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A PROSPECTIVE COMPARATIVE STUDY OF A-B GAP IMPROVEMENT IN PURE TONE AUDIOMETRY BETWEEN CSOM CASES UNDERGOING TYPE 1 TYMPANOPLASTY USING TRAGAL PERICHONDRIUM AND TEMPORALIS FASCIA GRAFT

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Abstract

Aim: To ascertain whether the A-B gap improvement of tragal perichondrial grafting is better than TF grafting in CSOM patients undergoing type 1 tympanoplasty by underlay technique.

Methodology: A prospective comparative study was done in CSOM patients presenting to a tertiary health care establishment. 60 patients underwent type 1 tympanoplasty, using TF graft in 30 and tragal perichondrial graft in 30 patients. Both groups of patients were compared in terms of A-B gap improvement following surgery.

Results: A-B gap improvement of all the 60 patients were analysed. 8(26.67%) patients had A-B gap improvement </= 15dB in both the tragal perichondrium and TF graft group. Rest 22(73.33%) patients had A-B gap improvement of 16-25dB in either group. In cartilage group, 14 out of 15 patients i.e, 93.33%, while in Fascia group, 10 out of 12 pateints i.e, 83.33% patients who had perforation involving anterior quadrant had A-B gap closure between 16-25dB post- operatively. Therefore, cartilage graft showed better A-B gap closure than fascia graft in anterior quadrant.

When both the quadrants were taken into consideration, 11 out 17 i.e, 65% patients in fascia group while 8 out of 13 i.e, 61% patients in cartilage group showed AB gap closure between 16-25dB. Therefore, fascia graft showed better result.

Conclusions: This study showed that A-B gap improvement is similar in CSOM patients undergoing type 1 tympanoplasty using either TF or tragal perichondrial graft. Either of these can be good for improving the hearing in CSOM patients but tragal cartilage with perichodrium showed better results with perforation involving anterior quadrants.

Introduction:

Chronic otitis media is traditionally defined as chronic inflammation of the mucoperiosteal lining of the middle ear cleft, which is associated with ear discharge, permanent perforation of the tympanic membrane & hearing impairment.[1]

Low socioeconomic conditions, poor living standards, overcrowding with poor hygiene and inadequate access to proper medical facilities in the periphery contribute to the picture. Most perforations require surgical intervention in the form of tympanoplasty. CSOM is most common ear disease in developing countries[2] It is major infective cause of deafness in India.[3]

Tympanoplasty, a surgical procedure for closure of tympanic membrane perforation, was first described by Wullstein in 1952 and Zollner in 1955.[4] The aim of tympanoplasty is to eradicate middle ear disease and improve hearing by closing the perforation in the ear membrane.

In 1955, Zoellner and Wullstein used different types of graft for tympanoplasty: Temporalis fascia, skin, fascia lata, vein, perichondrium, dura mater.[4-10]

Temporalis fascia remains the most commonly used material for tympanic membrane reconstruction with a success rate of 93-97% in primary tympanoplasties.[5] Heerman was the first to use temporalis fascia for myringoplasty.[6]

Although temporal muscle fascia (TMF) is the most commonly used graft material, the use of cartilage graft has evoked considerable interest in the last decade [11]

The first cartilage myringoplasty was performed by Salen in 1963.[12] During the last 20 years, various types and methods of cartilage myringoplasty have been presented.[13]

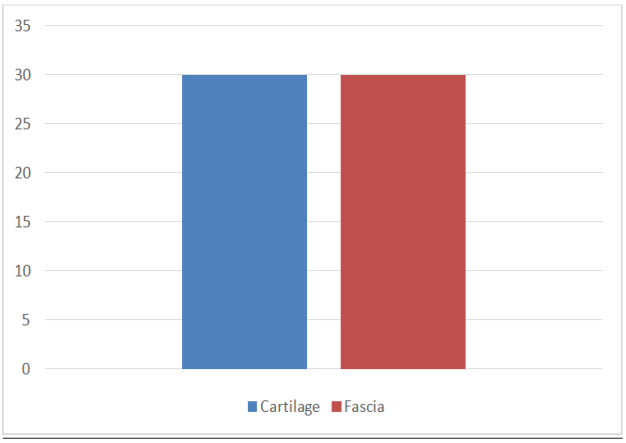
The aim of this study was to compare the A-B gap closure of Tragal cartilage with perichondrium grafting and Temporalis Fascia grafting in CSOM patients undergoing type-1 tympanoplasty by underlay technique.

Study Design

A prospective randomized study has been done with a sample size of 60 patients to compare the A-B gap closure of tragal cartilage with perichondrium & temporalis fascia grafting in patient with CSOM tubotympanic type undergoing type I tympanoplasty.

Materials and Methods

The present study was conducted over 60 patients of inactive tubotympanic type of chronic suppurative otitis media (CSOM) from our hospital in the Dept of ORL. All the patients were 18- 50 year of age. Detailed history of patients was recorded; examination with emphasis on otologic part was performed. Examination under was performed in all patients; followed by Pure tone audiometry to assess pre- operative hearing loss and x ray mastoid Schuller's view was performed in all the cases. Cases were randomly divided into two groups of 30 each. In first group Type I Tympanoplasty was performed using Temporalis Fascia Graft material and in second group type I tympanoplasty was performed using tragal cartilage with perichondrium graft material.



Graph Showing Distribution of Cases

Inclusion Criteria

Chronic suppurative otitis media, tubotympanic type, Patients of both gender with age above 10, Pure tone air bone gap between 15 to 45 dB hearing level, ear dry for at least 6 weeks, Non-healed traumatic perforation were included in the study.

Exclusion Criteria

Unsafe CSOM, Safe CSOM with sensorineural hearing loss, actively discharging ear, Patients < 10 years of age, all ASOM cases and patient with concurrent diseases i.e. uncontrolled hypertension, Diabetes, severe anaemia were excluded from the study.

Operative Procedure

All patients were operated using post aural approach with Wilde's post aural incision. Temporalis fascia graft was harvested from same incision line at just superior to infra temporal line. Tragal cartilage with perichondrium graft was harvested from posterior tragal surface of ipsilateral ear. After graft positioning gel foam soaked in antibiotic was kept in middle ear and external auditory canal. Wound stitches were removed on post- operative day 7. Patients were called for follow up on post op 3 weeks, 6weeks and 12 weeks. Graft uptake, audiological improvement, and degree of hearing improvement. Graft take up was assessed by otoscopy and hearing improvement was assessed by postoperative PTA at 6 weeks and 12 weeks. Post-op PTA of 12 weeks was used for comparison with the pre-operative pure tone audiogram.

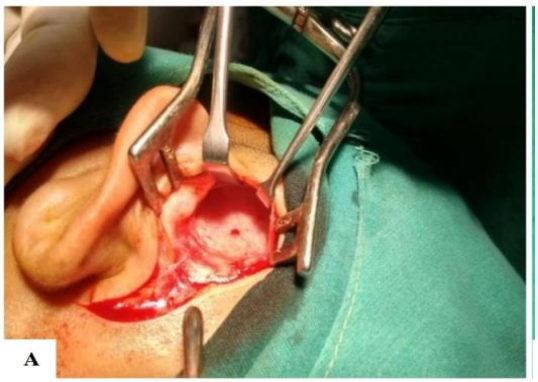


Figure 1- A Harvesting of temporalis fascia graft

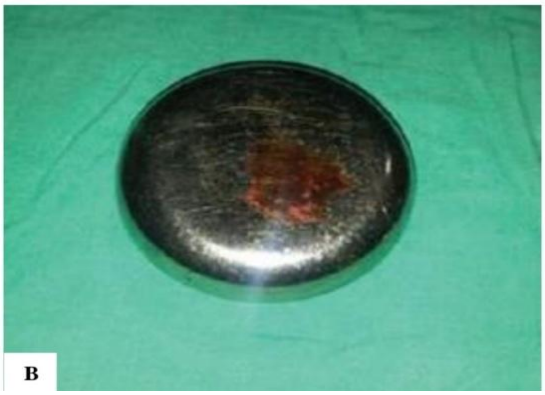


Figure 1- B Temporalis fascia graft

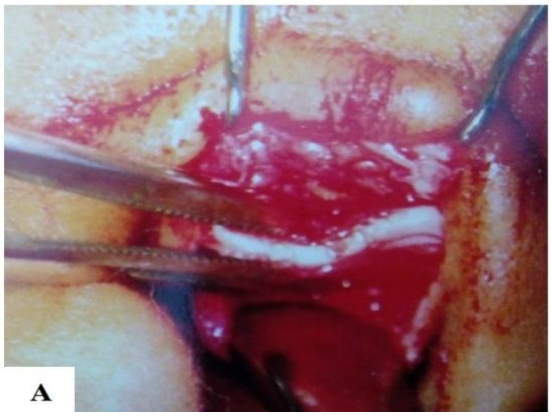


Figure 2- A Harvesting of tragal cartilage with perichondrium graft

Figure 2: B Tragal cartilage with perichondrium

Observation and Result

A total of 60 patients were taken under our study who underwent type 1 tympanoplasty. The total number of females and males in our study was 38 and 22 respectively. In temporalis fascia group, 40% were males and 60% patients were males. Similarly, in cartilage with perichondrium group, 33.33% patients were males and 66.67% were females. There was no statistical difference between gender distribution in both the group. The youngest patient in our study was a 12-year-old while the eldest was 50years old. Maximum number of patients, that is, 20 (33.33%) were in the age group of 21-30 years, followed by 16 (26.67%) in 41-50 years, 14 (23.33%) in 10-20 years and 10 (16.67%) in 31-40 years.

Table 1: Pre-Op and Post-Op AB Gap between the Groups

A-BGAP	PRE-OP AB GAP (n=60)		POST-OP AB GAP (n=60)	
	TEMPORALIS FASCIA (n=30)	TRAGAL CARTILAGE PERICHONDRIUM(n=30)	TEMPORALIS FASCIA (n=30)	TRAGAL CARTILAGE PERICHONDRIUM(n=30)
</= 15dB	0	0	24 (80%)	27 (90%)
16-25dB	15 (50%)	13 (43.33%)	5 (16.67%)	3 (10%)
26-40dB	15 (50%)	16 (53.33%)	1 (3.33%)	0
41-55dB	0	1 (3.33%)	0	0

27 (90%) patients in cartilage group and 24 (80%) patients in fascia group, had A-B GAP between 16-25dB, who previously had A-B GAP between 16-25dB and 26-40dB.

The results were slightly better with tragal cartilage with perichondrium than fascia graft but statistically non-significant. Both the groups showed similar results.

Table 2: AB Gap Closure between the Groups

A-B GAP CLOSURE	TRAGAL CARTILAGE PERICHONDRIUM (n=30)	TEMPORALIS FASCIA (n=30)
</= 15 dB	8 (26.67%)	8 (26.67%)
16-25 dB	22 (73.33%)	22 (73.33%)

Overall, 26.67% patients had AB gap closure of </= 15dB in both cartilage and fascia group and mostly patients i.e, 73.33%, had AB gap closure between 16-25 dB.

Table 3: Comparison of Quadrant of Perforation and Graft Take-Up

QUADRANT OF PERFORATION	TRAGALCARTILAGEPERICHONDRIUM (n=30)		TEMPORALIS FASCIA (n=30)	
	SUCCESSFUL GRAFTTAKE-UP	PERSISTENT PERFORATION	SUCCESSFUL GRAFTTAKE-UP	PERSISTENT PERFORATION
ANTERIOR	15	0	10	2
POSTERIOR	2	0	0	1
BOTH	7	6	16	1

In fascia group, out of 12 patients having perforation involving anterior quadrant, 10 (83.33%) patients had successful graft take-up, while 2 (16.66%) patients had persistent perforation. In cartilage group, 15 (100%) patients had perforation involving anterior quadrant and all of them showed successful graft take-up.

Table 4: Comparison between AB Gap Closure and Quadrant of Perforation

A-B GAP CLOSURE	TRAGAL CARTILAGE PERICHONDRIUM (n=30)			TEMPORALIS FASCIA (n=30)		
	ANTERIOR QUADRANT	POSTERIOR QUADRANT	ANTERIOR+POSTERIOR QUADRANT	ANTERIOR QUADRANT	POSTERIOR QUADRANT	ANTERIOR+POSTERIOR QUADRANT
</= 15 dB	1	2	5	2	0	6
16-25 dB	14	0	8	10	1	11

In cartilage group, 14 out of 15 patients i.e, 93.33%, while in Fascia group, 10 out of 12 pateints i.e, 83.33% patients who had perforation involving anterior quadrant had A-B gap closure between 16-25dB post- operatively. Therefore, cartilage graft showed better A-B gap closure than fascia graft in anterior quadrant.

When both the quadrants were taken into consideration, 11out 17i.e, 65% patients in fascia group while 8 out of 13 i.e, 61% patients in cartilage group showed AB gap closure between 16-25dB. Therefore, fascia graft showed better result.

Table 5: Comparison of Size of Perforation and AB Gap Closure

A-B GAP CLOSURE	TRAGAL CARTILAGE PERICHONDRIUM (n=30)			TEMPORALIS FASCIA (n=30)		
	SCP	MCP	LCP	SCP	MCP	LCP
</= 15 dB	3 (10%)	1 (3.33%)	4 (13.3%)	2 (6.67%)	2 (6.67%)	4 (13.3%)
16-25 dB	1 (3.33%)	15 (50%)	6 (20%)	1 (3.33%)	11 (36.67%)	10 (33.33%)

AB Gap closure, when size of perforation was taken into account was similar in both the groups as can be seen from the above table.

Table 6: Successful Graft Take-Up and AB Gap Closure

A-B GAP CLOSURE	TRAGAL CARTILAGE PERICHONDRIUM (n=30)		TEMPORALIS FASCIA (n=30)	
	SUCCESSFUL GRAFT TAKE-UP	PERSISTENT PERFORATION	SUCCESSFUL GRAFT TAKE-UP	PERSISTENT PERFORATION
</=15 Db	4 (13.33%)	4 (13.33%)	7 (23.33%)	1 (3.33%)
16-25 dB	20 (66.67%)	2 (6.67%)	19 (63.33%)	3 (10%)

20 (66.67%) patients in cartilage group, and 19 (63.33%) patients in fascia group with successful graft take-up had A-B gap closure between 16-25dB. Both the groups showed similar results.

Discussion

It is defined as any operation involving reconstruction of the tympanic membrane and/ or the ossicular chain.[14] The main aim of tympanoplasty is to establish a dry middle ear cavity and restoration of hearing andis one of the most common otological procedure. The ideal tympanoplasty restores sound protection for the round window by constructing a closed, air containing middle ear against the round window membrane. This also restore sound transfer for the oval window by connecting tympanic membrane or substitute membrane with stapes footplate via either an intact or a reconstructed ossicular chain. Although fascia of temporal muscle is still the most common graft material used for tympanoplasty, cartilage is being popular in recent years.

In this study 30 cases were subjected to tympanoplasty with temporalis fascia and 30 were subjected to tragal cartilage with perichondrium. The youngest patient in our study was a 12-year-old and the oldest was of 50 years. The average age incidence was 33.5 years for temporalis fascia and 29.7 years for tragal cartilage with perichondrium. A study done by Jyothi Dhabolkar[15] The overall female to male ratio in our study was 38:22. The mean age in the temporalis fascia group was 33.5 + -12.2 years, While in tragal cartilage with perichondrium graft group it was 29.7 +-10.8 years the difference was found to be statistically not significant (P value > 0.0), 5 showing that is was compatible between the two grafts groups. similar findings were noted in study of singh et al[16] in which mean age was 28.9 years and study of dornhoffer [17] in which the mean is was 28 years. The graft take-up rate in our study, in temporalis fascia group was 86.66% and tragal cartilage with perichondrium was 80%. Various studies show that graft uptake was in the range of 80 to 90% for either temporalis fascia for tragal perichondrium. Dabholkar[15], Krishna Vora, Abhi Abhik Sikdhar reported that graft uptake rate in comparative study of underlay tympanoplasty with tragal cartilage with perichondrium and temporalis fascia in a series of 50 cases with temporalis fascia and tragal cartilage with

perichondrium 84 and 80% respectively. Patil et al[18]. Evaluation of different graft material in type reported in their study of 120 cases graft take up of 86.67% in temporalis fascia, for tragal perichondrium 87.50% showed successful graft uptake.

In our study overall, 26.67% patients had AB gap closure of </= 15dB in both cartilage and fascia group and mostly patients i.e, 73.33%, had AB gap closure between 16-25 dB.In fascia group, out of 12 patients having perforation involving anterior quadrant, 10 (83.33%) patients had successful graft take-up, while 2 (16.66%) patients had persistent perforation. In cartilage group, 15 (100%) patients had perforation involving anterior quadrant and all of them showed successful graft take-up.In cartilage group, 14 out of 15 patients i.e, 93.33%, while in Fascia group, 10 out of 12 pateints i.e, 83.33% patients who had perforation involving anterior quadrant had A-B gap closure between 16-25dB post- operatively. Therefore, cartilage graft showed better A-B gap closure than fascia graft in anterior quadrant.

When both the quadrants were taken into consideration, 11 out 17 i.e, 65% patients in fascia group while 8 out of 13 i.e, 61% patients in cartilage group showed AB gap closure between 16-25dB. Therefore, fascia graft showed better result. AB Gap closure, when size of perforation was considered was AB gap closure was similar in both the groups. 20 (66.67%) patients in cartilage group, and 19 (63.33%) patients in fascia group with successful graft take-up had A-B gap closure between 16-25dB. Both the groups showed similar results.

Conclusion

- Post- operative A-B GAP closure with cartilage and fascia grafts in different sizes of perforation showed equal results.
- When quadrant of perforation is considered, perforation in ANTERIOR quadrant showed better results with cartilage graft in term of both graft take-up and AB gap closure.
- With successful graft take-up, AB gap closure with both the grafts showed equal results.
- Therefore, either of the graft materials are excellent for tympanoplasty with regards to A-B GAP closure.

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