

## Research Article

# Temporalis Fascia Grafting in Large/Subtotal Perforation; A Review of 60 Cases

Pradeep Pradhan<sup>1\*</sup>, Priti Lal<sup>2</sup>, and V P Venkatachalam<sup>2</sup><sup>1</sup>Department of Otorhinolaryngology, All India Institute of Medical Sciences, India<sup>2</sup>Department of Otorhinolaryngology, Safdarjung Hospital & Vardhmann Mahavir Medical College, India

## \*Corresponding author

Pradeep Pradhan, Department of Otorhinolaryngology, All India Institute of Medical Sciences, Bhubaneswar, Odisha, Pin-751019, India, Tel: 91 9968634053; Email: padiapradhan@gmail.com

Submitted: 23 March 2017

Accepted: 29 May 2017

Published: 31 May 2017

ISSN: 2475-9473

## Copyright

© 2017 Pradhan et al.

## OPEN ACCESS

## Keywords

- Large/subtotal perforation
- Temporalis fascia
- Type I tympanoplasty

## Abstract

**Objective:** To demonstrate the surgical techniques and to compare the anatomical and functional outcomes of type I underlay tympanoplasty using temporalis fascia graft in patients with large/subtotal perforation.

**Material method:** Temporalis fascia grafting has been done in 60 patients having large/subtotal perforations. Pure tone audiogram (PTA) and speech reception thresholds (SRT) were carried out preoperatively and each postoperative visit i.e. at the end of 1, 3 6 and 24 months. 10 dB closure of air bone gap and 10 dB improvement in SRT were considered significant.

**Results:** The graft uptake rates were 92% the end of 24 months. 90% of patients had significant improvement in hearing (ABG  $\geq$ 10 dB). The mean improvement of the SRT was 10 dB and 75% of the patients had significant gains in SRT.

**Conclusion:** Repair of large or subtotal perforation has been always a challenge to the otologist and temporalis fascia graft is an ideal autograft for the above purpose. Circumferential elevation of tympanomeatal flap can be effectively performed to have a better anatomical and functional outcome in patients undergoing type I tympanoplasty for large and subtotal perforation.

## INTRODUCTION

Although temporalis fascia grafts are considered as the gold standard for the repair of tympanic membrane defect in chronic otitis media (COM), it is challenging for subtotal/large perforation due to its poor graft uptake rate. It could be due to the presence of minimal residual tympanic membrane (TM) left for the lateral support of the graft. Although anatomical outcome has been satisfactorily documented using autologous cartilage graft, the variable hearing outcome has been documented by past literatures in the postoperative period [1,2]. Our aim is to demonstrate the long term anatomical and functional outcomes of type I underlay tympanoplasty using temporalis fascia graft in patients with COM with large/subtotal central perforations.

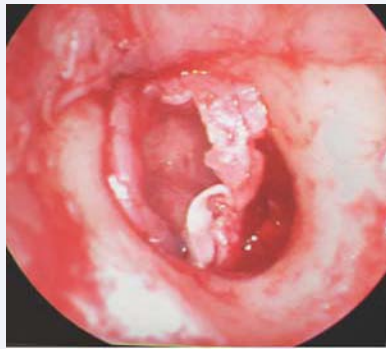
## MATERIALS AND METHODS

This is a prospective study conducted in the department of Otolaryngology at Safdarjung hospital from July 2012 to June 2015. A total of 60 patients with COM with large/subtotal perforations were included in the study. All of them underwent type I tympanoplasty using temporalis fascia graft. Patients with ossicular chain discontinuity, conductive hearing loss due to acquired and congenital conditions other than tympanic

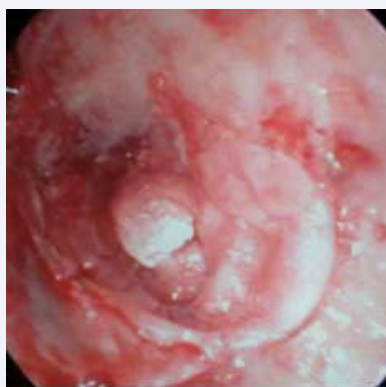
membrane perforation, sensorineural deafness and revision surgeries were excluded. Pure tone audiogram and speech reception thresholds were done preoperatively in each patient.

## Surgical technique

Patients were operated under local anaesthesia through post aural/endastral approach. Temporalis fascia graft was harvested in each patient. The margins of the perforations were freshened. Circumferential tympanomeatal flap along with fibrous annulus was elevated all around from the bony annulus keeping it pedicled at 12 to 1 o' clock anterosuperiorly (Figure 1). Ossicular continuity was assessed. Underlay grafting of temporalis fascia were carried out by extending it anterosuperiorly over the lateral wall of the eustachian tube and was secured medially by placing gelfoams in the Eustachian tube and in the middle ear. Tympanomeatal flap was then repositioned back after ensuring that the flap and the graft were closely approximated to each other circumferentially (Figure 2). The external auditory canal was packed with medicated gelfoam. The postaural/endastral incision was closed with double layer suturing and a dressing was placed. Patients were discharged after 24 hours of observation in the postoperative period.



**Figure 1** Endoscopic picture showing circumferential elevation of tympanomeatal flap.



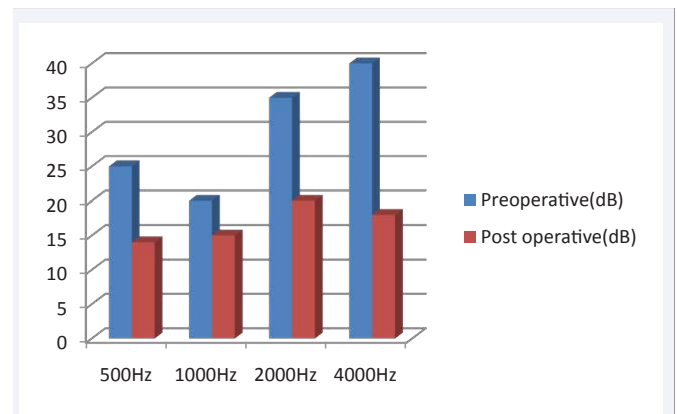
**Figure 2** Endoscopic picture showed reposition of circumferential flap over the graft.

The first postoperative visit was advised after one week for the removal of aural pack and the sutures. Afterwards, patients were advised to visit the outpatient department at the end of 1, 3, 6 months and 24 months after operation. Pure tone audiogram (PTA) and speech reception threshold (SRT) were carried out in each patient postoperatively at each follow-up visit. Air conduction and bone conduction threshold were calculated at 500, 1000, 2000 and 4000 Hz frequency. The preoperative audiogram was compared with the final postoperative audiogram and  $\geq 10$  dB improvement in both air gaps (ABG) in air conduction threshold and SRT were considered significant. Otomicroscopic examination of the operated ears were carried out in each follow-up visit to assess the graft uptake and complications that would have been occurred in the follow-up periods.

**RESULTS**

Of 60 patients 38(63.33%) were males and 22 (36.67%) were females. Type I tympanoplasty using temporalis fascia graft and cartilage palisades were performed in all patients. Demographic data and the results were described in the Table (1). The graft uptake rate in the patients with temporalis fascia was found to be 93.33% (56) and 4 had residual perforation noticed after 1 months of surgery. At the end of 06 months graft uptake rate was 92%, i.e. 5 patients had residual perforation. The mean preoperative and postoperative air conduction hearing

threshold in temporalis fascia group were found to be  $30.23 \pm 7.77$ dB and  $14.60 \pm 4.6$  dB respectively, with 15.63 dB closure of the air bone gap (AB gap).60% (36) of the patients had presented with  $\geq 15$  dB closure of ABG. In 30% (18) of the patients, ABG closure was found between 10 and 15 dB and in 10% (3) patients improvement in hearing was insignificant (ABG<10 dB). Considering the hearing gain at individual frequencies (i.e.500Hz, 1000Hz, 2000Hz and 4000Hz), ABG was found to be improved at each frequency level. The mean preoperative ABGs with the corresponding frequencies were found to be 25dB, 20dB, 35dB and 40 dB and the mean improvement in ABGs were found to be 11 dB, 5 dB,15 dB and 22 dB. Again the mean preoperative and postoperative SRT were found to be 25dB and 15 dB. The mean improvement of the SRT was found to be 10 dB.75% (45) of patients had significant improvement in the SRT ( $\geq 10$  dB). There was no significant intraoperative complication noted and no patient was found with lateralisation of the graft or blunting of anterior angle.



**Figure 3** Postoperative closure of AB gap in patients with temporalis fascia grafting (n=60).

**Table 1:** Description of preoperative and postoperative data in the study population.

Characteristics	Temporalis fascia grafting
Male	38
Female	22
Age (year)	
Mean	28
Range	17-32
Surgical approach	
End aural	35
Post aural	25
Surgical outcomes.	
Graft uptake rate	92%
Preoperative PTA	$30.23 \pm 7.77$ dB
Postoperative PTA	$14.60 \pm 4.6$ dB
SRT (speech reception threshold)	
Preoperative (dB)	25
Postoperative (dB)	15

## DISCUSSION

Type I tympanoplasty is one of the commonest surgical procedures performed in any otologic clinic for the reconstruction of the tympanic membrane defect. Although temporalis fasciagraft can be effectively used for small and medium size perforations, it is always challenging for large/subtotal perforation where the poor success rate is often anticipated. Looking into the literature, there are different studies conducted in the past demonstrating the effectiveness of temporalis fascia graft in tympanic membrane grafting [3-10]. In the present study also, we have obtained encouraging postoperative results of the temporalis fascia in type I tympanoplasty. The graft uptake rate in patients with cartilage palisades was 92% and the mean closure of the AB gap in the fascia group was 15 dB which was supported by Kalcioğlu MT<sup>1</sup> et al. [11]. According to Gerber et al. [12] and also in the present study, there was comparable improvement in the SRT in between patients undergoing tympanoplasty using cartilage palisade and temporalis fascia graft. The mean gain in SRT was found to be 10 dB and 75% of patients had significant improvement in the SRT ( $\geq 10$  dB). When it was considered at individual frequency, it has been found that patients had ABG a teach frequency level and was maximum towards the higher frequency. Again, as described by Jalali MM et al. [13], both the cartilage and temporalis fascia had the similar graft uptake rate and the hearing outcome which was supported by Övet G et al. [14], and Yang T et al. [15]. The encouraging anatomical and functional results may be due to the circumferential flap elevation from the bony annulus. In our cases the anatomical and functional outcome was better than the previous studies and that could be due to the flap technique applied in the tympanoplasty. We have elevated the tympanomeatal flap all around the bony annulus which was pedicled at the 12 'o' clock position and later allowed to rest closely over the temporalis fascia graft. Due to the close approximation between the graft and the flap, the graft displacement and lateralisation had been significantly decreased leading to significantly better anatomical results.

## CONCLUSION

Repair of large or subtotal perforation has been always a challenge to the otologist and temporalis fascia graft is an ideal autograft for the above purpose. Circumferential elevation of tympanomeatal flap can be effectively performed to have a better anatomical and functional outcome in patients undergoing type I tympanoplasty for large and subtotal perforation.

## REFERENCES

1. Iacovou E, Vlastarakos PV, Panagiotakopoulou A, Chrysostomou M,

- Kandiloros D, Adamopoulos G, et al. Effect of type I tympanoplasty on the resonant frequency of the middle ear: comparison between chondrotympanoplasty and fascia grafting. *J Otolaryngol Head Neck Surg.* 2012; 41: 14-19.
2. Kazikdas KC, Onal K, Boyraz I, Karabulut E. Palisade cartilage tympanoplasty for management of subtotal perforations: a comparison with the temporalis fascia technique. *Eur Arch Otorhinolaryngol.* 2007; 264: 985-989.
3. Singh GB, Ranjan S, Arora R, Kumar S. Role of circumferential subannular tympanoplasty in anterior and subtotal perforations. *J Laryngol Otol.* 2017; 131: 123-127.
4. Nardone M, Sommerville R, Bowman J, Danesi G. Otol Neurotol. Myringoplasty in simple chronic otitis media: critical analysis of long-term results in a 1,000-adult patient series. 2012; 33: 48-53.
5. Labatut P, Sierra C, Mora E, Cobeta I. Miringoplastias primarias. Resultados a los 2 años de seguimiento. *Acta Otorrinolaringol Esp.* 2009; 60: 79-83.
6. Altuna X, Navarro JJ, Martínez J, Lobato R, Algaba J. Miringoplastia con cartilago "en isla". Resultados anatómicos y funcionales en 122 casos. *Acta Otorrinolaringol Esp.* 2010; 61: 100-105.
7. Avilés Jurado FJ, Merán Gil JL, Tobed Secall M, Doménech Vadillo E, Masgoret Palau E, Martínez Novoa MD. Miringoplastia: seguimiento auditivo y estudio de los factores pronósticos. *Acta Otorrinolaringol Esp.* 2009; 60: 169-175.
8. Yu Yuasa, Ryo Yuasa. Post-operative results of simple underlay myringoplasty in better hearing hears. *Acta Otolaryngol.* 2008; 128: 139-143.
9. Bhat NA, De R. Retrospective analysis of surgical outcome, symptom changes, and hearing improvement following myringoplasty. *J Otolaryngol.* 2000; 29: 229-232.
10. Vartiainen E, Nuutinen J. Success and pitfalls in myringoplasty: follow-up study of 404 cases. *Am J Otol.* 1993; 14: 301-305.
11. Kalcioğlu MT, Tan M, Croo A. Comparison between cartilage and fascia grafts in type 1 tympanoplasty. *B-ENT.* 2013; 9: 235-239.
12. Matthew J. Gerber, John C. Mason, Paul R. Lambert. Hearing Results after Primary Cartilage Tympanoplasty. *Laryngoscope.* 2000; 110: 1994-1999.
13. Jalali MM, Motasaddi M, Kouhi A, Dabiri S, Soleimani R. Comparison of cartilage with temporalis fascia tympanoplasty: A meta-analysis of comparative studies. *Laryngoscope.* 2016.
14. Övet G, Alataş N, Şentürk M, Güzelkara F. Pediatric Type 1 Cartilage Tympanoplasty: Comparison between Graft Success Rates and Hearing Results in Adults. *J Int Adv Otol.* 2016; 12: 257-260.
15. Yang T, Wu X, Peng X, Zhang Y, Xie S, Sun H. Comparison of cartilage graft and fascia in type 1 tympanoplasty: systematic review and meta-analysis. *Acta Otolaryngol.* 2016; 136: 1085-1090.

### Cite this article

Pradhan P, Lal P, Venkatachalam VP (2017) Temporalis Fascia Grafting in Large/Subtotal Perforation; A Review of 60 Cases. *J Ear Nose Throat Disord* 2(2): 1021.