

## **Type 1 tympanoplasty with temporalis fascia and modified cartilage shield technique using tragal cartilage- A comparative study**

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### **Abstract**

#### **Objective**

To assess the graft uptake and audiological gain followed by type-1 tympanoplasty using temporalis fascia alone and a modified cartilage shield technique using tragal cartilage and temporalis fascia.

#### **Methods**

A prospective study of 30 Chronic otitis media (Mucosal disease –inactive) patients were done, out of which 15 underwent type-1 tympanoplasty using temporalis fascia and 15 of them using modified tragal cartilage shield technique. Patients were assessed for graft uptake and audiological evaluation was done preoperatively and at 1 month, 3 months & 6 months post op.

#### **Results**

On comparison graft uptake was better with the cartilage shield technique whereas there was no significant difference in the audiological gain.

#### **Conclusion**

Modified tragal cartilage shield technique is a good alternative for temporalis fascia due to its better graft uptake rate and comparable hearing advantages.

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## **I. Introduction**

Chronic otitis media (COM) defined as chronic inflammation of the mucoperiosteal lining of the middle ear cleft. It may be associated with or without ear discharge, permanent perforation of the tympanic membrane & reduced hearing. [1] Concept of tympanoplasty where repair of tympanic membrane is done was introduced by Wullstein, and Zollner in 1953. Several kinds of graft materials can be used for the repair of the tympanic membrane like fascia, perichondrium, cartilage etc. Temporalis fascia still remains the most commonly used graft material for tympanic membrane repair, especially due to its close proximity to the ear, basal metabolic rate and thickness is almost comparable to that of the tympanic membrane. More recently cartilage shield tympanoplasty has come up with promising results, as an alternative to conventional tympanoplasty especially in case of large and recurrent perforations.[2][3] This study was conducted in a tertiary centre in Kerala, India where we compared the graft uptake and hearing gain in temporalis fascia tympanoplasty and cartilage shield along with temporalis fascia.

## **II. Materials And Methods**

Ours is a prospective study conducted from November 2018 to January 2020 in department of otorhinolaryngology KMCT Medical College, a tertiary care centre in Kozhikode district in Kerala. A total number of 30 cases of COM mucosal disease inactive stage was included in the study. All the patients underwent a detailed preoperative assessment including history, clinical and audiological evaluation. Patients were divided in to two groups A and B. Group A patients underwent tympanoplasty grafting with temporalis fascia and Group B with tragal cartilage along with temporalis fascia. Only adult cases with mucosal disease and with intact and mobile ossicles were included in the study. Patients with cholesteatoma, ossicular erosions, sensory neural hearing loss, and previous surgeries were excluded. Oto endoscopy and pure tone audiogram (PTA) were done pre op and the same was recorded 1 month, 3 months, and 6 months post op. All surgeries were performed under general anaesthesia by single surgeon (first author) and the same technique was used in all

cases. For all the cases in both groups, post auricular incision was used. Incision was made in the posterior wall of the external auditory canal. Edges of the perforation were freshened by removing thin strip around the perforation. Vascular strip incision was made at 12 O'clock and 6 O'clock positions. Tympanomeatal flaps were elevated along with the tympanic annulus to enter the middle ear. Cortical mastoidectomy was done in all the cases and aditus patency was achieved. Temporalis fascia graft was harvested in all the cases, and in group A patients this graft was kept lateral to the handle of malleus and medial to the tympanic annulus. [4] Whereas, in group B patients a tragal cartilage was harvested, care was taken to keep a small piece at the dome for cosmetic purposes. This tragal cartilage was made in to half the thickness by slicing with a number 15 blade and the perichondrium was removed on one side of the cartilage. A notch was made to accommodate the handle of malleus. This cartilage was kept over the incudostapedial joint and medial to the handle of malleus with the perichondrium facing laterally. Temporalis fascia was placed over the cartilage lateral to the handle of malleus and medial to the tympanic annulus. Gelfoam was kept in middle ear to support the cartilage and prevent it from getting displaced. Gelfoam was also kept in the ear canal to keep the temporalis fascia and the tympanomeatal flap in place. Medicated cotton pack was kept in the ear canal and the postauricular wound was closed in layers. Sutures were removed on post op day 7 and the canal pack on day 14. Patients were advised to visit the outpatient department at 1 month, 3 months and 6 months after surgery. Otoendoscopic examination were carried out on each visit to assess the graft uptake and pure tone audiogram (PTA) was done and air and bone conduction threshold were calculated at frequencies of 250 to 8000Hz.

### III. Results

Total number of 30 cases were divided in to two groups. In group A (15 cases) - Type 1 tympanoplasty using temporalis fascia as the graft material was done. In group B (15 cases) - Type 1 tympanoplasty using tragal cartilage shield along with temporalis fascia was done. Male to female ratio was 12:18. Age group of our patients ranged between 20-55 years. Graft uptake was seen better in group B (93.3%) when compared to group A (80%) by 6 months post-surgery. Hearing improvement was assessed by calculating the average of air conduction at speech frequencies (500Hz, 1000Hz & 2000Hz) preoperatively, and at 3<sup>rd</sup> and 6<sup>th</sup> months postoperatively. One patient of group A had retraction of tympanic membrane by 6 months whereas none of the patients in group B had retraction.

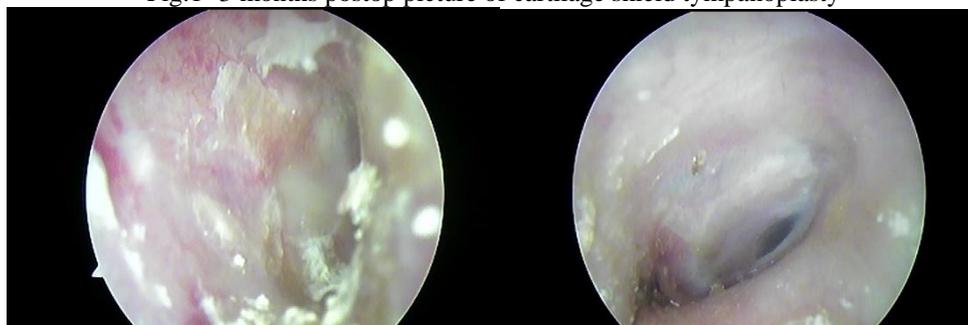
**Table: 1** Total number of patients

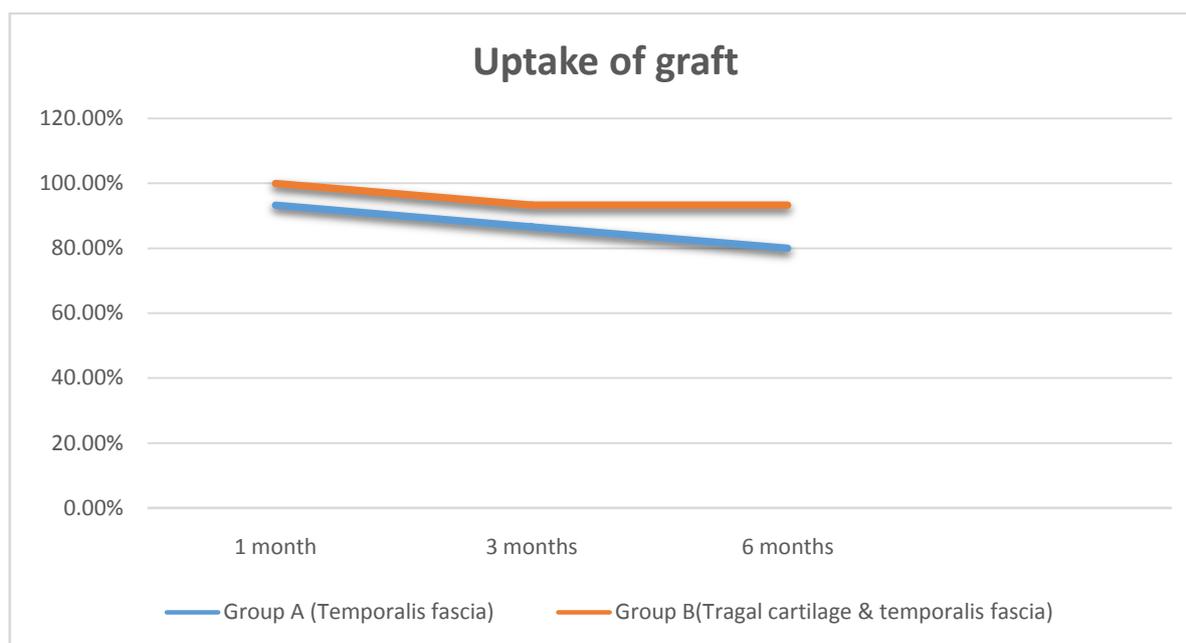
Sex	Number of patients	Percentage (%)
Male	12	40%
Female	18	60%
Total	30	100%

**Table: 2** Uptake of Graft

Complete graft uptake	Group A (Temporalis fascia)	Group B (Tragal cartilage & temporalis fascia)
1 month	14 patients (93.3%)	15 patients (100%)
3 months	13 patients (86.6%)	14 patients (93.3%)
6 months	12 patients (80%)	14 patients (93.3%)

**Fig:1-** 3 months postop picture of cartilage shield tympanoplasty





**Table 3: Comparisons of hearing improvement**

	Mean pre op airborne gap	Mean post op airborne gap	Mean Hearing improvement
Group A	38 db	18db	20 db
Group B	40db	22db	18 db

#### IV. Discussion

Even today temporalis fascia remains the most common graft material used for tympanic membrane grafting in chronic otitis media cases. But in cases of large perforations, patulous eustachian tube, revision surgeries etc. an additional support like cartilage may be helpful in improving the graft uptake rate and also prevent the development of retraction pockets in future. The aim of our study was to compare the hearing results and graft uptake when a cartilage shield was used along with temporalis fascia for tympanic membrane grafting in chronic otitis media mucosal disease. There are various methods of cartilage tympanoplasty mentioned in literature like island technique, inlay butterfly technique, shield technique and palisade technique. [5,6]

There are several studies in the literature comparing the clinical outcomes of cartilage and fascia tympanoplasty techniques. A review of the literature by Onal et al and Demirpehlivan et al showed the advantages of cartilage graft over the temporalis fascia for type-I tympanoplasty.[7]Mohamad et al have concluded that tympanoplasty using cartilage with or without perichondrium has better morphological outcomes than tympanoplasty using temporalis fascia.[8] In our study also we have got a better graft uptake rate with tragal cartilage(93.3%) than with temporalis fascia alone(80%).

In a study performed by Jain et al, the graft take-up rate was 97.1% in the cartilage group and 82.9% in the fascia group with similar hearing outcomes.[9] This was similar to our study results. Similarly development of retraction was also noted in the fascia group, and was not seen with the use of cartilage. Guler et al compared the temporal fascia and cartilage graft techniques in elderly patients and reported a higher graft acceptance rate in the cartilage group, but they reported that mean hearing gain was significantly higher in the fascia group.[10]Baklaci et al reported a better graft acceptance rate in cartilage tympanoplasty in pediatric patients.[11] In a recent meta-analysis, Jalaliet al reviewed a total of 37 studies and they reported that cartilage grafting had a higher graft acceptance rate compared

to fascia grafting. They also suggested that the hearing outcomes of cartilage and fascia grafting techniques were similar. [12]In our study also we had a better graft acceptance rate with the use of cartilage, whereas the hearing gain where similar in both the groups.

Our study has some limitations like we had a small sample size, and the follow-up period was limited. New prospective studies with larger populations and long-term follow-up are needed.

## V. Conclusion

To conclude cartilage shield along with temporalis fascia gives a better graft uptake rate than temporalis fascia alone and the hearing improvement is not affected by the use of cartilage along with fascia. So tragal cartilage can be considered as a good alternative for temporalis fascia in chronic otitis media mucosal disease.

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