



Comparative Study between Cartilage Perichondrium Graft and Temporalis Fascia Graft in Type 1 Tympanoplasty

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ABSTRACT-Background-In patients presenting with Chronic otitis media mucosal type, the aim of tympanoplasty is to eradicate the disease from the middle ear cleft with or without repair of tympanic membrane and ossicular chain. Most commonly used grafts are the temporalis fascia and the cartilage perichondrium graft. The purpose of this study was conducted to compare the healing of the tympanic membrane and the hearing improvement using these two grafts.

Methods-The study was conducted at the department of ENT, from Oct 2018 to Oct 2020. A total of 100 patients, divided into two groups of 50. One group underwent tympanoplasty with cartilage perichondrium graft and the other with temporalis fascia graft. Patients were followed up for 1 month post operative period.

Results- Graft uptake in patients with temporalis fascia graft was 94% whereas the patients with cartilage graft had 100% results. The airbone gap significantly reduced in both the groups with a p value of 0.0001.

Keywords-Temporalis fascia, cartilage perichondrium graft, tympanoplasty

I. INTRODUCTION

Chronic otitis media is one of the most common ear diseases encountered in developing countries due to poor socio-economic standards, poor nutrition, lack of health education and unhygienic. Chronic suppurative otitis media is a long standing infection of a part or whole of middle ear cleft characterized by intermittent or persistent, chronic discharge⁽¹⁾. Tympanoplasty is a procedure to eradicate disease in the middle ear and to reconstruct the hearing mechanism, with or without Tympanic membrane grafting⁽²⁾. Types of tympanoplasty was described based on graft placement in relation with the structures in the middle ear by Wullstein in 1956⁽²⁾. The ideal graft material to be used in Tympanoplasty should fulfill certain basic criteria in order for it to be successful.

1. Should serve to provide a scaffold for the regeneration of the tympanic membrane.
2. Should be a mesodermal tissue so that it will not desquamate.
3. Should have the ability to be infiltrated by mesenchymal cells and undergo neovascularization.
4. Very low metabolic rate, tough enough to be able to resist infections.
5. Should be thin and transparent resembling normal Tympanic membrane and should have similar elastic and vibratory property.
6. Can be obtained from the same operative field, preferably the same incision⁽³⁾.

The aim of the study is to compare the results of healing of temporalis fascia graft versus cartilage perichondrium as a graft material in tympanoplasty and the results of post operative hearing using temporalis fascia graft and cartilage perichondrium graft.

II. METHOD

For the study, we selected 100 cases of chronic otitis media visiting the tertiary care centre out patient department of ENT, from October 2018 to October 2020, based on the inclusion and exclusion criteria and divided them into 2 groups of 50 each in simple random method. After detailed history and examination, and getting fitness for surgery, tympanoplasty underlay technique was performed. One group underwent tympanoplasty with cartilage perichondrium graft and the other with temporalis fascia graft.

Inclusion criteria:

1. Age group 11 to 50 yrs
2. Chronic otitis media with a dry ear
3. Pure conductive hearing loss
4. Given written informed consent were selected.



Exclusion criteria:

1. Below 11 or above 50 years of age
2. Congenital hearing disorder
3. Mixed or sensorineural hearing loss,
4. Systemic disease like hypertension, diabetes mellitus, bleeding disorder
5. Local disease like otitis externa
6. Upper respiratory tract infection
7. Adenoid hypertrophy
8. Prior surgery of the same ear and those who did not consent for surgery were excluded.

PROCEDURE Tympanoplasty was performed under LA with IV sedation in most of the patients. Very few patients required general anaesthesia. After infiltration with 2 % lignocaine with adrenaline (1:1,00,000) by post aural approach through Wildes incision, temporalis fascia graft and conchal graft was harvested. In some, incision was taken over medial surface of tragus to harvest tragal cartilage. The cartilage was then sliced with the help of cartilage slicer to an appropriate thickness. After refreshing the margins of the perforation, raising the tympanomeatal flap and examining the middle ear cavity, ossicular integrity was checked. Once the ossicular chain continuity was confirmed the graft was placed in underlay technique, flap was reposed and post aural incision was suture in layers. Post operatively patient received antibiotics and antihistaminics. Sutures were removed on day 7 and antibiotics ear

drops were advised thrice daily. Patient was followed upto 1 month. otoscopic findings of the graft and hearing assessment by audiometry were noted.

RESULTS

Among a total of 100 patients, 50 were male and 50 were female were randomly allocated in two groups.

The mean age of the patients in the study was 21-40 years.

A total of 100 patients were operated, of which 94% (47 out of 50) had a successful closure of perforation who underwent tympanoplasty with temporalis fascia graft whereas 6% (3 patients) resulted in residual perforation. There was 100% graft uptake in the patients who underwent tympanoplasty with cartilage perichondrium graft.

Post operatively hearing in the patients of both the groups improved significantly. The mean pre operative AB gap of group which underwent tympanoplasty with temporalis fascia graft was 32.92 ± 5.17. The mean pre operative AB gap of the group which underwent tympanoplasty with cartilage perichondrium graft was 36.36 ± 5.26. The mean post operative AB of temporalis fascia and cartilage perichondrium graft is 20.22 ± 6.22 and 22.04 ± 6.38 respectively. There is significant improvement of AB gap in both groups with p value 0.0001.

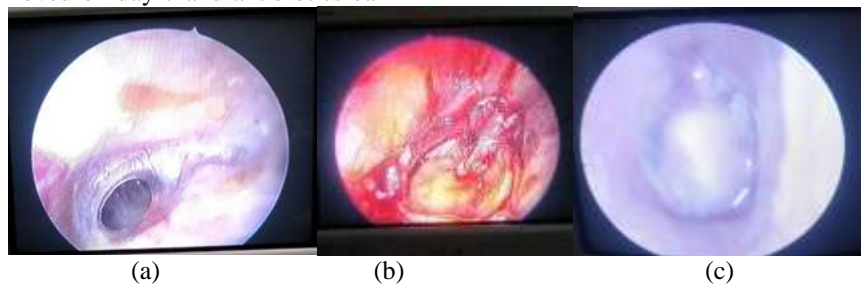


Fig no .1-otoendoscopic pictures of left ear .a) pre op ;b) intra operative after cartilage graft placement; c) post operative follow up after 1month

Table No.1: Comparison of Pre operative and Post operative AB gap of the cases in healing of Temporalis Fascia graft versus Cartilage Perichondrium as a graft material in Tympanoplasty:

AB gap	Cartilage Perichondrium Graft (n=50)	TemporalisFascia Graft (n=50)	Z test value and significance	
	Mean ± SD	Mean ± SD	Z test value	'p' value and significance
Pre operative	36.36±5.26	32.92±5.17	3.297	0.0014, Significant
Post operative	22.04±6.38	20.22±6.22	1.443	0.1523, Not significant
Student's Paired 't' test value from Pre to	22.819	23.583		



Post operative		
'p' value and significance	p=0.0001, significant	p=0.0001, significant

Table No.2: Comparison of Graft uptake of the cases in healing of Temporalis Fascia graft versus Cartilage Perichondrium as a graft material in Tympanoplasty:

Graft uptake	Cartilage Perichondrium Graft (n=50)	Temporalis Fascia Graft (n=50)	Chi-square test value 'p' value and significance
	No. of cases (%)	No. of cases (%)	
Positive	50(100.00%)	47(94.00%)	1.375, p = 0.2410, not significant
Residual	00(0.00%)	03(6.00%)	
Total	50(100%)	50(100%)	

III. DISCUSSION

Both Temporalis fascia and cartilage perichondrium fulfill all the criteria of ideal graft as both are of mesodermal in origin. Cartilage has been successfully used in middle ear procedures and has been shown to be well tolerated with minimal resorption overtime due to their stiffness and bradytrophic metabolism⁽⁴⁾. Utech was the first to begin using it in 1950s and was followed by Salen and Goodhill for repairing portions of tympanic membrane⁽⁵⁾. In our study conducted, patients were randomly put in two groups and underwent type 1 tympanoplasty with temporalis fascia and cartilage perichondrium each. The graft uptake was slightly better noted among cartilage perichondrium group in compared to temporalis fascia group. The post operative hearing was recorded with the help of pure tone audiometer was concluded by significant improvement in both groups noted with reduction in the AB gap. Here are some mentions of the studies by different authors with similar conclusions

- 1) **Tadke et al⁽⁶⁾** in her study of 64 subjects noted a mean pre op ABgap of 26.44+₋6.555db and 28.3+₋5.86 db in temporalis and cartilage groups respectively. The post operative mean ABgap of temporalis group was 11.47+₋6.50db and that of cartilage group was 13.2+₋6.48db . The functional success rate in the cartilage group was slightly higher than the fascia group but was statistically non significant with a p value >0.05.
- 2) In a study conducted by **Santhanakrishnan K et al⁽⁷⁾** the mean pre op ABgap for temporalis fascia group was 34.99+₋ 5.75db. the mean preop AB gap for cartilage perichondrium group is 33+₋ 7.58db . 3rd month post op mean AB gap for temporalis and cartilage group was 17.75+₋5.54 and 10.35+₋5.84 respectively with a p value of 0.80

- 3) **Singh SPetal⁽⁸⁾** reported that graft uptake rate in the temporalis fascia group was 85% while in the cartilage group patients had a uptake rate of 95% (P<0.001). Loss of graft or partial uptake was there in about 20% of the patients.
- 4) **Chhabra G et al⁽⁹⁾** in his work ,studied 60 patients which were divided into 2 equal halves. 28 /30 patient (93.33%) of cartilage group had complete graft uptake. Remaining 2 patients (6.67%) had residual perforation. Among the 30 patients who underwent tympanoplasty with temporalis fascia graft, 26 (86.67%) were found to have complete graft uptake and 4 (13.33%) had residual perforation.

We concluded that at an individual level, both groups of patients showed satisfactory results in the parameters evaluated. Uptake of the graft was better in patients who underwent tympanoplasty with cartilage perichondrium graft than those who underwent tympanoplasty with temporalis fascia graft – however overall, this result was statistically not significant. Hearing improvement assessed post operatively in both the groups individually was significant.

IV. CONCLUSION

Cartilage is a very effective material for the reconstruction of the tympanic membrane as it provides an excellent anatomical result, perfect stability and good functional outcomes. Otologists have a reliable outcome in tympanic membrane reconstruction with the help of cartilage. The choice of techniques depends on surgeon's preference, the integrity of the ossicular chain, the size of the perforation and various other factors. Despite its rigid quality, cartilage tympanoplasty achieves good audiologic results which are



comparable to tympanoplasty with temporalis fascia graft.

Hence, It can be concluded from the study that cartilage with perichondrium graft is as good a graft material as temporalis fascia graft.

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