

Comparative Study between Temporalis Fascia and Tragal Cartilage with Perichondrium as Graft Material Used in Type I Tympanoplasty**Ayanangshu Jana¹, Somnath Ray², Saheli Ghosh³, Dwaipayan Mukherjee⁴, Ajoy Kumar Khaowas⁵**¹Final Year Post Graduate Trainee, Department of ENT, KPC Medical College and Hospital, Kolkata²Senior Resident, Department of ENT, KPC Medical College and Hospital, Kolkata³Senior Resident, Department of ENT, NRS Medical College and Hospital, Kolkata⁴Professor and HOD, Department of ENT, KPC Medical College and Hospital, Kolkata⁵Associate Professor, Department of ENT, KPC Medical College and Hospital, Kolkata

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Conflict of interest: Nil

Abstract:**Introduction:** Type I Tympanoplasty is a surgical procedure designed to repair tympanic membrane perforations and restore hearing by using autologous graft materials. Among the commonly used grafts are temporalis fascia and tragal cartilage with perichondrium, both of which possess distinct structural and functional properties.**Aim:** To compare the surgical outcomes of Type I Tympanoplasty using temporalis fascia and tragal cartilage with perichondrium as graft materials in patients with chronic otitis media (COM) with tympanic membrane perforation.**General Objective:** To evaluate the effectiveness of temporalis fascia and tragal cartilage with perichondrium in terms of graft uptake and hearing improvement in patients undergoing Type I Tympanoplasty.**Specific Objective:** (1) To compare the graft uptake success rates between temporalis fascia and tragal cartilage with perichondrium using otoscopic findings post-surgery. (2) To assess and compare the hearing improvement between the two graft materials using pre- and post-operative pure tone audiometric findings at 1 and 3 months post-surgery.

These objectives aim to identify the most suitable graft material for Type I Tympanoplasty, providing evidence-based guidance for optimizing surgical management of chronic otitis media with tympanic membrane perforation.

Type of study: Prospective, comparative hospital based observational study.**Study Design & Setting:** This study is a prospective, comparative hospital-based observational study aimed at comparing temporalis fascia and tragal cartilage with perichondrium as graft materials in Type I tympanoplasty.**Study Duration:** The study spans a duration of 13 months, from November 1st, 2023, to November 30th, 2024.**Study Place:** The ENT Department of KPC Medical College and Hospital, Kolkata.**Study Population:** The study population consists of patients aged 18-59 years diagnosed with mucosal chronic otitis media (COM) presenting with tympanic membrane perforation.**Sample size:** Total sample size is 82 patients, with 41 patients in the temporalis fascia group and 41 patients in the tragal cartilage group done by systemic random sampling.**Result:** Graft uptake was successful in the majority of cases, with slightly higher success observed in the tragal cartilage with perichondrium group (97.6%) compared to the temporalis fascia group (95.1%). Failure rates were low in both groups, at 4.9% for temporalis fascia and 2.4% for tragal cartilage, indicating the reliability of both materials for tympanoplasty. The pre-op ABG was similar in both groups, with the temporalis fascia group having a mean of 25.5 dB and the tragal cartilage with perichondrium group showing a slightly higher mean of 26.1 dB. At 1 month post-operation, the mean ABG was 12.7 dB in the temporalis fascia group and 11.7 dB in the tragal cartilage group. Both groups showed similar median ABG values (11 dB) and overlapping confidence intervals, indicating comparable outcomes. At 3 months post-operation, the mean ABG was slightly higher in the temporalis fascia group (16.2 dB) compared to the tragal cartilage group (15.4 dB). Both groups demonstrated similar median ABG values (15 dB and 14 dB, respectively) and overlapping confidence intervals, indicating comparable hearing outcomes.**Conclusion:** In terms of graft uptake, it was found that tragal cartilage with perichondrium was found to be better than temporalis fascia and in terms of hearing outcome it was found to be comparable between the two.**Keywords:** Cartilage, Graft materials, Perichondrium, temporalis fascia, Tympanoplasty.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

The ear is a complex sensory organ responsible for hearing and balance. It is divided into three main parts: the external ear, the middle ear, and the inner ear. Each part plays a distinct role in the process of sound transmission and maintaining equilibrium. [1]

The vestibule and semicircular canals are integral to balance and spatial orientation. They contain specialized sensory cells that detect changes in head position and movement, sending information to the brain to maintain posture and equilibrium. Together, the ear and its intricate structures facilitate hearing and balance, underscoring their essential role in daily life and interaction with the environment. [2]

Type I Tympanoplasty is a surgical procedure designed to repair tympanic membrane perforations and restore hearing by using autologous graft materials. Among the commonly used grafts are temporalis fascia and tragal cartilage with perichondrium, both of which possess distinct structural and functional properties. [1]

This study compares the efficacy of temporalis fascia and tragal cartilage with perichondrium as graft materials in Type I Tympanoplasty, focusing on graft uptake success and hearing improvement. The findings aim to guide surgeons in selecting the most appropriate graft material tailored to individual patient needs. [4]

Type I tympanoplasty, or myringoplasty, is a well-established surgical intervention to repair tympanic membrane perforations, aiming to restore the structural integrity of the eardrum and improve hearing. The success of tympanoplasty largely depends on the choice of graft material, its biocompatibility, stability, and ability to ensure optimal hearing outcomes. Two of the most widely used graft materials in Type I tympanoplasty are temporalis fascia and tragal cartilage with perichondrium.

Temporalis Fascia: Known for its thin, pliable nature and acoustic similarity to the tympanic membrane, temporalis fascia is considered the gold standard graft material. However, its use has limitations in cases of large, anteriorly located perforations and in conditions where the middle ear is prone to retraction or adhesive changes.

Tragal Cartilage with Perichondrium: Cartilage, reinforced with its perichondrium, is preferred for its stiffness, durability, and resistance to retraction. It is particularly advantageous in patients with recurrent perforations, Eustachian tube dysfunction, or large perforations. However, its acoustic properties and potential impact on hearing outcomes compared to temporalis fascia remain areas of active debate.

This underscores the need for a comprehensive study to directly compare these graft materials in terms of graft uptake success, evaluated through otoscopic findings, and hearing outcomes assessed via Pure Tone Audiometry. By addressing these gaps, the proposed study aims to provide evidence-based recommendations to optimize surgical decision-making and improve outcomes for patients with chronic otitis media undergoing tympanoplasty.

Aims and Objectives

Aim: To compare the surgical outcomes of Type I Tympanoplasty using temporalis fascia and tragal cartilage with perichondrium as graft materials in patients with chronic otitis media (COM) with tympanic membrane perforation.

Objectives

General Objective: To evaluate the effectiveness of temporalis fascia and tragal cartilage with perichondrium in terms of graft uptake and hearing improvement in patients undergoing Type I Tympanoplasty.

Specific Objective

1. To compare the graft uptake success rates between temporalis fascia and tragal cartilage with perichondrium using otoscopic findings post-surgery.
2. To assess and compare the hearing improvement between the two graft materials using pre- and post-operative pure tone audiometric findings at 1 and 3 months post-surgery.

These objectives aim to identify the most suitable graft material for Type I Tympanoplasty, providing evidence-based guidance for optimizing surgical management of chronic otitis media with tympanic membrane perforation.

Materials and Methods

Type of study: Prospective, comparative hospital based observational study.

Study Design & Setting: This study is a prospective, comparative hospital-based observational study aimed at comparing temporalis fascia and tragal cartilage with perichondrium as graft materials in Type I tympanoplasty.

Study Duration: The study spans a duration of 13 months, from November 1st, 2023, to November 30th, 2024.

Study Place: The ENT Department of KPC Medical College and Hospital, Kolkata.

Study Population: The study population consists of patients aged 18-59 years diagnosed with mucosal chronic otitis media (COM) presenting with tympanic membrane perforation.

Sample Size: The sample size required per group is approximately 41 patients. Therefore, the total sample size for the study will be $41 \times 2 = 82$ patients, with 41 patients in the temporalis fascia group and 41 patients in the tragal cartilage group.

To determine the sample size required for this study, we use the formula for comparing two proportions:

$$n = \frac{2(Z_{\alpha/2} + Z_{\beta})^2 \cdot p(1-p)}{(p_1 - p_2)^2}$$

Where:

- n: Sample size for each group.
- $Z_{\alpha/2}$: Z-score for the desired level of significance (two-tailed). For a 5% significance level, $Z_{\alpha/2} = 1.96$.
- Z_{β} : Z-score for the desired power of the study ($1-\beta$). For 80% power, $Z_{\beta} = 0.84$.
- p_1 : Proportion of successful graft uptake with temporalis fascia.
- p_2 : Proportion of successful graft uptake with tragal cartilage with perichondrium.
- p: Pooled proportion, calculated as $p = (p_1 + p_2)/2$

Sampling Methodology

The study includes a total of 82 patients, systematically divided into two groups of 41 patients each:

1. Group A: Patients undergoing Type I tympanoplasty using temporalis fascia as the graft material.
2. Group B: Patients undergoing Type I tympanoplasty using tragal cartilage with perichondrium as the graft material.

A systematic random sampling method was used to select patients from the outpatient department

(OPD) of the ENT Department at KPC Medical College and Hospital, Kolkata. The aim was to ensure a representative and unbiased selection of participants over the 11-month data collection period, from December 2023 to October 2024.

Inclusion Criteria

1. Patients aged 18 to 59 years.
2. Diagnosis of mucosal chronic otitis media.
3. No ear discharge for at least 6 weeks before surgery.
4. Patients consenting to surgery and participation in the study.

Exclusion Criteria

1. Patients unfit for surgery.
2. Traumatic tympanic membrane perforation.
3. Squamous variety of chronic otitis media.
4. Recurrent tympanic membrane perforation.
5. Ossicular dysfunction.
6. Comorbidities such as diabetes mellitus.
7. Sensorineural hearing loss.

Data Collection: Data is collected for each patient during pre-operative, intra-operative, and post-operative phases. A structured proforma records socio-demographic details, clinical findings, surgical details, and outcomes.

Statistical Analysis

- Data entry is performed in Microsoft Excel.
- Descriptive statistics (percentages, means, and standard deviations) summarize socio-demographic and clinical variables.
- Comparative analysis between groups is conducted using the chi-square test for categorical variables and t-tests for continuous variables.
- A p-value of <0.05 is considered statistically significant.

Result

Table 1: Distribution of study population based on Age Group (N=82).

Age Group			
Age Group	Group	Frequency	% of Total
≤40 yrs	Temporalis Fascia	23	28.00%
	Tragal Cartilage with Perichondrium	23	28.00%
> 40 yrs	Temporalis Fascia	18	22.00%
	Tragal Cartilage with Perichondrium	18	22.00%

Distribution of study population based on Age (N=82)

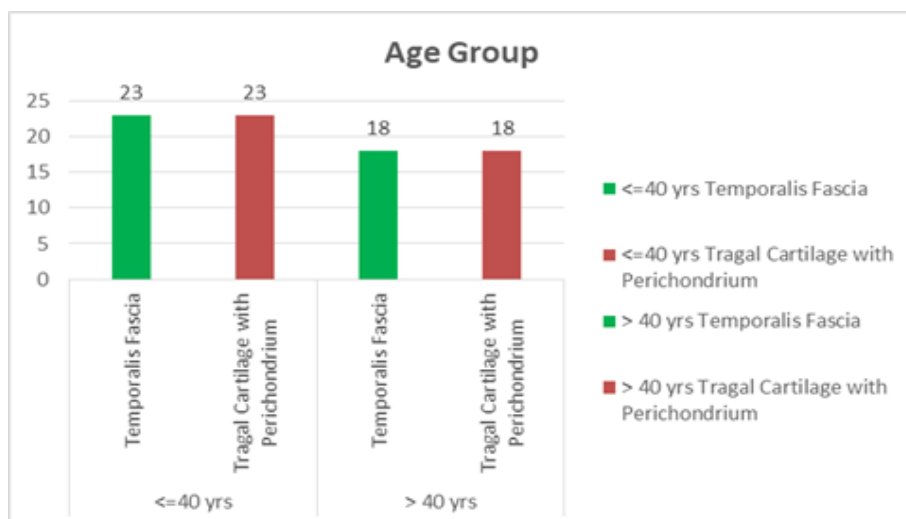


Figure 1: Age group

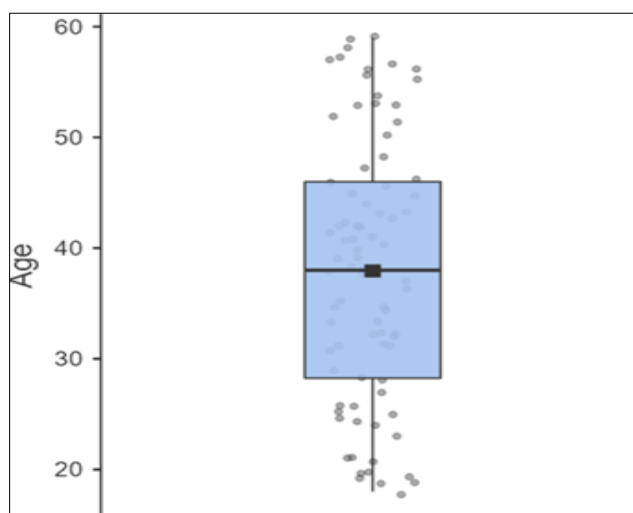


Figure 2:

The table provides descriptive statistics for the age distribution of a sample of 82 individuals. The mean age is 37.9 years, with a standard error of the mean of 1.31 years, indicating a relatively precise estimate of the population mean based on this sample. The 95% confidence interval (CI) for the mean ranges from 35.3 to 40.5 years, meaning there is a 95% probability that the true population mean lies within this range. The median age is 38 years, which is very close to the mean, suggesting a roughly symmetrical distribution of ages. The standard deviation of 11.8 years indicates moderate variability in the sample, with individual ages spread around the mean by about 12 years on average. The range of ages spans

41 years, from a minimum age of 18 years to a maximum age of 59 years.

The study included patients divided into two age groups: ≤40 years and >40 years. In both age groups, the graft materials used were Temporalis Fascia and Tragal Cartilage with Perichondrium. Among patients aged ≤40 years, Temporalis Fascia and Tragal Cartilage with Perichondrium were utilized equally, each comprising 28% of the total sample. Similarly, in patients aged >40 years, both graft materials were used equally, each constituting 22% of the total sample.

Table 2: Age Group v/s Graft Uptake

Age Group				
Age Group	Graft Uptake	Group	Frequency	% of graft uptake
≤40 yrs	Yes	Temporalis Fascia	20	86.95%
		Tragal Cartilage with Perichondrium	23	100%
>40 yrs	Yes	Temporalis Fascia	17	94.44%
		Tragal Cartilage with Perichondrium	16	88.88%

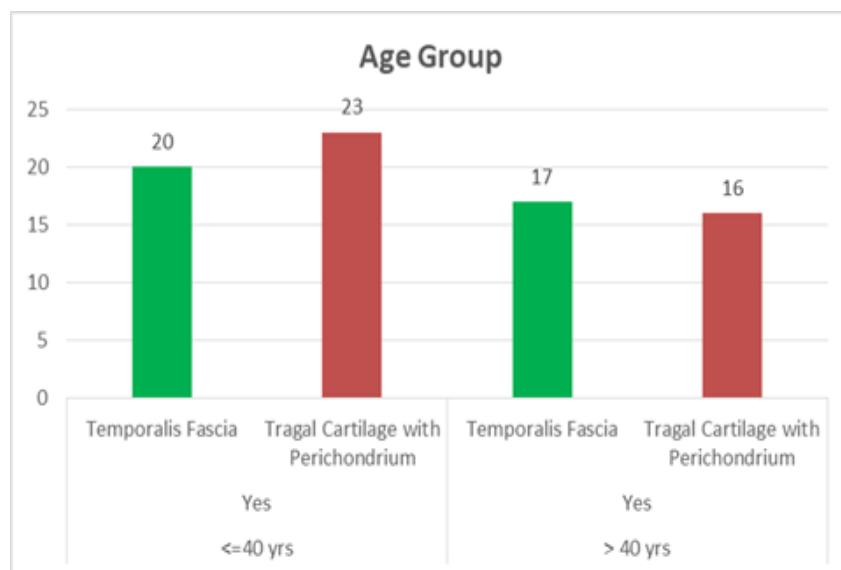


Figure 3: Age Group v/s Graft Uptake

Among patients aged ≤40 years, graft uptake was achieved in 20 of 23 (87%) temporalis fascia cases and 23 of 23 (100%) tragal cartilage cases. In those >40 years, uptake occurred in 17 of 18 (94%) fascia cases and 16 of 18 (89%) cartilage cases. The chi-square test yielded $\chi^2 = 0.1871$ with $p = 0.665$, indicating no statistically significant difference in

graft success between the two materials across age groups. Thus, both temporalis fascia and tragal cartilage with perichondrium demonstrated similarly high and comparable rates of successful tympanic membrane repair regardless of whether patients were younger or older than 40 years.

Table 3: Distribution of study population based on gender (N=82)

Gender			
Gender	Group	Frequency	% of Total
Female	Temporalis Fascia	17	20.70%
	Tragal Cartilage with Perichondrium	13	15.90%
Male	Temporalis Fascia	24	29.30%
	Tragal Cartilage with Perichondrium	28	34.10%

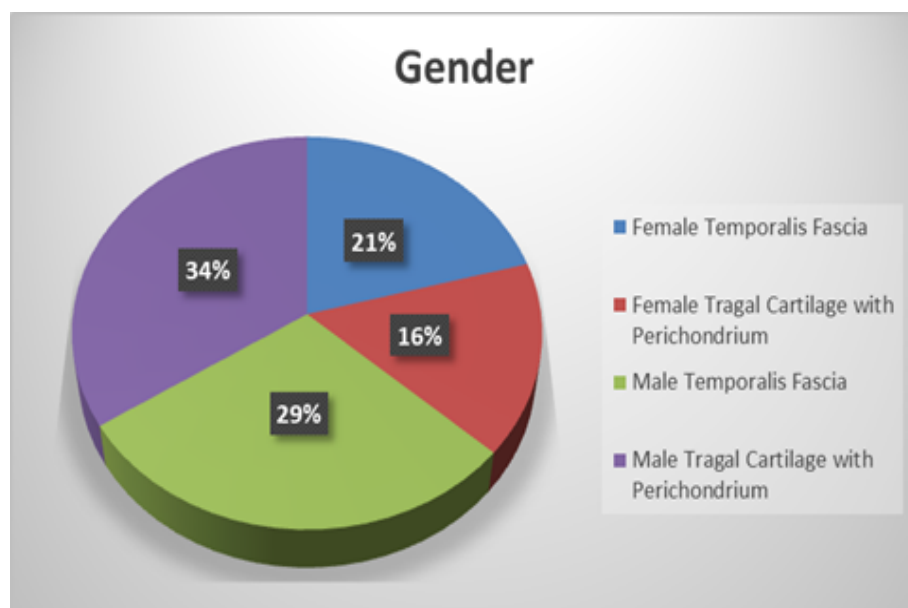


Figure 4: Distribution of study population based on Gender (N=82)

The gender-wise distribution of patients undergoing Type I Tympanoplasty using either Temporalis Fascia or Tragal Cartilage with Perichondrium reveals a fairly balanced and comparable pattern across both groups. Among female patients, 17 (20.7%) underwent tympanoplasty using Temporalis Fascia and 13 (15.9%) with Tragal Cartilage. In male patients, 24 (29.3%) received Temporalis Fascia grafts and 28 (34.1%) received

Tragal Cartilage grafts. The overall distribution shows that both graft materials were used almost equally across genders, indicating a lack of gender-based preference or selection bias in graft allocation. The frequencies and percentages demonstrate that the study groups were comparable in terms of gender, which helps in minimizing confounding due to gender-related anatomical or physiological differences.

Table 4: Distribution of study population based on Addiction

Smoking			
	Group	Frequency	% of Total
No	Temporalis Fascia	21	25.60%
	Tragal Cartilage with Perichondrium	21	25.60%
Yes	Temporalis Fascia	20	24.40%
	Tragal Cartilage with Perichondrium	20	24.40%
Alcohol			
No	Temporalis Fascia	24	29.30%
	Tragal Cartilage with Perichondrium	21	25.60%
Yes	Temporalis Fascia	17	20.70%
	Tragal Cartilage with Perichondrium	20	24.40%

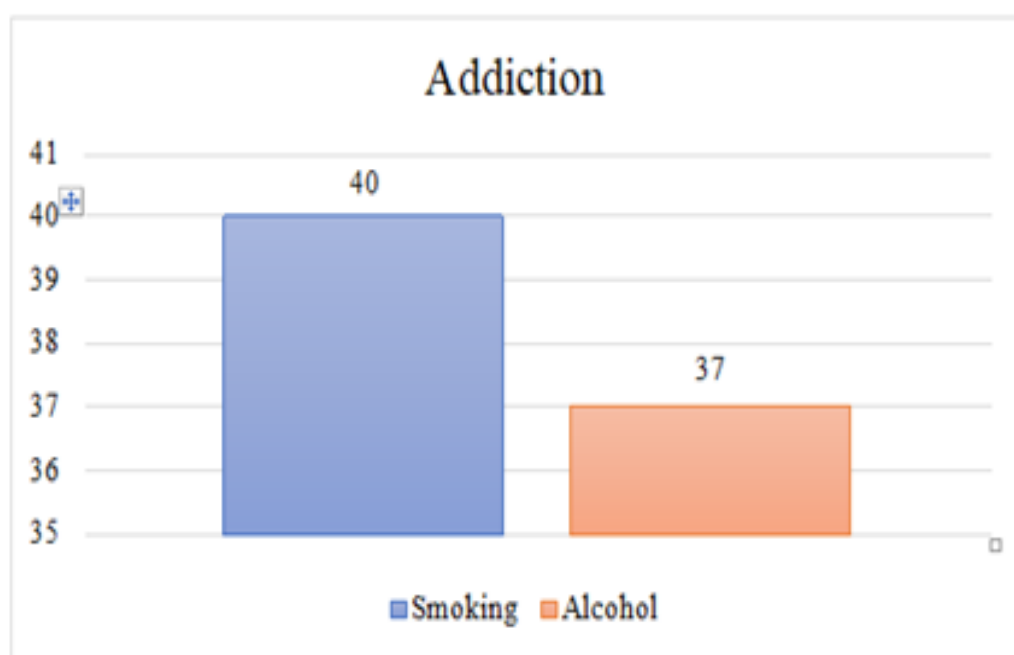


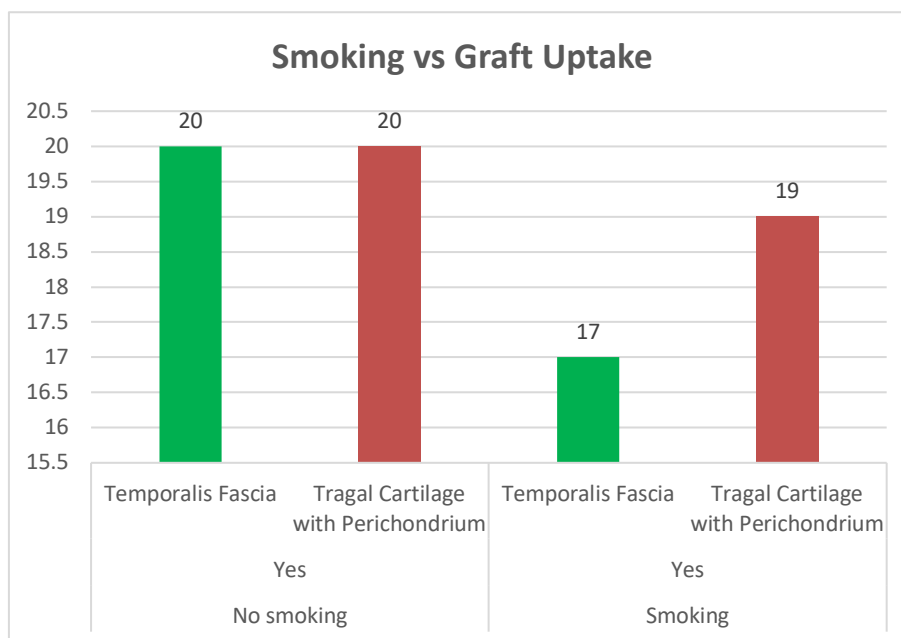
Figure 5: Distribution of study population based on Addiction History

The data regarding smoking and alcohol consumption among patients undergoing Type I Tympanoplasty using either Temporalis Fascia or Tragal Cartilage with Perichondrium shows a well-balanced distribution between the two groups, indicating their comparability. Among non-smokers, both graft types were used in exactly 21 patients each (25.6% of the total). Similarly, among smokers, 20 patients (24.4%) received Temporalis Fascia grafts and another 20 (24.4%) received Tragal Cartilage grafts. Regarding alcohol

consumption, 24 non-alcoholic patients (29.3%) underwent tympanoplasty with Temporalis Fascia and 21 (25.6%) with Tragal Cartilage. Among alcohol users, 17 (20.7%) underwent the procedure with Temporalis Fascia and 20 (24.4%) with Tragal Cartilage. These figures reflect a near-equal representation of smoking and alcohol habits in both graft groups, minimizing confounding due to these lifestyle factors and ensuring that graft-related outcomes can be more objectively assessed.

Table 5: Smoking vs Graft Uptake

Smoking				
Smoking	Graft Uptake	Group	Frequency	% of graft uptake
No smoking	Yes	Temporalis Fascia	20	95.23%
		Tragal Cartilage with Perichondrium	20	95.23%
Smoking	Yes	Temporalis Fascia	17	85%
		Tragal Cartilage with Perichondrium	19	95%

**Figure 6: Smoking vs Graft Uptake**

Among non-smokers, 95.23% had successful graft uptake with temporalis fascia and an equal percentage with tragal cartilage with perichondrium. Similarly, in smokers, 85% showed uptake with temporalis fascia, and 95% with tragal cartilage with perichondrium. The chi-square test yielded a statistic of 0.0585 with a p-value of 0.809, indicating

no significant association between smoking status and type of graft uptake at the conventional 0.05 significance level. This suggests that smoking does not differentially affect graft success rates between the two materials, confirming that both groups are comparable and that smoking status does not bias the comparison of graft efficacy in this study.

Table 6: Alcohol Intake vs Graft uptake

Alcohol				
Alcohol	Graft Uptake	Group	Frequency	% of graft uptake
No Alcohol	Yes	Temporalis Fascia	22	91.66%
		Tragal Cartilage with Perichondrium	20	95.23%
Alcohol	Yes	Temporalis Fascia	15	88.23%
		Tragal Cartilage with Perichondrium	19	95%

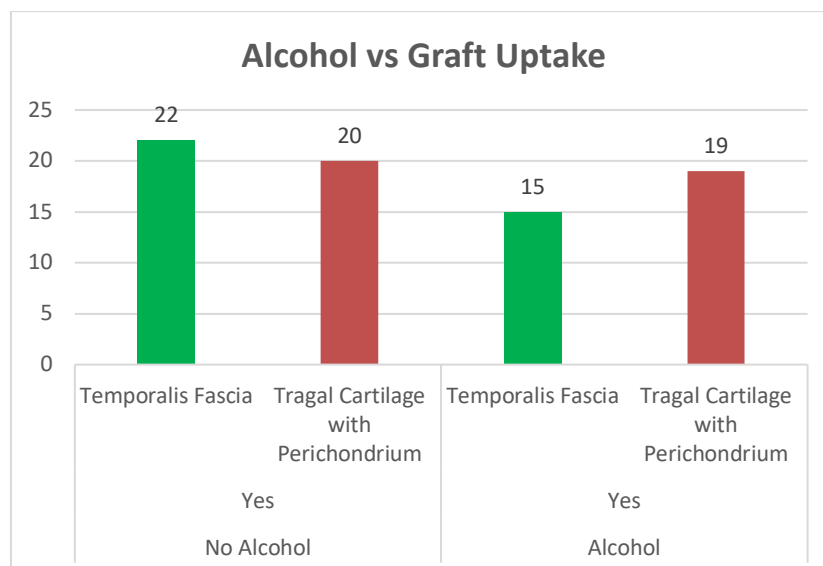


Figure 7: Alcohol Intake vs Graft uptake

Among non-alcohol users, 91.66% had successful uptake with temporalis fascia and 95.23% with tragal cartilage. Among alcohol users, 88.23% had uptake with temporalis fascia and 95% with tragal cartilage. The chi-square statistic of 0.5136 with a p-value of 0.474 suggests that alcohol consumption is

not significantly associated with graft uptake outcomes at the standard $p < 0.05$ level. This indicates that both graft groups are comparable regardless of alcohol consumption and that alcohol use does not significantly bias the success rate of either graft material in Type I tympanoplasty.

Table 7: Measurement of Central Tendency of Post-op ABG after 1 month (N=82)

	Group	Post- op ABG (1 month)
N	Temporalis Fascia	41
	Tragal Cartilage with Perichondrium	41
Mean	Temporalis Fascia	12.7
	Tragal Cartilage with Perichondrium	11.7
Std. error mean	Temporalis Fascia	0.898
	Tragal Cartilage with Perichondrium	0.946
95% CI mean lower bound	Temporalis Fascia	10.9
	Tragal Cartilage with Perichondrium	9.8
95% CI mean upper bound	Temporalis Fascia	14.5
	Tragal Cartilage with Perichondrium	13.6
Median	Temporalis Fascia	11
	Tragal Cartilage with Perichondrium	11
Standard deviation	Temporalis Fascia	5.75
	Tragal Cartilage with Perichondrium	6.05
Range	Temporalis Fascia	24
	Tragal Cartilage with Perichondrium	31
Minimum	Temporalis Fascia	2
	Tragal Cartilage with Perichondrium	-6
Maximum	Temporalis Fascia	26
	Tragal Cartilage with Perichondrium	25

The preoperative air-bone gap (ABG) was assessed in two groups: one using temporalis fascia (n=41) and the other using tragal cartilage with perichondrium (n=41) as graft materials. The mean pre-op ABG for the temporalis fascia group was 25.5 dB, with a standard error mean of 0.94, and a

95% confidence interval (CI) ranging from 23.6 to 27.4 dB. The median value was 24 dB, and the standard deviation was 6.02, indicating moderate variability. The range of values was 20 dB, spanning from a minimum of 16 dB to a maximum of 36 dB.

For the tragal cartilage with perichondrium group, the mean pre-op ABG was slightly higher at 26.1 dB, with a standard error mean of 0.764 and a narrower 95% CI of 24.6 to 27.7 dB. The median value was

26 dB, with a standard deviation of 4.89, reflecting slightly less variability compared to the temporalis fascia group. The range of ABG values was identical, from 16 dB to 36 dB.

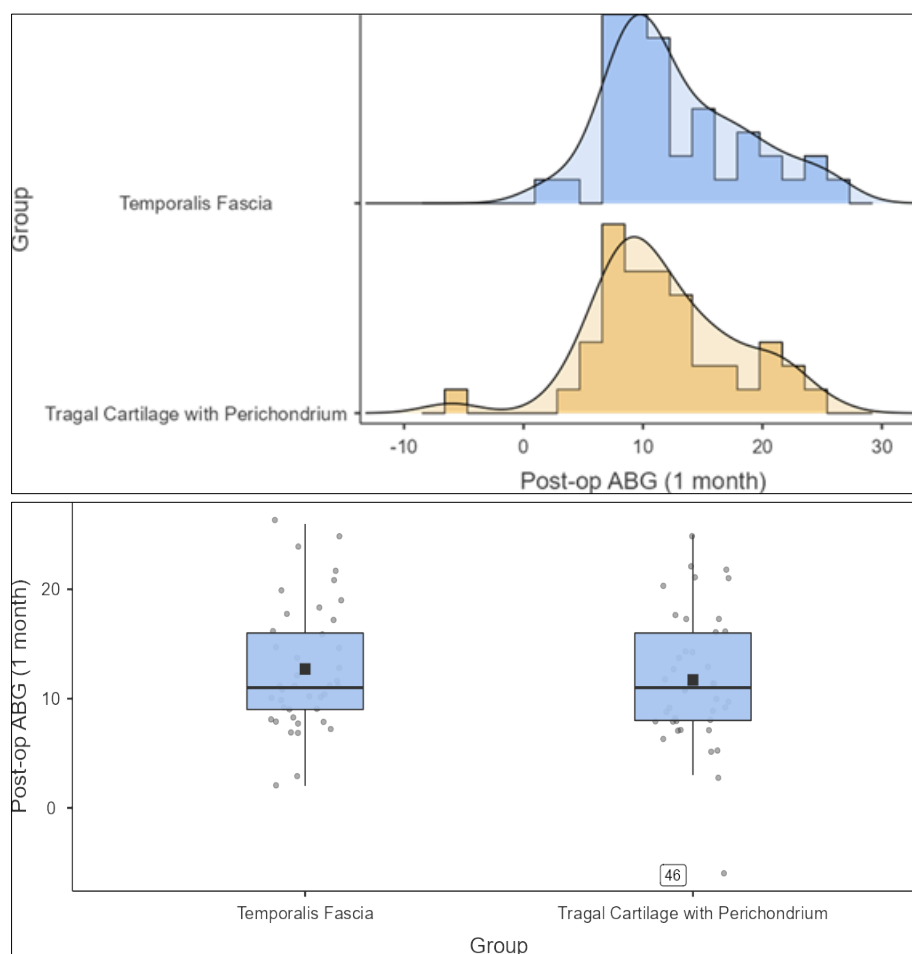


Figure 8: Measurement of Central Tendency of Post-op ABG after 1 month (N=82)

The post-operative air-bone gap (ABG) at 1 month was analyzed for two groups: temporalis fascia (n=41) and tragal cartilage with perichondrium (n=41). The mean post-op ABG in the temporalis fascia group was 12.7 dB, with a standard error of 0.898 and a 95% confidence interval (CI) ranging from 10.9 to 14.5 dB. The median value was 11 dB, and the standard deviation was 5.75, indicating moderate variability. The ABG values in this group ranged from a minimum of 2 dB to a maximum of 26 dB.

In the tragal cartilage with perichondrium group, the mean post-op ABG was slightly lower at 11.7 dB, with a standard error of 0.946 and a 95% CI ranging from 9.8 to 13.6 dB. The median value was also 11 dB, and the standard deviation was 6.05, reflecting slightly higher variability compared to the temporalis fascia group. The ABG in this group ranged from -6 dB (indicating potential improvement beyond normal hearing thresholds) to 25 dB.

Table 8: Measurement of Central Tendency of Post-op ABG after 3 months (N=82)

	Group	Post-op ABG (3 months)
N	Temporalis Fascia	41
	Tragal Cartilage with Perichondrium	41
Mean	Temporalis Fascia	16.2
	Tragal Cartilage with Perichondrium	15.4
Std. error mean	Temporalis Fascia	0.968
	Tragal Cartilage with Perichondrium	0.973
95% CI mean lower bound	Temporalis Fascia	14.2

	Tragal Cartilage with Perichondrium	13.5
95% CI mean upper bound	Temporalis Fascia	18.1
	Tragal Cartilage with Perichondrium	17.4
Median	Temporalis Fascia	15
	Tragal Cartilage with Perichondrium	14
Standard deviation	Temporalis Fascia	6.2
	Tragal Cartilage with Perichondrium	6.23
Range	Temporalis Fascia	24
	Tragal Cartilage with Perichondrium	31
Minimum	Temporalis Fascia	6
	Tragal Cartilage with Perichondrium	-2
Maximum	Temporalis Fascia	30
	Tragal Cartilage with Perichondrium	29

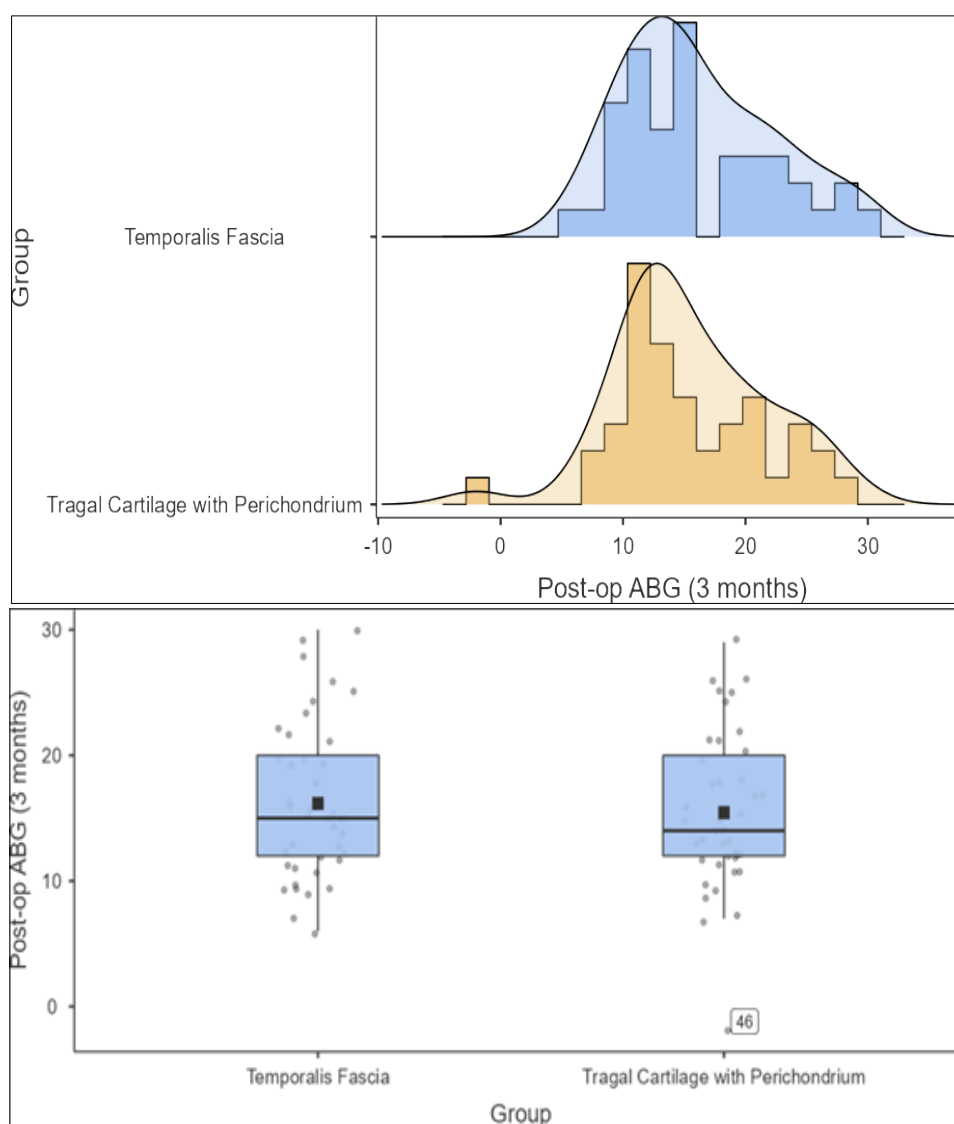


Figure 9: Measurement of Central Tendency of Post-op ABG after 3 months (N=82)

The 3-month post-operative air-bone gap (ABG) was assessed for two groups: temporalis fascia (n=41) and tragal cartilage with perichondrium (n=41). The mean ABG in the temporalis fascia group was 16.2 dB, with a standard error of 0.968 and a 95% confidence interval (CI) ranging from 14.2 to 18.1 dB. The median ABG was 15 dB, and

the standard deviation was 6.2, reflecting moderate variability. ABG values in this group ranged from 6 dB to 30 dB, indicating consistent post-operative outcomes.

In the tragal cartilage with perichondrium group, the mean ABG was 15.4 dB, with a standard error of 0.973 and a 95% CI ranging from 13.5 to 17.4 dB.

The median ABG was 14 dB, with a standard deviation of 6.23. The ABG values ranged from -2 dB (suggesting hearing improvement beyond

normal thresholds) to 29 dB, showing slightly greater variability compared to the temporalis fascia group.

Table 9: Distribution of study population based on Graft Uptake (N=82)

Graft Uptake			
Graft Uptake	Group	Frequency	% of Total
No	Temporalis Fascia	4	4.9 %
	Tragal Cartilage with Perichondrium	2	2.4 %
Yes	Temporalis Fascia	37	95.1 %
	Tragal Cartilage with Perichondrium	39	97.6 %
χ^2 Tests			
	Value	df	p
χ^2	0.719	1	0.396
N	82		

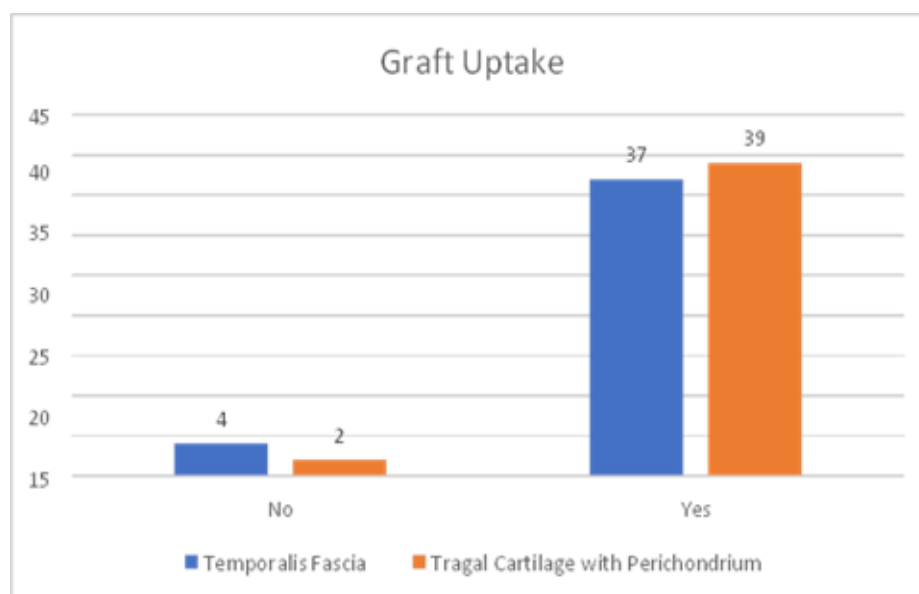


Figure 10: Distribution of study population based on Graft Uptake (N=82)

The study illustrates graft uptake rates for two groups: temporalis fascia and tragal cartilage with perichondrium. In the temporalis fascia group, 95.1% (37/41) of patients demonstrated successful graft uptake, while 4.9% (4/41) experienced failure. In comparison, the tragal cartilage with perichondrium group exhibited a slightly higher

success rate, with 97.6% (39/41) achieving graft uptake and only 2.4% (2/41) showing failure. These results indicate that both graft materials have high success rates, with tragal cartilage showing a marginally better performance. The chi-square value is 0.719 with a p value of 0.396 which shows no significant association.

Table 10: Paired Sample T-test

Paired Samples T-Test					
			statistic	df	p
Pre-op ABG	Post-op ABG (1 month)	Student's t	32.7	81	< .001
	Post-op ABG (3 months)	Student's t	23.4	81	< .001
ABG Reduction (1 month)	ABG Reduction (3 months)	Student's t	35.1	81	< .001

The paired samples t-test evaluates the significance of differences between pre-operative and post-operative audiometric measures in the study population.

Discussion

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- The age distribution reflects a sample with a central tendency concentrated around the late 30s, indicating that the majority of individuals are middle-aged. The relatively low standard error and narrow confidence interval demonstrate that the estimate of the mean is

robust and reliable, which enhances the credibility of the analysis. The range of ages (18–59 years) ensures that the sample is inclusive of both younger and older individuals, which is important for studies aiming to capture a broad perspective of outcomes or trends.

- When juxtaposed with findings from literature, such as Maurya et al. (2022) and Guler I. et al. (2018), who reported mean ages of 34.5 years and 36.2 years in their respective studies on chronic otitis media patients, the current study's mean age of 37.9 years is consistent with a middle-aged demographic commonly seen in otological research.[38] [40] The studies by Indorewala S. et al. (2004) also highlighted a similar age range, underscoring that middle-aged adults represent the majority of cases requiring tympanoplasty or related otologic interventions. [39]
- The gender disparity observed in this study, with a greater representation of males (63.4%) than females (36.6%), is consistent with findings in similar research contexts. For example, Deshmukh et al. (2024) and Sergi B. et al. (2011) have reported a higher prevalence of certain medical conditions, including chronic otological issues, among males, attributing this to increased occupational exposure, lifestyle habits, and delayed healthcare-seeking behavior in men. [35] [36] Conversely, some studies, such as those by Salvatore F. et al. (2022) and Maurya et al. (2022), suggest that women may be underrepresented in clinical studies due to societal barriers, cultural constraints, or sampling biases.[37] [38]
- The findings align with previous research indicating that smoking may not significantly alter graft uptake rates in tympanoplasty when using either temporalis fascia or tragal cartilage grafts. Studies by Yung et al. (2013) and Onal et al. (2016) similarly reported no significant difference in graft success between smokers and non-smokers, suggesting that the graft material may play a more critical role than smoking status in determining outcomes.
- The results indicate that both temporalis fascia and tragal cartilage with perichondrium are effective graft materials for tympanoplasty, achieving significant reduction in ABG post-operatively. The slightly lower mean ABG in the tragal cartilage group (11.7 dB vs. 12.7 dB) suggests a marginally better hearing outcome, although the overlapping CIs indicate no statistically significant difference. This aligns with findings from studies such as Indorewala S. et al. (2004) and Salvatore F. et al. (2022) [39] [37], which reported comparable auditory outcomes for temporalis fascia and tragal cartilage, with both materials achieving satisfactory ABG closure.

- The data comparing smoking status across graft uptake groups for temporalis fascia and tragal cartilage with perichondrium demonstrates no statistically significant difference between smokers and non-smokers in terms of graft type success.
- Graft uptake rates for temporalis fascia and tragal cartilage were uniformly high—87–100% in the ≤ 40 cohort and 89–94% in the >40 cohort—with no significant difference between materials ($p = 0.665$). This confirms that patient age did not influence the relative effectiveness of the two graft types in Type I tympanoplasty.
- The analysis of alcohol consumption and graft uptake outcomes between the two graft materials—temporalis fascia and tragal cartilage with perichondrium—reveals no significant statistical difference, indicating comparability between the groups.

Conclusion

- Graft uptake was successful in the majority of cases, with slightly higher success observed in the tragal cartilage with perichondrium group (97.6%) compared to the temporalis fascia group (95.1%). Failure rates were low in both groups, at 4.9% for temporalis fascia and 2.4% for tragal cartilage, indicating the reliability of both materials for tympanoplasty.
- At 1 month post-operation, the mean ABG was 12.7 dB in the temporalis fascia group and 11.7 dB in the tragal cartilage group. Both groups showed similar median ABG values (11 dB) and overlapping confidence intervals, indicating comparable outcomes.
- At 3 months post-operation, the mean ABG was slightly higher in the temporalis fascia group (16.2 dB) compared to the tragal cartilage group (15.4 dB). Both groups demonstrated similar median ABG values (15 dB and 14 dB, respectively) and overlapping confidence intervals, indicating comparable hearing outcomes.

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