

# Outcomes of Tympanoplasty Among Patients of Chronic Otitis Media at Tertiary Medical College, Ajmer : An Observational Study

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## Abstract

**Introduction:** Among various autologous grafts, the following can be used: Temporalis fascia, fascia lata, periosteum, perichondrium, cartilage with and without perichondrium, veins, fatty tissue, and skin. The present study was conducted to evaluate the outcome of tympanoplasty using different types of graft.

**Materials and Methods:** A hospital-based prospective observational study was conducted in Department of ENT and Head and Neck Surgery at JLN Medical College and attached hospital, Ajmer from July 2017 to June 2019. Total 44 (88%) patients who were fulfilling inclusion criteria were included in the present study. All cases selected for the study were evaluated using preformed pro forma. Data were analyzed using Microsoft Excel.

**Results:** Ear discharge was the most common, followed by decreased hearing. Out of 44 patients, in 39 (88.6%) patients, temporalis fascia autograft was placed and in remaining 5 (11.4%) patients, tragal perichondrium was used. Most 35 (79.5%) had graft uptake and 9 (20.5%) patients rejected graft. Association of success rate with graft material was found to be statistically insignificant ( $P > 0.05$ ).

**Conclusion:** Overall graft taken up rate is around 80% in the present study. The results of graft taken up with temporalis fascia and tragal perichondrium were almost similar.

**Key words:** Graft material, Temporalis fascia, Tragal perichondrium, Tympanoplasty

## INTRODUCTION

Chronic otitis media (COM) is defined as the chronic inflammation of the mucoperiosteal lining of the middle ear cleft, that is, Eustachian tube, middle ear, aditus, and mastoid air cells which present with recurrent ear discharge through tympanic membrane perforation. It is the most common cause of hearing impairment in our country. Tympanic membrane perforation associated with COM has been considered as the major indication for tympanoplasty.<sup>[1]</sup>

Various graft materials have been used for tympanic membrane reconstruction such as temporalis fascia graft, perichondrium, vein, dura mater, cartilage, and periosteum.<sup>[2,3]</sup> Temporalis fascia is the most widely used and accepted graft as it is easy to harvest, can be harvested as much as possible in the same incision, adequately firm, and thickness, which is similar to tympanic membrane and is revision surgeries, has low basal metabolic rate so can survive for long time period, and is rich in collagen matrix.<sup>[3]</sup> In 1961, Heerman was the first to use temporalis fascia as the grafting material.<sup>[4]</sup> Tragal perichondrium was first used in tympanoplasty by Victor Goodhill in 1964.<sup>[5]</sup> It, such as a fascia, vein, and Periosteum, is a mesenchymal tissues and for that reason does not desquamate, it is thicker and stiffer than fascia or a vein.

The success rate of the most commonly used graft and fascia temporalis is between 93% and 97% in the primary tympanoplasty, especially in well-aerated middle ears.<sup>[6,7]</sup>

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In the last decade, however, there has been an increasing interest in using cartilage grafts as the primary alternative. The stiffness and strength of cartilage confer greater stability to the graft and have a key role in the resistance against shrinkage. However, there is some concern, that these same characteristics of stiffness and strength may have a negative effect on sound conduction.<sup>[7,8]</sup> The present study was conducted to evaluate the outcome of tympanoplasty using different types of graft.

## MATERIALS AND METHODS

This hospital-based and prospective observational study was conducted in the Department of ENT and Head and Neck Surgery at JLN Medical College and attached hospital, Ajmer from July 2017 to June 2019. Patients above 18 years of age of the patient who had chronic suppurative otitis media, mucosal or tubotympanic type of COM, dry ear for at least 3 weeks, and those having intact ossicular chain with conductive hearing loss were included in the study. The patient having cholesteatoma (Squamous type of COM) and those with sensory neural hearing loss were excluded from the study. Total 50 patients had the tympanoplasty during the study period, of which 44 (88%) patients who were fulfilling inclusion criteria were included in the present study. Six (12%) patients were excluded on the basis of intraoperative findings. A written and fully explained consent stating the voluntary participation of subjects in the study was taken before the enrolment of the subjects. All cases selected for the study were evaluated using preformed pro forma. A detailed history was taken including age, sex, socioeconomic status, occupation, nature, and duration of symptoms. All patients underwent thorough history and ENT examination. A battery of investigation including routine blood investigation, urine examination, X-ray mastoid B/L lateral oblique view, X-ray chest, ECG, pure-tone audiometry, Oto-telescopic examination, and examination under microscopic was performed in all patients. Tuning fork tests were performed. Quantitative hearing evaluation was performed by pure-tone audiometry. The patients were planned for surgery after proper investigations and pre-anesthetic check-up and clearance. Pre-anesthetic check-up and xylocaine sensitivity testing of all the patients were conducted. The procedure was undertaken under local anesthesia. All the surgeries were performed by retroauricular approach. Graft used was temporalis fascia and tragal perichondrium. Postoperatively, patients were given antibiotics and antihistaminic. Stitches were removed after 7 days. Clinical evaluation of subjective and objective hearing improvement following surgery with tuning fork test was done. Patients were evaluated for healing, graft uptake, and hearing. Microscopic examination was performed after 3 months to evaluate the condition

of the graft. Hearing evaluation was done by audiometry recording air conduction and bone conduction of all these patients for 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz preoperatively and after 3 months of procedure. Hearing results were reported using the guidelines recommended by the WHO and committee on hearing and equilibrium of the American Academy of Otolaryngology-Head and Neck Surgery for the evaluation of result of the treatment of conductive hearing loss. This includes reporting of the mean, standard deviation and range of the post-operative air-bone gap (AB gap), the number of decibels of change in the AB gap, and the change in high-tone bone-conduction level.<sup>[5,6]</sup> Successful outcome was defined as complete healing of the perforation.

## RESULTS

In the present study, most 35 (79.5%) patients were of 18–40 years age group and rest 9 (20.5%) were >41 years old. Around two-thirds 68.2% (30/44) patients were female and female-to-male ratio was 2.14:1. All patients had ear discharge, while second most common symptom was decreased hearing among 36 (81.8%) patients and 11 (25%) patients had earache. All patients had central perforation with more than half 26 (59.1%) had large size perforation, followed by moderate size in 13 (29.5%) and small size perforation was seen among 5 (16.4%) patients. More than half 61.4% (27/44) had hearing loss ranging from 41 to 60 dB, followed by 26–40 dB hearing loss in 29.5% (13/44) patients and least 4 (9.1%) had 61–80 dB hearing loss.

Table 1 depicts that hearing loss is proportionate to the size of perforation among patients and association of hearing loss with size of perforation was statistically significant ( $P < 0.05$ ). The grafting technique and use of grafting material were decided by the operating surgeon [Figure 1]. Among maximum 39 (88.6%) patients, temporal fascia was used as grafting material and rest 5 (11.4%) patients had tragal perichondrium as graft [Graph 1].

Table 2 among cases who had graft of temporal fascia, success rate was 79.5% and similar rate of success (80%) was seen among cases who had graft of tragal

**Table 1: Association of size of perforation with level of hearing loss**

Size	PTA			Total %	Test of Significance
	26–40 dB	41–60 dB	61–80 dB		
Small	4 (80)	1 (20)	–	5 (100)	$\chi^2=9.614$ , df=4, $P=0.047$
Medium	4 (30.8)	9 (69.2)	–	13 (100)	
Large	5 (19.2)	17 (65.4)	4 (15.4)	26 (100)	

PTA: Pure-tone audiometry

**Table 2: Association of status of graft with graft's material**

Status of graft	Type of material		Test of significance
	Temporal fascia	Tragal perichondrium	
Taken up	31 (79.5)	4 (80)	$\chi^2=0.316$ ,
Rejected	8 (20.5)	1 (20)	Df=1,
Total	39 (100)	5 (100)	P=0.574



**Figure 1: Taken up temporalis fascia graft**



**Figure 2: Taken up tragal perichondrium graft**

perichondrium. Moreover, this difference in success rate was statistically not significant ( $P > 0.05$ ) [Figure 2].

Out of 44, most 79.5% (39/44) patients who had taken up graft successfully were evaluated for postoperative hearing gain. Out of 35 patients, maximum 22 (62.9%) had 11–20 dB post-operative hearing level, followed by 12 (34.3%) patients had 0–10 dB and only one (2.9%) patient had 21–30 dB post-operative hearing level. In the present study, graft rejection 9 (20.5%) and post auricular wound gaping 7 (15.90%) were main complications. Cases with

post-auricular wound gaping were treated conservatively with antibiotics and all cases did well following conservative management.

## DISCUSSION

From the beginning of ear surgery, various graft material for tympanic membrane reconstruction were tried. Graft material provides as a scaffold, on which remnant tympanic membrane grows. Temporalis fascia, tragal perichondrium, cartilage, and various other methods have been used. The present hospital-based and prospective observational study was conducted in the Department of ENT and Head and Neck Surgery at JLN Medical College and attached hospital, Ajmer from July 2017 to June 2019. The aim of the study was to study the, take up rate and hearing gain in type 1 tympanoplasty using different type of graft material.

The study consisted of 50 patients of CSOM (tubotympanic disease, dry for at least 3 weeks). Out of 50, six were excluded from the present study based on intraoperative findings. Maximum numbers of patients were seen in the age group 18–40 years in the present study (79.5%).

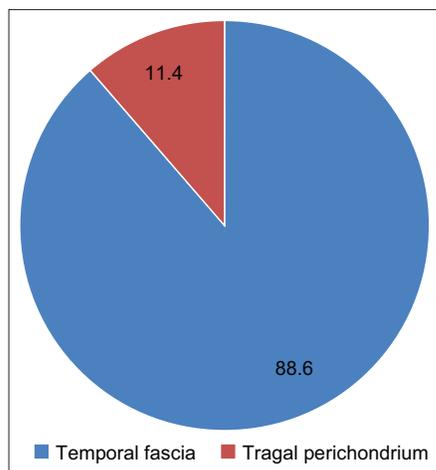
Younger patients were more in the present study; reasons may be onset of COM early in life and patients having active life seeking early advice for deafness. In the present study, the ratio of female: male population was 2.14:1 which was comparable to the study by Thakur *et al.*<sup>[8]</sup> and Mahmud *et al.*<sup>[9]</sup>

The most common chief complaint was ear discharge (100%) which was similar to Parida.<sup>[10]</sup>

Majority of the patients operated had large perforation (59.1%) which was almost similar to the studies by Thakur *et al.*<sup>[8]</sup> and Jaiswani<sup>[11]</sup> constituting 47% and 40%, respectively.

Table 1 shows that hearing loss was proportionate to the size of perforation in majority of the patients similar to Mehta *et al.*<sup>[12]</sup> In the present study, success rate using temporalis fascia autograft and tragal perichondrium was 79.5% and 80%, respectively, though numbers of cases are small to make any conclusion [Table 2]. Singh *et al.*<sup>[13]</sup> also state that use of the different graft materials has similar results in graft up take. It can be concluded the type of graft does not alter the outcome of the surgery.

Out of 44, most 79.5% (39/44) patients who had successful graft take up were evaluated for postoperative hearing gain. In the present study, 22 (62.9%) cases had post-operative hearing levels between 11 and 20 dB, followed by 12 (34.3%) cases had post-operative hearing level between 0 and 10 dB, whereas in a study by Sergi



**Graph 1: Distribution of type of graft material**

*et al.*,<sup>[1]</sup> 46.15% cases had post-operative hearing level between 0 and 10 dB and 32.69% had hearing level ranging between 11 and 20 dB.

In the present study, post-auricular wound gapping and graft rejection were main complications which were 15.90% and 20.5%, respectively. In a study by Fukuchi *et al.*,<sup>[14]</sup> post-auricular wound gapping and graft rejection were seen in 22% and 46% of the cases.

## CONCLUSION

The present study depicted that results of graft taken up with temporalis fascia and tragal perichondrium were almost similar. Thus, it can be concluded that the success rate of graft does not depend on the type of graft.

## Limitations

The number of cases taken for study purpose is less. Further study on large population needs to be done.

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