

Evaluation of healing and hearing of grafted materials used in tympanoplasty

M K Bose^{1*}, Manoj Kumar²

¹Assistant Professor, ²Sr. Resident, Department of ENT, Darbhanga Medical College and Hospital, Bihar, INDIA.

Email: drmkbose@gmail.com

Abstract

Problem Statement: Tympanoplasty operation could prevent recurrent infection from external canal source by making the ear waterproof. It also would convert the open middle ear into a cul – de – sac, so that free flow of air could prevent the infected mucus up the Eustachian tube from the nasopharynx. So by this simple tympanoplasty operation the ear could also be protected from further damage by the diseased process. **Methods:** The present study was carried out in the otolaryngology Department of Darbhanga Medical College and Hospital, 110 subjects were selected from the outpatient department of otolaryngology, 47 subjects were male and 63 were female ranging from 12 to 50 years. 104 ears were operated under local anaesthetic infiltration with 2% lignocaine in adrenaline (1:1,00,000). Of these patients premeditation was given as follows in 54 cases of Large to moderate size perforation operated post aurally. **Result:** After elevating the posterior tympanomeatal flap in 60 cases of large and moderate size perforation. The graft so preserved (Temporalis fascia, Tragal perichondrium and areolar tissue was placed by underlay technique i.e. the graft material was placed in between the handle of the malleus and the elevated tympanomeatal flap. The tympanomeatal flap was then reflected back over the grafting tissue to its original position. 110 Patients suffering from unilateral chronic suppurative otitis media had undergone Type –I tympanoplasty. 104 cases were operated under local anaesthesia and 6 cases were operated under general anaesthesia. Four types of autogenous tissues were used as grafting material. Temporalis fascia was used in 40 cases, Tragal perichondrium in 10 cases, Areolar tissue in 10 cases, and Fat from Lobule of same ear in 50 cases. The age of the subject in this present study ranged from 13 years to 48 years. The maximum numbers of subjects were in age group 21-30 year, followed by 31 subjects in 30-40 years, followed by 27 and 14 subjects in 11-20 year and 40-50 years age group respectively Mean age was 28.9 years. **Conclusion:** The younger age group had less impairment of hearing than that of the older age group in chronic suppurative otitis media with central perforation. It is also observed that the larger the size of the perforation greater was the degree of hearing impairment pre operatively. Post operatively also successful hearing was achieved only in 63% of patients with large perforation.

Key Words: tympanoplasty, suppurative otitis media, temporalis fascia, areolar tissue.

*Address for Correspondence:

Dr. M K Bose, Assistant Professor, Department of ENT, Darbhanga Medical College and Hospital, Bihar, INDIA.

Email: drmkbose@gmail.com

Received Date: 13/01/2018 Revised Date: 20/02/2018 Accepted Date: 05/03/2018

DOI: <https://doi.org/10.26611/1016531>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:
10 March 2018

INTRODUCTION

Chronic otitis media is the chronic inflammation of mucoperiosteal lining of the middle ear cleft characterized by ear discharge, a permanent perforation

of the tympanic membrane and impairment in hearing. It 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 habits.¹⁻³ It is a major cause for deafness in India.⁴ Tympanoplasty is now an established surgery for tympanic membrane perforations being carried out routinely by otorhinolaryngologists.⁵ Autologous graft materials such as, temporalis fascia, tragal perichondrium, cartilage, fat, and fascia lata have stood the test of time in repairing tympanic membrane perforations. Such abundance of materials implies that there is no clear cut favorite and the choice of graft material depends on individual surgeon's preference.^{6,7} However, due to its anatomic proximity, translucency, and suppleness,

temporalis fascia is the most preferred grafting materials among the otologists and successful closure is anticipated in approximately 90% of primary tympanoplasties. Failure rates are higher in larger perforations with temporalis fascia as a graft material.^{8,9} Graft displacement, improper placement,¹⁰ autolysis, infection, hemorrhage, dysfunction are the known contributing factors for the failure of closure of perforation. Thus, consistent achievement of good hearing is still a challenge and one of the most difficult tasks of otology surgery. Keeping all these factors in mind and in the light of good results, the present comparative study of different graft materials, that is, temporalis fascia, tragal perichondrium, and fascia lata in underlay tympanoplasty was undertaken to evaluate the postoperative graft take-up and hearing improvement.

MATERIAL AND METHODS

The present study was carried out in the otolaryngology Department of Darbhanga Medical College and Hospital, 110 subjects were selected from the outpatient department of otolaryngology, 47 subjects were male and 63 were female ranging from 13 to 48 years, average being 28.9 yrs. The period of study was from January 2016 to February 2017 starting from the pre-operative assessment to post-operative follow up all findings were noted. All the selected 110 ears were operated under operative

microscope model Zeiss OPMI-1 using the magnification of 0.4 to 0.6 with 12.5 x eye piece and 200mm lens. 104 ears were operated under local anaesthetic infiltration with 2% lignocaine in adrenaline (1:1,00,000). Of these patients premeditation was given as follows in 54 cases of Large to moderate size perforation operated post aurally. The premeditation was administered ½ an hour before the patient was taken to operation theatre. Six ears were operated under general anaesthesia with endotracheal intubation with hypotensive technique. After shaving and antiseptic dressing of the planned temporal area. Subjects were taken to operation theatre. The subject was placed supine on the operating table with the head supported on a rubber ring and rotated to the opposite side. The entire table was tilted head up slightly (about 30°). The neck was in extended position. Antiseptic dressing with Betadine solution and rectified spirit then the operated area was covered with sterile drapes. Then local anaesthetic infiltration of the ear was done in 104 cases. Temporalis fascia and Areolar tissue was taken out from the same site of operated ear by extension of postauricular incision for Type –I. Tympanoplasty. The temporalis fascia areolar tissue was identified and taken out of adequate size. Perichondrium was taken from the tragus of the same ear. A vertical incision was made lightly on medial aspect of the tragus starting from the incisura terminlis to the inter-tragic notch.

RESULT

Table 1: Age distribution

Age (in years)	No. of subjects
0 – 10	1
11-20	27
21 – 30	37
31 – 40	31
41 – 50	14

Table 2: Pre-investigation profile of x-ray

X- Ray Mastoids	Sclerotic - 81 cases
	Cellular - 29 cases
X-ray PNS	Hazy - 27 cases
	(Mucosal Thickening)
	Normal - 83 cases.

Table 3: Impairment of hearing in relation to age

Group	Age (Year)	Average A-B gap range (dB)	Mean A-B gap (dB)
I	11-20	24.0 to 25.5	25.3
II	21 – 30	23.2 to 28.0	26.3
III	31 – 40	25.2 to 32.0	27.3
IV	40-50	22.0 to 39.0	34.6

Table 4: Audiometric assessment to site of perforation

	No of cases	Average A – B gap range (dB)	Mean A – B gap (dB)
Anterior perforation	40	17.4 – 30.5	24.3
Posterior perforation	24	20.1 – 33.2	28.5
Central perforation	46	24– 39.0	35.4

Table 5: Graft materials used in type-i tympanoplasty

Materials used	No. of cases
Temporalis fascia	40
Tragal perichondrium	10
Areolar tissue	10
Fat from ear lobule	50

Table 6: Type -1 tympanoplasty with different sizes of perforation

Perforation size	No. of cases	Successful closure of perforation	Mean pre operative A-B gap (dB)	Mean post operative A-B gap (dB)	Mean improvement of hearing (dB)
Small	64	59 (92%)	22.9	14.4	8.3
Large	46	41 (89%)	38.3	27.1	9.7

Table 7: Type -1 tympanoplasty with different grafting materials

Material used	No. of cases	Successful closure of perforation	Mean pre operative A-B gap (dB)	Mean post operative A-B gap (dB)	Mean improvement of hearing (dB)
Temporalis fascia	40	38 (95%)	36.2	25.3	8.8
Tragal perichondrium	10	9 (90%)	33.0	24.1	7.9
Areolar tissue	10	8 (80%)	33.1	23.1	9.1
Fat from ear lobule	50	45 (90%)	21.65	15.3	7.2

DISCUSSION

In the present study of 110 cases using four autogenous graft materials successful closure was seen in 91% cases with successful hearing of 74% cases. Hough (1970) in his study achieved hearing improvement any average 81.1% ay cases.

Table 8: Other authors and their results

Author	Successful closure
Haegemann M (2003) using Adipose tissue	91%
Cueva RA (1999) using Areolar tissue	97.5%
Lubianca. Neto JF using temporal fascia and tragal perichondrium	90%
Palva and Palva (1969)	93%
Strauss <i>et al</i> (1975)	82%
Stungeland (1977)	93%
Gibb AG (1982)	89.3%
Bcnecke Je (1995)	90%
Perez Cauo Rios (2002)	85.59%
Present Study (2016)	91%

Trombetta (1963) mentioned few condition that had to be fulfilled for a graft to remain viable in the middle ear surgery.

1. The field must be dry and free of infection.
2. The graft should be kept immobile not to be dislodged by middle ear air movement
3. The graft should get adequate blood supply

Table 9: A bubble of air must be maintained in the middle ear to prevent adhesion with the middle ear structures.

Grafts used	No. of Failure
Temporalis fascia (40)	2
Tragal Perichondrium (10)	1
Areolar Tissue (10)	2
Ear lobule Fat (50)	5

Healing of the perforation was complete in most of the cases in 2-3 months except in 2 cases of tragal perichondrium which took about 4 months for healing. Five failures, one in tragal perichondrium and two each in temporalis fascia and areolar tissue were seen in large perforations. Three of them rejected within 6 weeks of post operative period (2 areolar tissue and 1 of temporalis fascia). In other two cases rejection occurred after 10 weeks with history of acute otitis media and discharge. So the early failure might be due to large perforation there by getting poor blood supply and less attachment with rim of perforation margin or may be due to post operative infection due to poor hygiene and unattentive post operative advice. Four cases of temporal fascia developed small perforations after 3-4 months. Two of the cases responded to trichloroacetic acid cautery while other two responded to fat myringoplasty (mini-myngopalsty). Five failures also occurred in tiny perforation using ear lobule fat. One week after the operation fat graft was in situ in 38 cases out of 50 cases. In remaining 12 (24%) cases fat graft were displaced 7 (14%) cases perforation decreased in size and healed conservatively in remaining 5 (10%) perforation increased in size, and these were the failure of tympanoplasty. Cause of failure may be infection despite antibiotic coverage, respiratory tract infection producing cough and sneezing leading to graft displacement. And continuing pond bathing even after advice of not to. Later complication in this present study was deformed tragal height due to loss of replaced cartilage in two cases. No other complication was seen within this follow up period of 6 months.

CONCLUSION

The graft were placed by underlay technique, when using temporalis fascia, Tragal Perichondrium and Areolar

tissue but directly into perforation when might fat 6 month from ear lobule. Postoperative follow up was carried out up to 6 months. The comparative analysis of the material used for the tympanoplasty and their results with regard to successful repair of the tympanic membrane defect and subsequent improvement of hearing.

REFERENCES

1. Jung TT, Hanson JB. Classification of otitis media and surgical principles. *Otolaryngol Clin North Am* 1999; 32:369-83.
2. Saha AK, Munsri DM, Ghosh SN. Evaluation of improvement of hearing in type I tympanoplasty and its influencing factors. *Indian J Otolaryngol Head Neck Surg* 2006; 58:253-7.
3. Chandra KS. Combined effect of eustachian tube function and middle ear mucosa on tympanoplasty. *Indian J Otol* 2006; 12:26-7.
4. Singh M, Rai A, Bandyopadhyay S. Middle ear microsurgery in India: A retrospective audit study. *Indian J Otolaryngol Head Neck Surg* 2006; 58:133-6.
5. Sadé J, Berco E, Brown M, Weinberg J, Avraham S. Myringoplasty: Short and long-term results in a training program. *J Laryngol Otol* 1981; 95:653-65.
6. Gibb AG, Chang SK. Myringoplasty (A review of 365 operations). *J Laryngol Otol* 1982;96:915-30.
7. Dabholkar JP, Vora K, Sikdar A. Comparative study of underlay tympanoplasty with temporalis fascia and tragal perichondrium. *Indian J Otolaryngol Head Neck Surg* 2007;59:116-9.
8. Booth JB. Myringoplasty. The lessons of failure. *J Laryngol Otol* 1974; 88:1223-36.
9. Booth JB. Myringoplasty - Factors affecting results. Final report. *J Laryngol Otol* 1973; 87:1039-84.
10. Herman MK. Tang: The perforated ear-drum: To repair or not? *Hong Kong J Online* 1989; 11:124-5.

Source of Support: None Declared
Conflict of Interest: None Declared