

Temporalis Fascia Graft versus Sliced Tragal Cartilage Graft for Type-1 Tympanoplasty: A Comparative Study

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Abstract

Introduction: Tympanoplasty is a tissue transference procedure to reconstruct the tympanic membrane perforation inline of chronic otitis media. Cartilage graft and temporal fascia graft are reliable methods for tympani membrane reconstruction. The aim of this study was to compare the temporalis fascia graft versus sliced tragal cartilage graft for type-1 tympanoplasty.

Material and Methods: A source of forty-eight participants with safe type chronic otitis media aged between 14 to 60 years were included. Study participants were randomly divided into group 1 or cartilage group and group 2 or fascia group were undergone mastoidectomy with type 1 tympanoplasty or type 1 tympanoplasty alone. Postoperative follow-up was done at 1st week, 3rd week and 3rd month and pure tone audiometry was conducted to check the hearing gain.

Results: The hearing gain was 9.42 dB in group 1 and 5.64dB in group 2. The mean difference was statistically not significant between study groups ($p>0.05$). One case in each group showed retraction and 12.5% and 29.17% of cases showed reperforation in type-1 tympanoplasty alone and type-1 tympanoplasty with CM respectively.

Conclusion: The temporal fascia graft and sliced tragal cartilage graft are effective for type 1 tympanoplasty. However, type 1 tympanoplasty with sliced cartilage graft have showed better hearing gain than temporal fascia graft.

Keywords: Type-1 tympanoplasty, Temporal fascia, cartilaginous graft, pure tone audiometry, Hearing gain

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Introduction

Tympanoplasty, which aims to repair the damaged tympanic membrane and middle ear ossicles with a central perforation for chronic otitis media, has a good outcome that determined by the membrane's mobility and hearing gain [1,2]. Tympanoplasty has involved the use of a

variety of tissues, including cartilage grafts, skin grafts, vein grafts, perichondrium, periosteum, and temporalis fascia grafts [3]. Among these, tympanoplasty frequently used cartilage and temporal fascia grafts.

Temporal fascia is the most popular choice since it is thin, translucent, and simple to

harvest. Studies have shown that it is susceptible to infection, pressure changes due to lack of elasticity, retraction pockets, suffer atrophy, and tend to decrease as a result of its poor stability [4-6]. Due to their resistance to retraction and rate of resorption, cartilage grafts are increasingly the preferred option for tympanoplasty. Due to its thickness and lack of agreement over its audiological components, cartilaginous grafts have had a difficult time being accepted [7,8].

With reference to the above literature, the present study was designed to compare temporalis fascia graft versus sliced tragal cartilage graft in type-1 tympanoplasty.

Material and Methods

The present prospective randomized study was conducted in the Department of ENT, MNR Medical College and Hospital, Sangareddy during January 2022 to March 2023. A source of forty-eight participants with safe type chronic otitis media aged between 14 to 60 years, cases with mucosal disease, mild to moderate auditory tube malfunctions, intact ossicular chain, with conductive hearing loss were included. Cases with squamosal disease and traumatic perforation, with sensorineural hearing loss, damaged ossicular chain were

excluded. Written informed consent was obtained from all the cases and study protocol was approved by institutional ethics committee.

All the participants were undergone clinical examination, tuning fork test, pure bone audiometry, X-ray of both mastoids, and CT scan of temporal bone. Study participants were randomly divided into two study groups. The group 1 or cartilage group and group 2 or fascia group were undergone mastoidectomy with type 1 tympanoplasty or type 1 tympanoplasty alone. The cases with active chronic otitis media undergone critical mastoidectomy with type-1 tympanoplasty and inactive stage as type-1 tympanoplasty by post auricular method.

Postoperative follow-up was done at 1st week, 3rd week and 3rd month. Pure tone audiometry was conducted once in every three months till the viable graft was visible. The data was analysed by using SPSS version 23.0. Categorical variables were represented in the form of frequency and percentage. Pre and postoperative data were analysed by using paired 't' test and unpaired 't' test was used to compare the mean of study groups. P<0.05 was considered as statistically significant outcome.

Results

Table 1: Demographic and clinical details of study participants.

Variables	Group 1 (n=24)	Group 2 (n=24)	p-value
	Frequency (%)	Frequency (%)	
Age (In years)	34.56±8.93	33.12±9.02	2.652
Gender (M:F)	11:13	10:14	1.840
Side of surgery			
Right	15 (62.5%)	17 (70.83%)	0.267
Left	09 (37.5%)	07 (29.17%)	
Disease activity			
Inactive	10 (41.67%)	07 (29.17%)	0.0163
Active	14 (58.33%)	17 (70.83%)	
Type of surgical procedure			
Type-1 tympanoplasty alone	10 (41.67%)	08 (33.33%)	0.0334
Type-1 tympanoplasty with CM	14 (58.33%)	16 (66.67%)	
Details of otoscopic findings			
Large CP	04 (16.67%)	05 (20.83%)	0.398

Medium CP	13 (54.17%)	11 (45.83%)	
Small CP	07 (29.16%)	08 (33.33%)	

Table 2: Details of postoperative impedance and complication among two study groups.

Variables	Group 1	Group 2	p-value
	Frequency (%)	Frequency (%)	
Postoperative impedance			
A	01 (4.17%)	15 (62.5%%)	0.0115
B	23 (95.83%%)	05 (20.83%)	
C	-	04 (16.67%)	
Complications			
Retraction	01 (4.16%)	01 (4.16%)	1.562
Reperforation	03 (12.5%)	05 (20.83%)	5.585

Table 3: Comparison of Pure tone audiometry levels between two study groups.

Variables	Group 1	Group 2	p-value
	Mean±SD	Mean±SD	
Pure tone audiometry (dB)			
Before surgery	31.89±3.48	34.56±6.72	0.001
After surgery	22.47±1.90	28.92±3.14	0.0256
Hearing gain			
At 3 rd month	9.42±4.53	5.64±2.23	1.628

Table 4: Comparison of pre and post operative Pure tone audiometry levels related to type of surgical method.

Surgical procedure	Before surgery	After surgery	Hearing gain
Type-1 tympanoplasty alone	31.46±4.78	22.59±2.06	8.87±1.62
Type-1 tympanoplasty with CM	33.90±6.57	23.18±3.50	10.72±1.89
p-value	0.0938	0.162	0.874

Table 5: Comparison of postoperative complication and impedance related to type of surgical method.

Variables	Type-1 tympanoplasty alone (n=18)	Type-1 tympanoplasty with CM (n=30)	p-value
	Frequency (%)	Frequency (%)	
Postoperative impedance			
A	04 (22.2%)	08 (26.67%)	0.621
B	12 (66.67%)	20 (66.67%%)	
C	02 (11.1%)	02 (6.66%%)	
Complications			
Retraction	01 (4.16%)	01 (4.16%)	0.186
Reperforation	03 (12.5%)	07 (29.17%)	0.452

Discussion

Mean age was 34.56 years in group 1 and 33.12 years in group 2. Female participants were common in both study groups. Majority cases in both the groups had

surgical procedure on right side and with active state of the disease. Type-1 tympanoplasty alone was performed in 41.67% and 33.33% and type-1

tympaanoplasty with CM was performed in 58.33% and 66.67% cases of group 1 and group 2 respectively. Medium CP was common otoscopic finding in both study groups (Table 1). The postoperative impedance was B type curve in 95.83% cases and A type curve in 4.17% of cases in group 1. While, 65.2% and 20.83% and 16.67% of cases had Type A, B and C curve in group 2, which was found to be statistically significant. One case in each group showed retraction and 16.67% and 20.83% of cases showed reperforation in group 1 and 2 respectively (Table 2).

The hearing gain was 9.42 dB in group 1 and 5.64dB in group 2. The mean difference was statistically not significant between study groups ($p > 0.05$) (Table 3). While comparing the hearing gain with respect to surgical procedure, it was observed that the improvement of 10.72 dB in type 1 tympanoplasty with CM group and 8.87 in type 1 tympanoplasty alone (Table 4). A study by Bhattacharya *et al.*, found that the mean hearing gain at 6 months was 11.7dB in cartilage group and 12.6dB in temporal fascia group ($p > 0.05$) [9].

Guler *et al.*, found that the mean hearing gain was 12.5dB in the temporal fascia group and 8.9dB in the cartilage groups, which was statistically significant ($p < 0.05$). However, functional outcomes did not show significant differences between the two groups [10]. Xing *et al.*, found that hearing gain was high in temporal fascia group and the partial thickness cartilage group than full thickness cartilage group [11]. Balci MK *et al.*, found decreased PTA in both temporal fascia and cartilage graft groups [12].

The comparison of postoperative complications and impedance related to type of surgical procedure exhibited that the postoperative impedance was B type curve in 66.67% followed by A type curve in 22.2% and C type in 11.1% in type-1 tympanoplasty alone. While in type-1 tympanoplasty with CM, 66.67% and 26.67% and 6.67% of cases had Type B,

A and C curve, which was statistically not significant. One case in each group showed retraction and 12.5% and 29.17% of cases showed reperforation in type-1 tympanoplasty alone and type-1 tympanoplasty with CM respectively (Table 5).

According to Bhattacharya *et al.*, in terms of graft take rates and functional outcomes, cartilage shield graft tympanoplasty is more effective than traditional temporalis fascia tympanoplasty. However, because recurring procedures were less common with the cartilage technique than the fascia technique, morphologic success was actually higher with the cartilage technique [9]. Balci MK *et al.*, stated that the graft success rate of cartilage was found to be superior to temporal fascia ($p > 0.05$) [12].

A study by Rathaur SK *et al.* found that tympanoplasty type-1 with a temporalis graft was superior to that with cartilage slice reinforcement in terms of hearing improvements. However, graft uptake in cartilage reinforcement is larger than it is in temporalis muscle fascia alone [13].

In comparison to tympanoplasty with TF grafts, Salviz *et al.* reported that tympanoplasty using cartilage grafts was related with improved graft takes and comparable hearing outcomes [14]. According to a meta-analysis by Chen K *et al.*, cartilage grafts have a better success rate than TF grafts in tympanoplasty. Both cartilage and TF tympanoplasty provided similar improvements in hearing outcome [15].

The present study findings are similar to the findings of above study. The present study was limited to less sample size and less duration of postoperative follow up. Further studies are required to evaluate and compare multiple surgical approaches in type 1 tympanoplasty.

Conclusion

The temporal fascia graft and sliced tragal cartilage graft are effective for type 1

tympoplasty. The reperforation rates was 12.5% in cartilage group and 20.83% in fascia group. However, type 1 tympanoplasty with sliced cartilage graft have showed better hearing gain than temporal fascia graft.

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