eur Arch Otorhinolaryngol*. 2013 Nov;270(11):2803-13. doi: 10.1007/s00405-012-2329-4. Epub 2013 Jan 16. PMID: 23321796.
12. Altuna X, Navarro JJ, Algaba J. Island cartilage tympanoplasty in revision cases: anatomic and functional results. *Eur Arch Otorhinolaryngol*. 2012 Oct;269(10):2169-72. doi: 10.1007/s00405-011-1875-5. Epub 2011 Dec 7. PMID: 22146865.
13. Onal K, Arslanoglu S, Songu M, Demiray U, Demirpehlivan IA. Functional results of temporalis fascia versus cartilage tympanoplasty in patients with bilateral chronic otitis media. *J Laryngol Otol*. 2012 Jan;126(1):22-5. doi: 10.1017/S0022215111002817. Epub 2011 Oct 28. PMID: 22032518.
14. Mundra RK, Sinha R, Agrawal R. Tympanoplasty in subtotal perforation with graft supported by a slice of cartilage: a study with near 100 % results. *Indian J Otolaryngol Head Neck Surg*. 2013 Dec;65(Suppl 3):631-5. doi: 10.1007/s12070-013-0673-3. Epub 2013 Aug 3. PMID: 24427728; PMCID: PMC3889364.
15. Lee JC, Lee SR, Nam JK, Lee TH, Kwon JK. Comparison of different grafting techniques in type I tympanoplasty in cases of significant middle ear granulation. *Otol Neurotol*. 2012 Jun;33(4):586-90. doi: 10.1097/MAO.0b013e31824b78ba. PMID: 22429943.
16. Vashishth A, et al. Clinical advantages of cartilage palisades over temporalis fascia in type I tympanoplasty. *Auris Nasus Larynx* (2014), <http://dx.doi.org/10.1016/j.anl.2014.05.015>.