



A COMPARATIVE STUDY OF OUTCOME OF MYRINGOPLASTY USING TEMPORALIS FASCIA VERSUS TRAGAL PERICHONDRIUM

Otorhinolaryngology

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ABSTRACT

Background: Chronic suppurative otitis media (CSOM) is a major burden to public health in the developing world due to low socio-economic standards. A variety of grafts for use in myringoplasty have evolved with temporalis fascia and tragal perichondrium being the most commonly used. The present study was undertaken to compare the temporalis fascia and tragal perichondrium in terms of anatomical (graft uptake) and functional (hearing improvement) results. **Methods:** This prospective study was conducted in the Department of ENT, Ram Lal Eye and ENT Hospital, Government Medical College, Amritsar. The study comprised of 60 patients which were randomly divided into two groups of thirty patients each. In Group I, temporalis fascia graft was used and in Group II, tragal perichondrium graft was used. All the patients were followed in the OPD on 30th, 60th and 90th day. **Results:** Successful graft uptake had occurred in 86.67% patients belonging to Group II and 83.33% patients of Group I. The mean pre-op air bone gap in Group I was 25.22 ± 7.11 dB and of Group II was 23.66 ± 7.96 dB. The mean post-op air bone gap in study Group I was 11.32 ± 5.06 dB and of Group II was 16.39 ± 7.53 dB. The mean percentage change in pre-op and post-op values in Group I and II was 13.90 ± 5.50 and 7.28 ± 6.15 respectively. **Conclusion:** The graft uptake rate of myringoplasty is not influenced by graft material (temporalis fascia and tragal perichondrium) but the hearing improvement depends upon the graft material and it is better with temporalis fascia than tragal perichondrium. However, longer follow up is required to assess the functional outcome more effectively.

KEYWORDS

Chronic Suppurative Otitis Media (CSOM), Myringoplasty, Temporalis Fascia, Tragal Perichondrium

INTRODUCTION

Chronic suppurative otitis media (CSOM) constitutes a major public health problem in the developing world due to poor socio-economic standards, poor nutrition, lack of health education and unhygienic habits.¹ Traditionally, the term chronic suppurative otitis media is defined as 'chronic inflammation of the middle ear cleft, which presents with recurrent ear discharge or otorrhoea through a tympanic membrane perforation'.² Although most perforations heal spontaneously in few weeks and those that persist after dry ear precautions, ototopical drops should be considered for surgical repair.³

A variety of grafts for use in myringoplasty have evolved since the full thickness skin graft, initially used by Berthold⁴ in 1878. The temporalis fascia⁵ is the most commonly used graft because of its known advantages, as it is easy to harvest and produces no deformity. It can be obtained through the same post aural incision. For primary operation, there are no size limitations and does not have a tendency to contract and pull away from the margins of the perforation. Fascia is quite similar to tympanic membrane with respect to its thickness and also low basal metabolic rate and thus requires less blood supply and is more resistant to infection. However, it has few disadvantages like it can eventually become thin and atrophic. It lacks elasticity and resistance to pressure changes in the external ear canal.

Tragal perichondrium⁶ another popular choice of graft, is also available locally, is tough and easily harvestable with just a small incision. No preparation of surgical area (shaving) is required. It is a mesodermal graft, hence, it gives complete freedom from possibility of post operative graft keratoma (cholesteatoma). In revision cases where the temporalis fascia has already been harvested, it is sometimes difficult to obtain it again without extending the incision above the ear, hence in such cases perichondrium is a better choice.

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 versus tragal perichondrium in underlay tympanoplasty was undertaken to evaluate the postoperative graft take-up and hearing improvement.

AIMS AND OBJECTIVES

The present study was undertaken to compare the anatomical and functional aspects of using temporalis fascia and tragal perichondrium. The anatomical success in terms of graft uptake rates and functional success judged by post operative hearing improvement (closure of air bone gap).

MATERIAL AND METHODS

This prospective study was conducted in the Department of ENT, Ram Lal Eye and ENT Hospital, Government Medical College, Amritsar. This study is approved by Ethics Committee of institute (No.: 107/74/D-26/2018) and by BFUHS university (No.: BFUHS/2k19p-TH/14184). The study comprised of 60 patients of either sex who fulfilled the inclusion criteria. An informed consent was obtained from all the patients.

Inclusion Criteria:

1. Tubo tympanic type of CSOM.
2. Ear to be operated should be dry for at least 4 weeks prior to surgery.
3. Conductive type of hearing loss.
4. Patients between age group 15 to 45 years.

Exclusion Criteria:

1. Active discharging ear.
2. Sensorineural hearing loss.
3. Unsafe pathology
4. Previous history of ear surgery.
5. Patients with ossicular chain disruption.
6. Any other disease condition which could affect the result of the study for example diabetes mellitus, smokers.

The patients were randomly divided into two groups of thirty patients each. The patients were operated either under general or local anaesthesia. In patients of Group I, temporalis fascia graft was used and in patients of Group II, tragal perichondrium graft was used for Type-I tympanoplasty.

All patients were operated using a postauricular incision and graft placed by underlay technique using microscope. The temporalis fascia graft (Fig.1) was harvested through the same incision.

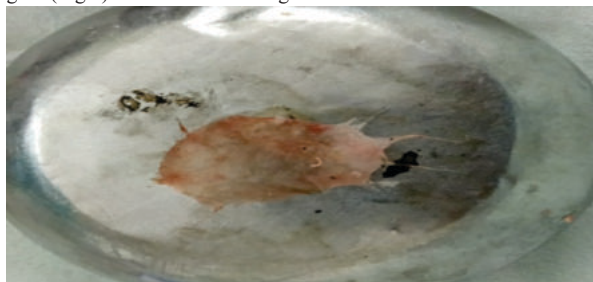


Figure 1: Temporalis fascia (TF) graft harvested and spread out For the tragal perichondrial graft, an incision was made 2mm medial from the tragal crest line. The skin flaps were elevated on anterior and posterior surface of tragal dome. The dome of the tragal cartilage was removed using blade no 15. (Fig.2) The perichondrium was harvested in continuity from both surfaces of the excised cartilage. (Fig.3)



Figure 2: Tragal Cartilage harvested along with perichondrium on both sides

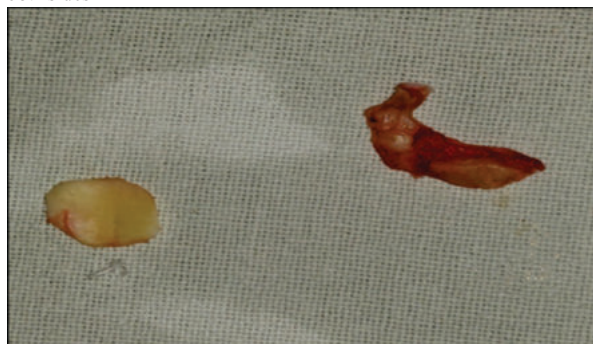


Figure 3: Tragal perichondrium graft separated from cartilage The cartilage was replaced in its skin pocket and the incision was closed. The graft was spread out and the redundant tissue shaved. (Fig.4)



Figure 4: Tragal perichondrium (TP) graft harvested and spread out When the middle ear was reached then ossicular intactness and mobility were confirmed and if any disruption of ossicular chain was found intraoperatively then the patients were excluded from the study. The graft was placed by underlay technique and suturing done in 3 layers. Postoperatively, the patients were put on oral antibiotics for 1 week and topical antibiotics for 4 weeks as per institution protocol All the patients were followed in the OPD on 30th, 60th and 90th day. During the follow-up visit healing of the surgical wound, presence or absence of any ear discharge and appearance of any new symptom were assessed. On 30th day the external auditory canal was cleaned.

Otoscope examination was performed to see the status of the tympanic membrane (graft) at 1, 2 and 3 months. Additionally, on 90th day, otoendoscopy was performed and patients were subjected to pure tone audiometry to evaluate air bone gap closure at 500, 1000, 2000 and 4000 Hz frequencies.

The observations were carefully recorded and the data so obtained was collated and analysed using chi-square test and student-t test. The level of significance was determined and p value of <0.05 was taken as statistically significant.

RESULTS

The present study was conducted on 60 patients who underwent myringoplasty using either temporalis fascia (Group I) or tragal perichondrium (Group II) as graft material.

Demographic profile

Maximum number of patients, that is, 24 (40%) were from the age group of 15-25 years, followed by 23 (38.33%) in 26-35 years and 13 (21.67%) patients in 36-45 years. The mean age of all the cases together was 28.37 years with a standard deviation of 8.31 years. In Group I 56.67% of the patients were female and 43.33% were male. While in Group II 59.33% were female while 40.67% were male. In group I most of the patients were from rural background that constituted 60.33% while rest 39.67% were from urban background. In group II 58.33% patients were from rural background and 41.67% were from urban area. However, there was no statistically significant difference in the demographic profile of patients in between the groups.

Clinical features

The most common symptom of patients recruited in the present study was difficulty in hearing (85%) from the affected ear, followed by tinnitus in 13.33%. Pain in the ear was present in 11.67% patients. Aural fullness and itching were present in 5% and 3.33% patients. The hearing loss ranged from mild to moderate degree of CHL in the affected ears. 60% patients in Group I and 60% patients in Group II had mild hearing loss. 30% patients in Group I and 20% in Group II had moderate hearing loss. 15% patients had hearing within normal limit. On otoscopy, all the patients had central type of perforation of the tympanic membrane, 5% patients had subtotal tympanic membrane perforations, 25% had large central perforations, 40% patients had medium, and 30% patients had small perforation. There was statistically insignificant difference ($p > 0.05$) in the two study groups with respect to symptoms and mean size of preoperative perforations.

Intraoperative findings

In the present study the ossicular chain was found to be intact in all the patients in both groups. The status of middle ear mucosa as seen through the tympanic membrane perforation was also recorded. 95% patients had a pale middle ear mucosa with both the groups put together. In 5% patients the middle ear mucosa was congested. Although it was found to be statistically insignificant ($p > 0.05$) when two groups were compared.

Anatomical outcomes

Graft success rate was 83.33% in Group I (Figure-5) and 86.67% patients belonging to Group II (Figure-6) at 3 months follow up period. Thus, the graft uptake rate in patients belonging to group II was better than those in Group I. However, it was observed that there was no statistically significant difference ($p > 0.05$) between the two groups in relation to graft uptake.

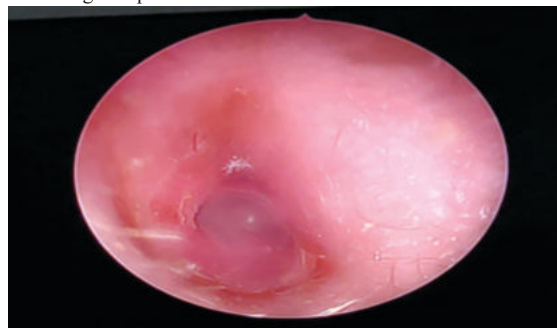


Figure 5: Postoperative image of graft uptake in temporalis fascia group

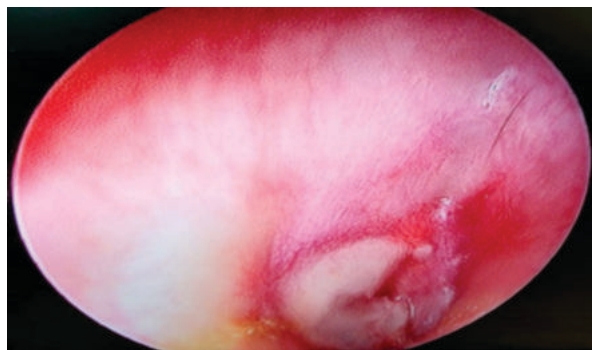


Figure 6: Postoperative image of graft uptake in tragal perichondrium group

Functional outcomes

In all the patients the mean pre-operative PTA (Pure Tone Average) at 500, 1kHz, 2kHz and 4kHz frequencies for air conduction in Group I was 34.16 ± 7.73 dB and in Group II was 32.16 ± 8.56 dB. The mean AC preoperatively showed statistically no significant difference between the groups. While the mean post-op PTA in air conduction in Group I was 20.00 ± 4.65 dB and in Group II was 23.16 ± 7.64 dB at last postoperative visit of 3 month follow up. The mean percentage change in pre-op and post-op values in Group I and II was 14.17 ± 6.26 and 9.00 ± 5.99 respectively. (table 1)

TABLE 1

TABLE SHOWING COMPARISON OF PRE-OPERATIVE AND POST OPERATIVE PTAIR CONDUCTION

	Group I	Group II
Mean pre operative PTA	34.16 ± 7.73	32.16 ± 8.56
Mean post operative PTA	20.00 ± 4.65	23.16 ± 7.64
Mean % change	14.17 ± 6.26	9.00 ± 5.99
P value	0.001	0.001

The mean pre-op air bone gap (ABG) in Group I was 25.22 ± 7.11 dB and of Group II was 23.66 ± 7.96 dB and the difference was non-significant between the groups. The mean post-op air bone gap in study Group I was 11.32 ± 5.06 dB and of Group II was 16.39 ± 7.53 dB. The mean percentage change in pre-op and post-op values in Group I and II was 13.90 ± 5.50 and 7.28 ± 6.15 respectively. (table 2)

TABLE 2

TABLE SHOWING COMPARISON OF PRE-OPERATIVE AND POST OPERATIVE AIR BONE GAP (ABG)

	Group I	Group II
Mean pre operative AB gap	25.22 ± 7.11	23.66 ± 7.96
Mean post operative AB gap	11.32 ± 5.06	16.39 ± 7.53
Mean % change	13.90 ± 5.50	7.28 ± 6.15
p value	0.001	0.001

Concerning the audiological parameters, the difference between preoperative and postoperative hearing levels was statistically significant for both the groups. Post-operative gain in air conduction, air bone gap closure was better in Group I than Group II and this difference was statistically significant ($p < 0.05$) while doing comparative analysis.

DISCUSSION

Myringoplasty is technique to reconstruct the tympanic membrane and thereby improving hearing.⁷ An ideal graft is one that is easy to take with less invasive procedures, with shorter hospitalization, less morbidity to donor area, less risk of infection, with no transfer of infectious disease and costs less.⁸ However, due to its anatomical proximity and translucency, temporalis fascia and tragal perichondrium are amongst the two most preferred grafting materials of the contemporary otologist.

The temporalis fascia graft is commonly harvested for the procedure due to its metabolic similarities to tympanic membrane. But due to its thinness and suppleness, anatomical failure can be seen especially in tubal dysfunction disorders. Cartilage graft (tragal or conchal) is known for its anatomical stability and resistance to shrinkage. Although slightly antigenic, its thickness and rigidity can affect the functional outcomes. So, the perichondrium graft being resistant and thin behaves from impedance metric point just like temporalis fascia

graft has an edge. Moreover, there is no obvious scar in harvesting tragal perichondrium graft⁹.

Anatomical outcomes

The otoscopic examination of the operated ear revealed that at 3 months follow up, successful graft uptake had occurred in 83.33% patients belonging to Group I and 86.67% patients of Group II. 13.33% patient in Group II and 16.67% patients in Group I showed evidence of residual perforation. Thus, the graft uptake rate in patients belonging to group II was better than those in Group I however the difference was insignificant ($p > 0.05$). Thus, the graft uptake rate results of the present study are comparable with other studies. (table 3) In the present study, the tragal perichondrium graft had slightly better graft uptake rate than temporalis fascia due to rigidity of perichondrium over fascia but this anatomical difference is statistically non-significant.

TABLE 3

TABLE SHOWING GRAFT UPTAKE RATE IN COMPARATIVE STUDIES OF TEMPORALIS FASCIA VERSUS TRAGAL PERICHONDRIUM

Author	Year of publication	Temporalis fascia (TF)	Tragal perichondrium (TP)
Sperm et al ¹¹	2001	91%	92%
Lackany et al ¹²	2005	80%	92%
Zulkifal Awan ¹³	2008	75%	85%
Kshitij Patel ¹⁰	2014	86.67%	87.50%
Ibrahim A ¹⁴	2016	86.7%	88.4%
Singh VP ¹⁵	2018	86.67%	87.50%
Hodzic-Redzic S ¹⁶	2018	92.5%	95.18%
Guha T ¹⁷	2016	93.33%	86.66%
Santhanakrishna n K ¹⁸	2018	95.65%	89.5%
Majeed J ¹⁹	2016	85.7%	85.7%

Functional outcomes

The mean percentage change in pre-operative and post-operative values of AC in Group I and II was 14.17 ± 6.26 and 9.00 ± 5.99 respectively. There was no statistically significant difference between pre-operative AC at 500, 1k, 2k and 4kHz in between TF and TP groups but mean percentage change of AC within each group pre and post-operatively was statistically significant. The mean pre-operative ABG in Group I was 25.22 ± 7.11 dB and of Group II was 23.66 ± 7.96 dB. The mean post-op ABG in study group Group I was 11.32 ± 5.06 dB and of Group II was 16.39 ± 7.53 dB. The mean percentage change in pre-op and post-op values in Group I and II was 13.90 ± 5.50 and 7.28 ± 6.15 respectively. Concerning the audiological parameters, the difference between preoperative and postoperative hearing levels was statistically significant. Similar results were seen in a study by Kayet B²⁰, who observed that the mean pre-op air bone gap in TF group was 31.9 ± 5.1 dB and in TP group was 32.8 ± 4.66 dB. Mean post-op air bone gap in TF group was 13 ± 6.34 dB and in TP group was 19 ± 6.22 dB, the post-op difference of two groups being statistically significant ($p = 0.0013$). In TF group, the mean audiological gain was 17.75 ± 8.05 dB and in TP group was 12.30 ± 7.15 dB. Another study²¹ reported 10.5 dB improvement in mean hearing threshold in fascia group, compared to 8.16 dB improvement in perichondrium group.

In a prospective study by Bongale et al, 80% hearing improvement (ABG < 20 dB) was seen with TF and 75% improvement with TP. This study concluded that temporal fascia is a better graft material as compared to tragal perichondrium.²² In another study mean pre-op air bone gap in TF group was 34.99 ± 5.75 dB and in TP group was 33 ± 7.58 dB. Mean post-op air bone gap in TF group was 17.75 ± 5.54 dB and in TP group was 10.35 ± 5.84 dB.¹⁸

Hodzic-Redzic S¹⁶ et al concluded that improvement of audiological outcome was slightly better in the fascia group while graft acceptance in the postoperative period was slightly better in the perichondrium group which was comparable to our study. However, due to controversial results in the literature regarding anatomical and functional benefits with each of the two graft materials, future studies with larger sample size and longer duration of follow up period are required to appraise the usefulness of the TF and TP grafts.

CONCLUSION

From the present study, we conclude that:

- Temporalis fascia and tragal perichondrium provide viable autograft material for myringoplasty.
- The graft uptake rates are similar for the both these graft materials used. There was statistically insignificant difference ($p > 0.05$) between the two groups in relation to graft uptake rates.
- Both these graft materials achieve good hearing restoration but audiological gain is better in TF than in TP as the perichondrium is more resistant to vibration than the temporalis fascia.
- Thus, with all the things we come to the conclusion that the graft uptake rate of myringoplasty is not influenced by graft material (temporalis fascia and tragal perichondrium) but the hearing improvement depends upon the graft material and it is better with temporalis fascia than tragal perichondrium. However future studies with longer follow up periods are required preferably of minimum of 12 months to effectively evaluate the functional difference between the two graft materials.

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