

Original research article

A study to compare hearing improvement of placing temporalis fascia graft medial to malleus and lateral to malleus by pure tone audiometry

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Abstract

Tympanoplasty is a surgical method, to eradicate middle ear infection and improve its function. A main part of tympanoplasty is repair of perforated tympanic membrane which results mainly from chronic otitis media (COM). Other etiologies include traumatic or neoplastic defects on tympanic membrane. Ventilation tube insertion is reported the most common surgical cause of tympanic perforation. Patients with COM mucosal who presented to ENT opd, hospital who satisfy the inclusion and exclusion criteria were included in the study. Detailed history, general and ENT examination was done including otoendoscopy and tuning fork tests. Each patient underwent routine blood investigation and pure tone audiometry (PTA). There is significant hearing improvement in group A (medial) whereas there is no significant improvement in hearing in case of group B (lateral).

Keywords: Hearing improvement, temporalis fascia graft, pure tone audiometry

Introduction

Chronic otitis media (COM) is an infection of middle ear cleft with ear discharge, hearing loss and perforation for more than 3 months. Chronic otitis media is common in developing countries like India, leading to hearing loss ^[1].

Prevalence of COM is 0.5-30%. There are 120 million patients of COM around world. Essential treatment of COM is by surgical procedures to eliminate disease, prevention of recurrence and maintain or improve hearing ^[2].

Modern tympanoplasty was introduced in 1950s by Zollner & Wullstein, since then different techniques were evolved for repair of tympanic membrane. Tabb & Shea first innovated medial positioning of grafting tissue to malleus and residue of tympanic membrane. Wullstein in 1956 classified tympanoplasty, with myringoplasty being classified as type 1 tympanoplasty ^[3].

Tympanoplasty is a surgical method, to eradicate middle ear infection and improve its function. A main part of tympanoplasty is repair of perforated tympanic membrane which results mainly from COM. Other etiologies include traumatic or neoplastic defects on tympanic membrane. Ventilation tube insertion is reported the most common surgical cause of tympanic perforation ^[4].

Myringoplasty can be defined as surgical repair of tympanic membrane. Type 1 tympanoplasty is of three type underlay, overlay and interlay. In Overlay technique after elevation of squamous tissue the graft is positioned lateral to annulus & fibrotic layer of tympanic membrane residue. Underlay technique is widely used method. There are two types of underlay technique that is placing graft medial to handle of malleus and lateral to handle of malleus. Placing graft medial to malleus reduces the middle ear space and graft medialisation can occur, postoperative hearing improvement is found to be good in this technique. While on the other hand placing graft lateral to malleus has less chance of medialisation and better hearing improvement, but lateralization of graft can occur in this technique ^[5,6].

Methodology

Period of study: 18 months.

Design of study: Prospective study with two groups Groups of study:

1. **Group A:** Graft medial to handle of malleus.
2. **Group B:** Graft lateral to handle of malleus.

Sample size: 30.

Sampling technique: Every consecutive eligible case.

Statistical analysis

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test or Fischer’s exact test (for 2x2 tables only) was used as test of significance for qualitative data. Yates correction was applied wherever chi- square rules were not fulfilled (for 2x2 tables only).

Continuous data was represented as mean and standard deviation. Independent t test was used as test of significance to identify the mean difference between two quantitative variables.

p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Type of study

Prospective study conducted on patients who satisfied the inclusion and exclusion criteria.

Inclusion criteria

1. Patient undergoing type 1 tympanoplasty between age 12 years to 60 years.
2. Mild to moderate conductive hearing loss.
3. Mucosal disease.
4. Small to subtotal central perforation.

Exclusion criteria

1. Actively discharging ear.
2. COM with mixed hearing loss.
3. Total and marginal perforation.
4. Hearing loss of more than 60db.
5. Ossicular pathology.

Patients with COM mucosal who presented to ENT opd, hospital who satisfy the inclusion and exclusion criteria were included in the study. Detailed history, general and ENT examination was done including otoendoscopy and tuning fork tests. Each patient underwent routine blood investigation and pure tone audiometry (PTA).

Before surgery a written informed valid consent was taken. Patients were operated under general anaesthesia after proper preanaesthetic evaluation.

Results

Table 1: Comparison of preop and postop PTA (1ST month)

	Group			
	Medial		Lateral	
	Mean	SD	Mean	SD
Preop	45.88	9.62	30.46	11.49
Postop	31.56	15.03	28.92	12.87
P Value	0.001824		0.5559	

There is significant improvement in postop PTA in medial group (p value=0.0018) whereas there is no significant improvement in lateral group.

Table 2: PTA improvement in both groups (1st month)

Group						
Medial		Lateral		Total		P Value
Mean	SD	Mean	SD	Mean	SD	
14.32	15.83	1.53	9.15	8.78	14.64	0.0099

There is significant hearing improvement in medial group whereas there is no significant improvement in lateral group.

Table 3: PTA comparison between preop and postop (3rd month)

Postop 3rd month	Group			
	Medial		Lateral	
	Mean	SD	Mean	SD
Preop	45.88	9.62	30.46	11.49
Postop	28.75	13.79	27.25	10.45
P Value	0.000367		0.160042	

There is significant hearing improvement in group A (medial) whereas there is no significant hearing improvement in group B(lateral).

Table 4: Post op hearing improvement (3rd month)

post op 3 imp	Group						P Value
	Medial		Lateral		Total		
	Mean	SD	Mean	SD	Mean	SD	
	15.44	14.79	3	7.21	10.05	13.47	0.00573

There is significant hearing improvement in group A (medial) whereas there is no significant improvement in hearing in case of group B (lateral).

Discussion

Different methods of tympanoplasty have been in use with different success rates. Underlay method of tympanoplasty is the most frequently used method in which the graft is placed medial to residue of tympanic membrane or tympanomeatal flap. There are two types of underlay technique i.e. placing graft medial to malleus and placing graft lateral to malleus. There are very few studies which compares these two methods of underlay technique.

A study conducted by Yigit O *et al.*, “short term evaluation of over-under myringoplasty technique” at turkey university shows 91.5% of success rate in underlay technique and 94.9% in case of over-underlay technique. AB gap improvement was 16.55db in underlay whereas 16.96% in over-underlay technique [7].

A study conducted in Alzahara & kashani hospital by Rogha *et al.*, shows both the technique of placing graft medial to, malleus or lateral to it are effective with success rate of 96.42% & 92.85% respectively. And there was no significant airborne gap closure in both the groups [8].

In our study in group A(medial) mean hearing improvement of 15.44 dB was seen whereas in group B (lateral) there was mean hearing improvement of 3dB.

Conclusion

There was significant hearing improvement in group A (Medial) whereas there is no significant hearing improvement in group B (Lateral).

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