

## Comparison Between Tragal Cartilage With Perichondrium and Temporalis Fascia Graft in Type 1 Tympanoplasty

Tallat Najeeb<sup>1</sup>, Nisa Siddiqui<sup>2</sup>, Azam Khan<sup>3</sup>, Saleem Ahmed<sup>4</sup>, Abdul Hameed Bhatti<sup>4</sup>

1: Department of ENT PAF Hospital, Islamabad.

2: Department of Radiology, CDA Hospital Islamabad

3: Department of Ophthalmology, PAF Hospital, Islamabad, Pakistan.

4: Department of Anaesthesia PAF Hospital, Islamabad.

---

### ABSTRACT

**Objective:** To compare the efficacy of Tragal Cartilage Tympanoplasty (TC) and conventional Temporalis Fascia (TF) Tympanoplasty in terms of graft uptake and hearing outcomes.

**Methodology:** This cross-sectional study was conducted in the Department of Otorhinolaryngology at Fazaia Medical College (FMC), PAF Hospital, Islamabad, from December 2020 to January 2025. A total of 90 patients with mucosal-type chronic suppurative otitis media (CSOM) were enrolled and categorized into two groups: Group A (46 patients undergoing Tympanoplasty with TF graft) and Group B (44 patients undergoing tympanoplasty with TC and perichondrium graft). All patients of CSOM who met the inclusion criteria underwent comprehensive preoperative assessments, including otoscopy, tuning fork tests, Valsalva maneuver, fistula test, and facial nerve integrity. Pure tone audiometry (PTA) was performed to measure hearing levels. Type I tympanoplasty, using TF for Group A and TC with perichondrium for Group B. Postoperative outcomes were evaluated, with hearing thresholds via PTA at 3 and 6 months. Data were analyzed using SPSS version 22, with statistical significance defined as a  $p$ -value  $<0.05$ .

**Results:** We evaluated 90 patients; 46 in Group A and 44 in Group B. Preoperative mean hearing loss was approximately 30 dB in Group A and 35 dB in Group B. Type I Tympanoplasty was performed either microscopically or endoscopically. Success rates of graft uptake was 95.65% for Group A and 95.45% for Group B, indicating no statistical significance. However, hearing improvement, was greater in Group B (20 dB) compared to Group A. Statistically significant difference was observed ( $P<0.05$ ).

**Conclusion:** TC with perichondrium is more effective in achieving  $\geq 20$  dB air-bone gap (AB gap) closure compared to TF.

**Keywords:** Cartilage, Temporalis fascia, Tympanoplasty

---

### INTRODUCTION

Tympanic membrane (TM) perforations have a definite risk to the health of the patients.<sup>1</sup> The common causes of perforations are acute otitis media<sup>2</sup> and chronic otitis media with or without cholesteatoma. Less commonly it can be a complication of grommet insertion (in approximately 3-5% of cases) or barotrauma.<sup>3</sup>

Long standing perforations can lead to conductive hearing impairment primarily but potentially sensorineural in some instances.<sup>1</sup>

Zollner and Wullstein are pioneers of tympanoplasty surgeons, they used temporalis fascia and since then, it has become the traditional graft material of choice.<sup>2,4</sup> For chronic otitis media tympanoplasty, a surgical procedure that repairs the tympanic membrane and middle ear ossicles, is a well-established treatment.<sup>1,5</sup>

Although various graft materials like

---

Corresponding Author:

Prof Dr Tallat Najeeb

Department of ENT PAF Hospital, Islamabad

Email: tallatnajeeb@yahoo.com

---

perichondrium, periosteum, vein, cartilage, and other fasciae, have been used, but temporalis fascia has been a popular choice due to its easy accessibility, low metabolic rate and plenty of availability. However, shrinking and medialization leading to retraction pockets and failure are not very uncommon.<sup>2,6</sup> Utech, first introduced cartilage in 1959, now becoming popular with the advent of endoscopic Tympanoplasty. Its advantages are rigidity, easy handling, late resorption and avoiding post-auricular scars and pain, becoming the preferred graft material for endoscopic surgeons.<sup>1,2,7</sup>

Studies have statistically proved that cartilage, particularly sliced cartilage, yields similar outcomes to temporalis fascia regarding hearing improvement and graft uptake.<sup>3,8</sup> This study aims to compare the efficacy of sliced cartilage and temporalis fascia in Tympanoplasty in terms of graft uptake and hearing outcomes, by comparing with previous research using cartilage and temporalis fascia in tympanoplasty.

## MATERIALS AND METHODS

This retrospective cross-sectional study was conducted in the Department of Otorhinolaryngology at Fazaia Medical College, PAF Hospital, Islamabad, from December 2020 to January 2025. Total ninety patients with mucosal-type chronic suppurative otitis media (CSOM) were included and divided into two groups: Group A (46 patients undergoing Tympanoplasty with temporalis fascia graft) and Group B (44 patients undergoing Tympanoplasty with tragal cartilage and perichondrium graft).

All the patients presenting to the ENT outpatient department with mucosal-type CSOM, who fulfilled the inclusion criteria were included. Inclusion criteria were: mucosal-type CSOM with small or medium central perforation, conductive hearing loss  $\leq 40$  dB, patent Eustachian tube, no nasal or nasopharyngeal pathology, and a minimum follow-up of 6 months and also without preoperative comorbidities such as

diabetes. Exclusion criteria included pre-existing comorbidities, large or total perforations, conductive hearing loss  $>40$  dB, blocked Eustachian tube, or follow-up of less than 6 months.

Complete preoperative assessments were done, including otoscopy to evaluate the tympanic membrane, middle ear mucosa, and ossicles. Additional tests included tuning fork tests, Valsalva maneuver, fistula test, and facial nerve assessments. Pure tone audiometry (PTA) with masking was used to measure hearing levels, and X-rays of the mastoid and paranasal sinuses were performed to exclude nasal pathology and mastoiditis.

Type I Tympanoplasty was performed either endoscopically or microscopically, using temporalis fascia grafts for Group A and tragal cartilage with perichondrium grafts for Group B. In cases of dry perforations, type I Tympanoplasty alone was performed; for wet ears, cortical mastoidectomy was preferred alongside type I Tympanoplasty. Postoperative outcomes were assessed for graft uptake and hearing improvement, with hearing thresholds measured on PTA at frequencies 250, 500, 1000, and 2000 Hz at 3- and 6-months periods of follow up. Data were analyzed using SPSS version 22, with statistical significance defined as a  $p$ -value  $<0.05$ .

## RESULTS

In this study 90 patients were included (41 were males and 49 females), with 46 patients

in Group A (Tympanoplasty with temporalis fascia graft) and 44 in Group B (Tympanoplasty with tragal cartilage and perichondrium graft). Preoperative mean hearing loss was approximately 30 dB in Group A and 35 dB in Group B. Type I Tympanoplasty, with or without cortical mastoidectomy, was performed either microscopically or endoscopically.

Success of the surgery was assessed on the

basis of graft uptake and hearing improvement. Graft uptake results are presented in Table I, and hearing improvement results in Table II. Graft uptake rates were comparable between temporalis fascia and tragal cartilage grafts. Success rates (95.65% for Group A vs. 95.45% for Group B) showed a 0.20% difference. Fisher's Exact Test yields a  $p$ -value  $> 0.05$ , indicating no statistical significance.

However, hearing improvement, measured as mean air-bone gap closure, was greater in Group B (20 dB) compared to Group A. Statistical analysis using Fisher's Exact Test confirmed significant difference ( $p < 0.05$ ). Indicating tragal cartilage with perichondrium (Group B) is more effective in achieving  $\geq 20$  dB AB gap closure compared to temporalis fascia (Group A).

## DISCUSSION

Temporalis fascia (TF) graft failures often result from retraction pockets due to lack of rigidity, infection, and technical errors.<sup>9,10</sup> Moreover, TF grafts can shrink, atrophy, or undergo unpredictable changes due to poor stability, increasing the risk of failure.<sup>2,3,9</sup> In contrast, cartilage grafts are more rigid to retraction and take more time for resorption, making them a popular choice for tympanic membrane reconstruction.<sup>11,12,13</sup> However, there is no clear

consensus on audiological outcomes due to thickness and rigidity of cartilage grafts.<sup>1,10,14</sup>

Our study evaluated graft success based on uptake and hearing improvement. Although both graft materials showed similar perforation closure rates, but TC demonstrated significantly better audiological outcomes. These findings compared with previous research, including a meta-analysis by Kai Chen and Rui Zhao in 2022, which found that TC compared with TF grafts were better in both graft uptake and postoperative hearing improvement. However, some studies have reported mixed results, with significant differences only in hearing improvement, not graft uptake.<sup>1,11,15</sup>

Another study published in the Pak Armed Forces Med J in 2021, found that both TC with perichondrium and TF grafts achieved comparable success rates in endoscopic Tympanoplasty.<sup>3,9,16</sup> Similarly, research by Raghav Mehta et al. in Jaipur, India, concluded that TC and TF grafting have similar audiological outcomes.<sup>8,17</sup> However, TC grafts demonstrated a higher successful uptake rate due to their elasticity and resistance to resorption and retraction under negative middle ear pressure.

## CONCLUSION

In conclusion, our study found that cartilage with

**Table I:** Graft Uptake in TF and TC

| Sr. No. | Total Number of Patients | Type of Graft                            | Graft Uptake | Hearing Improvement |
|---------|--------------------------|------------------------------------------|--------------|---------------------|
| Group A | 46                       | Temporalis Fascia                        | 44           | 95.65%              |
| Group B | 44                       | Tragal Cartilage and Perichondrium Graft | 42           | 95.45%              |

**Table II:** Hearing Improvement with TF and TC

| Sr. No. | Total Number of Patients | Type of Graft                            | Average Preop Hearing Loss | Patients with 20dB Hearing Improvement | Hearing Improvement |
|---------|--------------------------|------------------------------------------|----------------------------|----------------------------------------|---------------------|
| Group A | 46                       | Temporalis Fascia                        | 30dB                       | 38                                     | 82.5%               |
| Group B | 44                       | Tragal Cartilage and Perichondrium Graft | 35dB                       | 42                                     | 95.45%              |

perichondrium yields better functional outcomes, while both cartilage and temporalis fascia grafts have similar success rates in closing perforations but TC is better in achieving improved audiological results.

## REFERENCES

1. Çayır S, Kayabaşı S. Type 1 tympanoplasty in pediatric patients: Comparison of fascia and perichondrium grafts. *Int J Pediatr Otorhinolaryngol* 2019; 121(1):95-8.
2. Ayman A, Abdel H, Ahmed H, et al. Comparative study between fascia lata and temporalis fascia in myringoplasty. *EJO* 2020; 36:48. <https://doi.org/10.1186/s43163-020-00052-y>.
3. Tahir M, Asim A, Faiz Ul Hassan N, Syed Asad S, et al. Comparison between tragal cartilage with perichondrium and temporalis fascia graft by underlay endoscopic tympanoplasty. *Pak Armed Forces Med J* 2021; 71(Suppl-3):S622.
4. Chen K, Zhao R. Comparison of cartilage and temporalis fascia grafts in type 1 tympanoplasty: A meta-analysis. *Ear Nose Throat J* 2025; 104(8):476-89. doi: 10.1177/01455613221137122. Epub 2022 Oct 27.
5. Xing C, Liu H, Li G, Li J, Li X. Type 1 tympanoplasty in patients with large perforations: Comparison of temporalis fascia, partial-thickness cartilage, and full-thickness cartilage. *J Int Med Res*. 2020; 48(8):300060520945140. doi: 10.1177/0300060520945140.
6. Bayram A, Bayar Muluk N, Cingi C, Bafaqeeh SA. Success rates for various graft materials in tympanoplasty- A review. *J Otol* 2020; 15(3):107-11.
7. Shakya D, Nepal A. Long-term results of type I tympanoplasty with perichondrium reinforced cartilage palisade vs temporalis fascia for large perforations: A retrospective study. *J Otol*. 2021; 16(1):12-7.
8. Raghav M, Pradeep P, Mohit P, Mukesh D, Pandey S. Comparative study of cartilage tympanoplasty with temporalis fascia tympanoplasty. *Int J of Otorhinolaryngol Head Neck Surg* 2019; 5(6):1543-47.
9. Ovet G, Alatas N, Senturk M, et al. Pediatric type 1 cartilage tympanoplasty: comparison between graft success rates and hearing results in adults. *J Int Adv Otol* 2016; 12:257-60.
10. Yuksel AN, Gurkan S, Aslier M, et al. Sound energy absorbance characteristics of cartilage grafts used in type 1 tympano plasty. *Auris Nasus Larynx* 2018; 45:985-93.
11. Ferlito S, Fadda G, Lechien JR, Cammaroto G, Bartel R, Borello A, et al. Type 1 Tympanoplasty Outcomes between Cartilage and Temporal Fascia Grafts: A Long-Term Retrospective Study. *J Clin Med* 2022; 11(23):7000. doi: 10.3390/jcm11237000.
12. Reynders M, Philips D. Outcomes of Tympanoplasty with an Autologous Two-Piece Perichondrium-Cartilage Graft in a Tertiary Care Setting. *J Clin Med* 2025; 14(8):2600. doi: [10.3390/jcm14082600](https://doi.org/10.3390/jcm14082600).
13. England RJ, Strachan DR, Buckley JG. Temporalis fascia grafts shrink. *J Laryngol Otol* 1997; 111:707-708. doi: 10.1017/S0022215100138423.
14. Indorewala S, Pagare R, Aboojiwala S, Barpande S. Dimensional stability of the free fascia grafts: A human study. *Laryngoscope* 2004; 114:543-47. doi: 10.1097/00005537-200403000-00029.
15. Kim AS, Betz JF, Reed NS, Ward BK, Nieman CL. Prevalence of Tympanic Membrane Perforations Among Adolescents, Adults, and

- 
- Older Adults in the United States. *Otolaryngol Head Neck Surg.* 2022; 167:356–58. doi: 10.1177/01945998211062153.
16. Prinja, Sumit K, Kuldeep S, Gurbax B. Comparison of the Functional and Audiological Success of Temporalis Fascia and Tragal Perichondrium as a Graft in Type 1 Tympanoplasty. *Indian J Otol* 2023; 29(4):234-38 DOI: 10.4103/indianjotol.indianjotol\_59\_23.
17. Umair I, Sadia Ch, Mahwash U, et al. A comparative study of Type-I underlay tympanoplasty using temporalis fascia graft versus tragal cartilage. *RMJ* 2023; 48(3):735-38.