

A Comparative Study of Endoscopic Tympanoplasty Cartilage vs Temporalis Fascia in CSOM with Tubotympanic Disease

Krishna Sumanth Kotagiri¹, B Krishna Santosh², V. Chandra Shekar³, M Ravikumar Raju⁴, T Jaya Chandra⁵

¹Assistant Professor, Department of ENT, Konaseema Institute of Medical Sciences Research Foundation, Amalapuram.

²Professor, Department of ENT, Konaseema Institute of Medical Sciences Research Foundation, Amalapuram

³Junior Resident, Department of ENT, Konaseema Institute of Medical Sciences Research Foundation, Amalapuram

⁴Professor, Department of ENT, Konaseema Institute of Medical Sciences Research Foundation, Amalapuram

⁵Professor, Department of Microbiology, GSL Medical College, Rajahmundry.

Received: 16-07-2022 / Revised: 20-08-2022 / Accepted: 01-09-2022

Corresponding author: Dr M Ravikumar Raju

Conflict of interest: Nil

Abstract

Introduction: Surgical treatment is the main stay to treat CSOM. With this a study was taken to find the hearing improvement among the individuals undergoing tympanoplasty with conchal cartilage and temporalis fascia.

Materials and methods: This was a prospective randomized study, conducted in the department of Otorhinolaryngology, KIMS, Amalapuram, from March to December 2021. Study protocol was cleared by the Institutional ethics committee. Informed consent was taken from all the participants. Individuals aged >18 years with CSOM, those with non-discharging ear were included in this research. Those not willing for surgery, pregnant women, history of ear surgery, immune suppressed were excluded. To group A, cartilage shield tympanoplasty and temporalis fascia tympanoplasty to group B. First postoperative visit was on day 7, sutures were removed. At 3rd and 6th month, tympanic membrane, pure tone audiogram and impedance audiometry were assessed. P<0.05 was considered as significant.

Results: Total 40 participants were included, group wise, 20 (50%) each, respectively. Gender wise, most of these participants were female; statistically there was no significant difference. The mean preoperative AB gap was 26.20±8.2, 22.5±8.9; after 3 months, 12.45±8.173, 11.39±9.23 and after 6 months 14.66±9.9, 12.01±8.2 respectively among the groups; statistically there was no significant difference, respectively.

Conclusion: For successful closure of tympanic membrane perforations, cartilage shield as well as temporalis fascia material both are acceptable. However, there was better hearing improvement with cartilage shield material.

Keywords: Tympanoplasty, conchal cartilage, temporalis fascia, hearing outcome, comparison

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Background

Chronic suppurative otitis media (CSOM) is highly prevalent middle ear inflammation, particularly in the developing countries like India [1,2]. Poverty, nutrition, poor personal hygiene, crowded living conditions are the predisposing factors of CSOM [3]. The prevalence of CSOM is 46 and 16 per 1 thousand, respectively in rural and urban population [4].

Cholesteatoma and mucosal CSOM are the 2 different forms of CSOM [5]. In addition to significant conductive hearing loss, perforation, ossicular destruction and so on are the pathological changes in tympanic membrane, and middle ear occur due to CSOM.

Among the safe CSOM individuals, medical treatment is not sufficient; the individuals should undergo surgical treatment [6]. Different surgical techniques as well as grafting were reported in the literature; studies reported the superiority as well as advantages of temporalis fascia and cartilage grafts, respectively [6-9]. Post-operative hearing is the best assessment technique in this context. With this a study was taken to find the hearing improvement among the individuals undergoing tympanoplasty with conchal cartilage and temporalis fascia.

Materials and Methods

This was a prospective randomized interventional study, conducted in the department of Otorhinolaryngology, KIMS, Amalapuram. Study was conducted from March 2021 to December 2021. Study protocol was cleared by the Institutional ethics committee. Informed consent was taken from all the participants.

Individuals aged >18 years with CSOM, tubotympanic disease with large size perforation, those with non-discharging ear for at least 6 weeks, those with mild to moderate conductive hearing loss were

included in this research. Those aged <18 years, who were not willing for surgery, pregnant women, with history of ear surgery, immune suppressed, cancer individuals were excluded in this research.

Detailed history was collected. Clinical examination for ear, nose and throat was done and findings were recorded. Air conduction and bone conduction were done; the difference of these 2 averages was used to find the air bone (AB) gap. Preoperative investigations such as complete blood, urine examinations, bleeding time, clotting time, viral markers were carried.

The participants were randomly divided into 2 groups, positioned and draped with proper aseptic precautions. Both groups were operated under general anaesthesia. Temporalis fascia was harvested by infiltrating, with xylocaine adrenaline in to temporal region; 2cm incision was made above the hair line and temporalis fascia was identified. 1.5cm X 1.5cm graft harvested and air dried. EAC infiltrated with premixed xylocaine and adrenaline (1:100000), 270° TM flap elevated with Rosen's knife and kept superiorly. The ossicle integrity was assessed and confirmed and graft kept as underlay technique. Finally, tympanomeatal flap was repositioned, gel foam was kept over the graft and dressing was applied.

Cartilage was harvested normally from tragus. About 1.2 cm incision made over the canal surface of tragus, after infiltrating xylocaine with adrenaline solution. Subcutaneous tissue was dissected using blunt scissors to expose the tragal cartilage. The cartilage incision was 0.4cm below from the dome of tragus to maintain contour. Full thickness cartilage graft was taken with perichondrium dissected out. Cartilage is harvested and wedge is removed to fit manubrium.

First postoperative visit was on day 7, sutures were removed. Then weekly visit

for one month, thereafter monthly for 3 month and after 6 months. At 3rd and 6th month, tympanic membrane, puretone audiogram and impedance audiometry were assessed. Successful tympanoplasty was defined as full acceptances of the graft and intact healing of the tympanic membrane without perforation.

Statistical Analysis

SPSS version 22 was used to analyse the data. Chi-square tests was used to find the association of significance between the categorical and P<0.05 was considered as significant.

Results

In this study, total 40 (100%) participants were included. In this, 20 (50%) each were included in group A and B, respectively. Gender wise, most of these participants were female; statistically there was no significant difference (Table 1). Graft uptake was successful in group A whereas success rate was 80% (18/20) in group B. The mean preoperative AB gap was 26.20± 8.2, 22.5 ± 8.9; after 3 months, 12.45 ± 8.173, 11.39 ± 9.23 and after 6 months 14.66 ± 9.9, 12.01 ± 8.2 respectively among the groups A and B; statistically there was no significant difference, respectively (Table 2).

Table 1: Gender wise distribution of the study participants; n (%)

Group	Male	Female	Total
A	9 (22.5)	11 (27.5)	20 (50)
B	8 (20)	12 (30)	20 (50)
Total	17 (42.5)	23 (57.5)	40 (100)
Statistical analysis	$\Psi^2 = 0.1023$; P=0.749085; statistically not significant.		
A: cartilageshieldtympanoplasty; B: temporalis facia tympanoplasty			

Table 2: The mean AB gap among the study participants

Time	AB gap	
	Group A	Group B
Preoperative	26.20± 8.2	22.5 ± 8.9
After 3 months	12.45 ± 8.173	11.39 ± 9.23
After 6 months	14.66 ± 9.9	12.01 ± 8.2
A: cartilage shield tympanoplasty; B: temporalis facia tympanoplasty		

Discussion

CSOM is a clinical condition, where continuous pus discharge through the perforated tympanic membrane for > 2 weeks [9]. It is one of the common public health issues worldwide; in developing countries, it is the important cause for hearing loss especially among the school going children [10]. As per the WHO reports, prevalence is highest in western pacific countries followed by South east Asia.

In this research, the age of the study participants was ranged between 20 to 60 year; 35.2 years is the mean age of the study participants. In a study by Naveen Kumar A G, the age range was reported to be 10 – 45 years; the mean was 26.5±0.5 years [5].

The graft uptake in this research was 100% (20/20) among the group A whereas it was 80% (18/20) in group B. similar findings were reported by Uzun *et al* [11] the success rates were 100% and 84.2%, respectively for groups. Sohil Vadiya *et al*

[12] reported the success rates to be 98.46% and 89.61%, respectively among the groups. The graft uptake for different age group was same. This indicates that age doesn't have influence on the graft uptake. These findings were similar to study reported by Michael *et al* [13]. The authors reported 1556 tympanic membrane grafting and concluded that age does not influence the graft uptake. In postoperative audiometry there was B curve in group A; this significantly decreases the ear canal volume and some these participants complain ear blocking. Whereas for group B, the postoperative graph is similar to normal tympanic membrane. But the graft uptake rate was reported to be better in type A. Temporalis fascia the most frequently used graft material, very easy to harvest. Due to lack of elasticity, it will become thin and atrophic. Whereas cartilage is more rigid and resistant. Studies also reported that the hearing results were good those underwent cartilage shield tympanoplasty [14,15]. In this report, the mean preoperative AB gap was 26.20 ± 8.2 , 22.5 ± 8.9 ; after 3 months, 12.45 ± 8.173 , 11.39 ± 9.23 and after 6 months 14.66 ± 9.9 , 12.01 ± 8.2 respectively among the groups A and B; statistically there was no significant difference, respectively (Table 2). Shechy JL. *et al* [16] reported that cartilage grafts stabilized successfully but limited utility in hearing improvement. Whereas, similar to this study findings, there were reports that no significant difference in hearing improvements in cartilage shield tympanoplasty and temporalis fascia tympanoplasty [17,18]. Early improvement was also reported with temporalis fascia grafting compared to cartilage graft; but after 1 years there was no significant difference [18,19].

Conclusion

For successful closure of tympanic membrane perforations, cartilage shield as well as temporalis fascia material both are acceptable. However, there was better

hearing improvement with cartilage shield material.

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