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Research article

ROLE OF COMPOSITE GRAFT IN TYPE 1 TYMPANOPLASTY

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ABSTRACT

Type 1 tympanoplasty is done to reconstruct the tympanic membrane. There is evolution of tympanic membrane grafting with various graft materials**.** Temporalis fascia is most commonly used but there is rise in use of tragal cartilage-perichondrium (composite graft) as it offers resistance from middle ear pressure changes and provides excellent acoustic results. The aim of our study was to compare the functional outcome of temporalis fascia and tragal cartilage-perichondrium (composite graft) as graft materials for the Type I tympanoplasty. A total of 80 cases in the age group of 11-60 years with chronic suppurative otitis media were studied. They were divided into group A and group B with 40 cases in each group. Temporalis fascia graft was used in Group A while tragal cartilage-perichondrium (composite graft) was used in Group B. The results were evaluated in the form of graft take-up and acoustic gain. The male to female ratio was found to be 1.17:1. Majority (41.25%) patients were of age group 11-20 years. Graft uptake rate at the end of 1-year follow-up in Group A and B were 90% and 97.5% respectively. Post-operative air-bone gap closure <10 dB in Group A and B were 85% and 77.5% respectively. Our study showed that functional outcome with respect to graft uptake was comparatively better in the tragal cartilage-perichondrium (composite graft) group. The temporalis fascia group showed better AB gap closure. Composite graft is a suitable alternative to temporalis fascia as it provides protection from retraction pocket formation and re-perforation with minimal interference in the sound transmission.

Keywords: Type 1 Tympanoplasty, Composite graft, Temporalis fascia.

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INTRODUCTION

Tympanic membrane reconstruction is done in myringoplasty whereas in type 1 tympanoplasty, clearance of disease from middle ear plus reconstruction of tympanic membrane is done. Tympanoplasty is done to reconstruct the tympanic membrane as well as the sound conducting mechanism. A wide variety of autologous grafting material have been used for tympanoplasty which includes cartilage [1, 2] perichondrium [3], periostium [4], vein [5], dura mater [6] and most commonly, temporalis fascia [7].

Temporalis fascia is composed of irregularly arranged elastic fibres and fibrous connective tissue. For this reason postoperative dimensions of temporalis fascia are unpredictable.

Salen and Jansen first reported the use of composite graft for tympanic membrane reconstruction in dimensions remains the same. It is nourished by diffusion and show great adaptation with tympanic membrane.

1963 [8, 9]. Cartilage has a constant shape, firmer than fascia and also lack fibrous tissue, so that postoperative

AIM

To compare the functional outcome of composite graft over temporalis fascia graft in type 1 tympanoplasty with respect to graft uptake and air bone gap closure.

MATERIALS & METHODS

A total of 80 cases in the age group of 11-60 years, attending the Department of Otorhinolaryngology, Silchar Medical College & Hospital, Silchar with chronic suppurative otitis media during the study period were studied. The present study was a prospective observational study conducted for a period of 4 years, from August 2011 to July 2015.

Inclusion Criteria

- Patient with chronic otitis media with safe variety.
- Pure conductive hearing loss.
- Dry ear for 2 months.

Exclusion Criteria

- Patient with unsafe variety of CSOM.
- Patient with ossicular chain defect.
- Patients with complications of CSOM.
- Any systemic disease making patient unsuitable for surgical procedure.

A comprehensive history was taken and detail examination of ear, nose, paranasal sinuses and throat was done. Full emphasis was given on otomicroscopy and pure tone audiometry. All patients were advised HRCT temporal bone.

Patients were randomly divided into two groups (group A and group B), each group comprising of 40 patients. Group A were subjected to tympanoplasty with temporalis fascia graft while the Group B underwent with Cartilage with temporalis fascia/perichondrium.

- All surgeries were done under general anaesthesia after obtaining full informed consent. Post-auricular approach with underlay grafting technique was opted in all the cases.
- Local infiltration was given in post auricular region and four quadrant of external auditory canal using 2% xylocaine with 1:200,000 adrenaline.
- The margins of the perforation were freshened. Vascular strip incision was made with elevation of posterior tympanomeatal flap to expose the middle ear.
- Temporalis fascia graft was harvested and placed by underlay technique for Group A patients.
- In group B, cartilage graft was harvested from symba concha or tragal cartilage. Cartilage piece was placed under the TM remnant. Then temporalis fascia or perichondrium was placed lateral to the cartilage.
- The tympanic membrane was examined after 3 weeks to determine the condition of the graft. Follow-up was done at 6 weeks, 12 weeks and 6 months. Pure tone audiometry was done and changes in hearing were compared with preoperative audiogram.
- Student's t test was used for the statistical analysis. The difference was accepted as statistically significant if the value of p was <0.05.

RESULTS AND OBSERVATIONS

A total of 80 patients were studied with most of the patients in the age group of 11-20 years (41.25%), followed by age group 21-30 years (28.75%). While 54% were males, 46% were females.

Majority of the patients presented with disease in the right ear (61.25%) followed by 38.75% having disease to the left. Pre operative tympanic membrane perforation size were divided into small (<25% pars tensa involved), mild (25%-50% pars tensa involved), moderate (50%-75% pars tensa involved) and large (>75% pars tensa involved). The perforation size in group A and group B showed in the table below. All the perforations were central perforation. The success rate of tympanic membrane closure with temporalis fascia (Group A) at 3, 6, and 12 months postoperatively were 98%, 95% and 90% respectively. While Group B that underwent perforation closure using composite graft (cartilage with temporalis fascia/ perichondrium) had graft uptake rate of 100% after 3 months postoperatively and 98% after 6 and 12 months postoperatively.

Hearing was assessed at 3, 6, 12 months post-operatively using audiometry. Air–bone gap closure of <10 dB at one year follow up when temporalis fascia graft was used for closure of perforation was seen in 85% of cases. Air bone gap with Cartilage with temporalis fascia/perichondrium was <10 dB in 77.5% patients.

Table 1. Age distribution of the patients

Age(yrs)	Cases	Percentage
11-20	33	41.25%
21-30	23	28.75%
31-40	15	18.75%
41-50	7	8.75%
50-60	2	2.5%
Total	80	100

Table 2. Sex distribution of the patients

Sex	Cases	Percentage
Male	43	54%
Female	37	46%
Total	80	100

Fig 1. Pre operative Tympanic Membrane perforation size

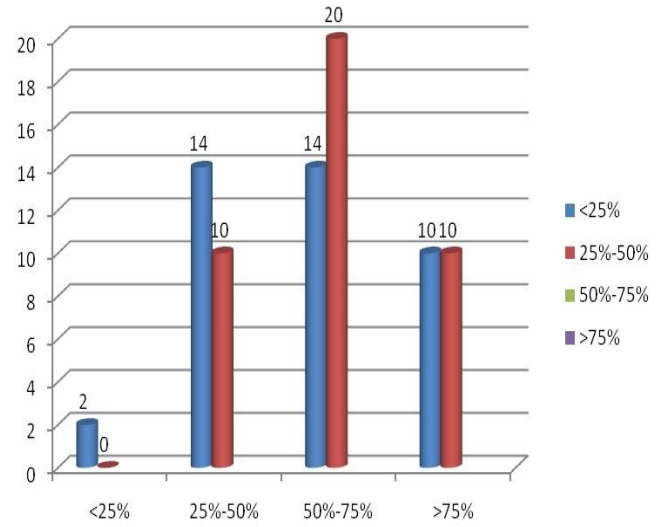


Fig 2. Graft uptake rate at post operative follow up

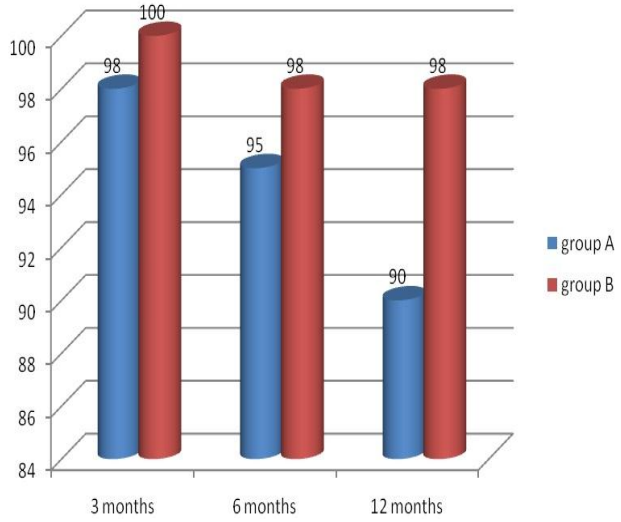
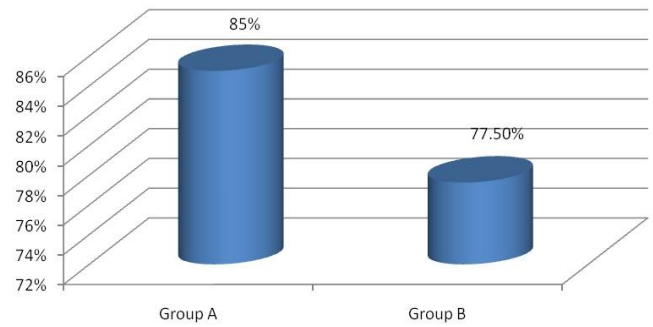


Fig 3. AB gap closure < 10 db after 1 year follow up



P value = 0.3902 (chi square test), Not Significant

Fig 4. Central perforation of the left tympanic membrane.

Fig 5. Harvesting cartilage graft from tragus.

Fig 6. Harvesting temporalis fascia graft.

Fig 7. Post-operative picture of healed tympanic membrane using composite graft

Fig 8. Comparison of graft uptake rate of different studies with present study.

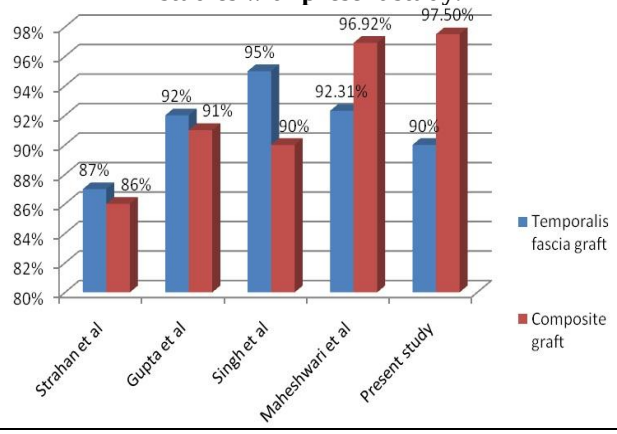
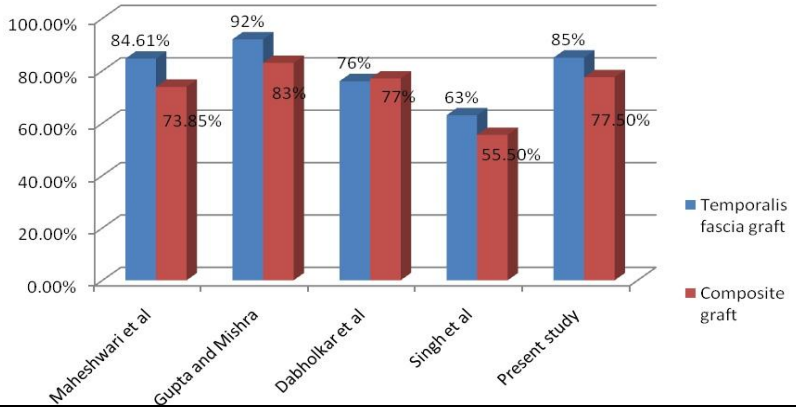


Fig 9. Comparison of closure rate of ABG within 10 dB of different studies with present study.



DISCUSSION

Tympanoplasty is one of the most common ontological procedures performed. It is considered successful if the graft successfully covers the perforation, withstands the pressure changes in the middle ear and its acoustic properties are near normal to the original healthy tympanic membrane. Temporalis fascia is commonly used for reconstruction as it is easy to harvest, available in the same operative field and sufficient amount of graft is available. Although the temporalis fascia has been widely used, it eventually becomes thin and atrophic. Tragal cartilage-perichondrium (composite) grafts are used nowadays to overcome this problem.

Most of the patients in this study were in the age group of 11-20 years (41.25%), followed by age group 21-30 years (28.75%). While 54% were males, 46% were females with an approximate ratio of 1.17:1. The findings were in concordance with a study by Barua [10].

Majority of the patients presented with disease in the right ear (61.25%) followed by 38.75% of the cases having disease to the left.

Success rate of the tympanic membrane perforation closure i.e graft uptake rate at the follow up of 3, 6, and 12 months postoperatively with temporalis fascia (Group A) used as graft materials in 40 patients were 98%, 95% and 90%. This finding is comparable with the study of Strahan *et al*, Gupta *et al*, Singh *et al*, and Maheshwari *et al*. Where take-up rate of 87%, 92%, 95%, and 92.31% was achieved using temporalis fascia at the end of 1-year [11-14].

Strahan *et al* was achieved pectivelyres 86% success rate when they used tragal perichondrium as graft material [11]. Similarly graft uptake rate with other studies like Gupta et al, Singh *et al* and Maheshwari *et al* were 91%, 90% and 96.92% respectively [12-14]. This was concordance with our study where graft uptake rate was 97.5%.

Maheshwari *et al* in their study of 130 cases of chronic otitis media found closure rate of ABG within 10 dB, at the end of 1-year with temporalis fascia graft and tragal cartilage-perichondrial graft to be 84.61% and 73.85%. Other studies like Gupta and Mishra, Dabholkar *et al.*, and Singh *et al*., found closure rate of ABG within 10 dB, at the end of 1-year with temporalis fascia graft to be 92%, 76% and 63% respectively. While with tragal cartilage-perichondrial graft it was 83%, 77% and 55.5% respectively [12-15]. These are comparable with results obtained in our study where in group A (temporalis fascia graft) closure rate of ABG within 10 dB, at the end of 1-

year is 85% and group B (tragal cartilage-perichondrial graft) is 77.5%.

The perforations of TM significantly impair the quality of life of the patients as Tympanic Membrane plays important role in the physiology of hearing and pathophysiology of chronic inflammatory middle ear diseases [16]. The final step in surgical conquest of conductive hearing losses is myringoplasty [17]. Tympanic membrane perforation closure and improvement in hearing are achieved excellently with the use of either temporalis fascia or tragal perichondrium [18]. As tragal cartilage-perichondrium graft is thicker and stiffer than temporalis fascia, it need not be dried and can be placed as wet graft, so it is easier to manipulate during surgery [14].

CONCLUSION

TM has remarkable ability to regenerate and heal spontaneously. Nevertheless chronic perforations of TM require tympanoplasty. Various graft materials are presently used for this purpose. Our study shows that both temporalis fascia and Tragal cartilage-perichondrium (composite graft) grafts used in tympanoplasty give comparable functional results. Composite graft is a suitable alternative to temporalis fascia as it provides protection from retraction pocket formation and re-perforation with minimal interference in the sound transmission.

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Nil

CONFLICT OF INTEREST

No interest

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