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"COMPARATIVE STUDY BETWEEN TRAGAL PERICHONDRIUM AND TRAGAL CARTILAGE WITH PERICHONDRIUM AS GRAFT MATERIAL IN TYPE 1 UNDERLAY TYMPANOPLASTY"

Otolaryngology

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ABSTRACT

Background: Several graft material used in tympanoplasty operation to repair the perforated tympanic membrane. Our aim of this study is to compare the efficacy of tragal perichondrium and tragal cartilage with perichondrium as graft material

Matetials and Methods: This study was a prospective one, conducted in Malda Medical College during January 2015 to December 2017, over 60 patients divided in two equal group randomly 30 patients each. One group undergone Tympanoplasty with tragal perichondrium as graft and in the other group we used tragal cartilage with perichondrium as graft material. The data was collected from above patients and statistically analyzed regarding graft taken or rejected and hearing improvement.

Results and Analysis: Underlay tympanoplasty with tragal perichondrium as graft show about 86.67% success rate in respect to drum closure and Tragal cartilage with perichondrium show drum closure in about 80%. Post-operative AIR BONE gap improvement also little better in tragal perichondrium group than cartilage with perichondrium group.

Conclusion: The study showed that both tragal perichondrium and tragal perichondrium with cartilage are good graft material in respect to drum closure and hearing improvement.

KEYWORDS

Tragal Perichondrium, Tragal Cartilage with Perichondrium, Tympanoplasty

INTRODUCTION:

Impairment of hearing is a minor inconvenience for some people but for others it can be extremely troublesome and a source of social embarrassments. The impairment of hearing is mostly due to the perforations of the tympanic membrane. The most common causes of perforations are trauma and chronic suppurative otitis media. Low socioeconomic conditions, poor hygiene and also inadequate access to proper medical facilities contribute to that picture. A large section of the world suffers from otitis media and unfortunately the majority is compromised by people from developing and underdeveloped country[1]. If this perforation fails to heal conservatively, to restore hearing and to protect the middle ear and round window from infection and external allergen, the surgical repair of the ear drum is required in the form of tympanoplasty. Since the introduction of tympanoplasty, in the fifties, by Zoellner2 and Wullstein3, numerous graft materials have been used for the closure of the defective membrane like skin, temporalis fascia, cartilage, perichondrium, vein, fascia lata. The choice of graft material depends on individual surgeon's preference for their accessibility near the operative site, availability in adequate amount, having excellent contour, and posing excellent survival capacity. If the grafts are mesodermal in origin then they are free from the possibility of post operative cholesteatoma. Thus they fulfill all the criteria of excellent graft tissue. Biological graft materials act as a scaffold of tissue matrix and subsequently revascularises in readiness for migration of fibroblast and epithelium. But each of these materials has a different failure rate mostly due to graft rejection leading to great disappointment on the part of otolaryngologist. The aim of the study is to present the experience in underlay tympanoplasty while comparing tragal perichondrium versus tragal cartilage with perichondrium as graft material with regards to graft uptake and hearing Improvement (post operative A-B gap < 10 dB) is satisfactory.

MATERIALS AND METHODS:

The study was a prospective study conducted in the Department of Otolaryngology of a tertiary care centre of West Bengal during the session January 2015 to December 2017. The study groups consist of 60 patients divided into two equal groups randomly. One group (Group A) underwent tympanoplasty with tragal perichondrium graft and the other group (Group B) underwent tympanoplasty with tragal cartilage with perichondrium. Patients between age group of 15 to 45 years having dry (for at least 6 weeks) central perforation and having pure conductive hearing loss were included in our study. Patients with sensorineural hearing loss, ossicular dysfunction, cholesteatoma flakes, needs mastoid exploration and age below 15 year and above 45 year were excluded from this study. Air bone gap less than 10 dB in pure tone audiometry will be satisfactory. Objective assessment done by microscopic examination using a two point scale (ear drum closed and ear drum not closed)

After taking history all the patients underwent a through clinical examination of nose throat with special attention to ear. Every patient underwent heamatological tests including blood sugar and heamoglobin percentage, radiological tests including chest X- Ray and CT scan of temporal bone, Pure tone audiometry and impedence audiometry .

Most of the patients underwent the operation under local anesthesia by 2% lignocaine with 1:200000 of adrenaline after premedicating with pethidine, promethazine and atropine. Young and non cooperative patients operated under general anesthesia.

For tragal perichondrium graft material, an incision was made 2 mm medial from the tragal crest line. The tragal cartilage was removed and from the both surface of the perichondrium is dissected out in continuity and the cartilage was replaced in its skin pocket.

In the cases where the tragal cartilage with perichondrium was used the cartilage removed leaving 2 mm of cartilage in the dome of the tragus for cosmesis. All the cases were done via endaural route. Following exposure of the external auditory canal, the perforated margin was trimmed all around. Rosen incision was made on the posterior bony canal wall from 6-12 'o' clock position about 5-8 mm from the annulus. The annulus was dislodged from the tympanic sulcus after elevating tympanomeatal flap. Following elevation, integrity of ossicular chain was tested. Tragal perichondrium was placed beneath the flap underlying the denuded handle of the malleus. Tragal cartilage with perichondrium graft is harvested and made it flat, thin and abundant. Next, a complete strip of cartilage 2 mm in width is removed vertically from the center of the cartilage to accommodate the entire malleus handle. The entire graft is placed in an underlay fashion, with the malleus fitting in the groove. Tympanomeatal flap was repositioned. Incision was closed and pressure dressing was applied.

In postoperative period antibiotics and nasal decongestants were given and patients were advised not to strain, cough, sneeze or heavy work for three week. All patients were called for regular follow up. On the 12th week the status of neotympanum was recorded and pure tone audiometry was done to assess the auditory status. All the data collected from this study was analyzed.

RESULTS AND ANALYSIS:

From January 2015 to December 2017 total 60 patients underwent type 1 tympanoplasty. Group A comprised of 30 patient (13 male and 17 females) and group B also comprised of 30 patient (16 males and 14 females). Total number of male patient was 29(48.33%) and 31 (51.66%) was female as shown in **Table 1**.

TABLE 1: SEX DISTRIBUTION

SEX	Tragal Perichondrium	Tragal cartilage with perichondrium	PERCENTAGE
MALE	13	16	29(48.33%)
FEMALE	17	14	31(51.66%)

Right ear was involved in 18 patients and left ear was involved in 12 patients in case of Group A (tragal perichondrium). Whereas in group B (Tragal cartilage with perichondrium) 16 patients having right ear involvement and 14 patients with left ear involvement. A total number of 34 patients having right ear involvement and 26 patients with left ear involvement as shown in

TABLE 2: LATERALITY OF EAR

LATERALITY	Tragal Perichondrium	Tragal cartilage with perichondrium	TOTAL(%)
RIGHT	18	16	34(56.66)
LEFT	12	14	26(43.33)

Data of Table 3 describe that In group A patients preoperative A-B gap< 10 dB were nil, between 11-20 dB in 3 patients, 21-30 dB in 14 patients and 31-40 dB in 8 patients and 5 patients had 41-50 dB loss . Where as post operative A-B gap less than 10 dB was in 22 patients, 11-20 dB in 3 patients, 21- 30 dB in 1 patients, 3 patients had 31-40 dB and in single patient it was 41-50 dB hearing loss.

TABLE 3: PRE & POST OPERATIVE AIR BONE GAP (A-B) GAP IN TRAGAL PERICHONDRIUM (GROUP A) PATIENTS

AVERAGE A-B GAP(dB)	PRE-OPERATIVE	POST-OPERATIVE
< 10	0	22
11-20	3	3
21-30	14	1
31-40	8	3
41-50	5	1

in group B preoperative A-B gap <10 dB in none,11-20 dB loss in eight patients, 21-30 dB loss in 11 patients,31-40 dB in 4 patients and 7 patients had 41-50 dB hearing loss. Where as in this group post operative A-B gap less than 10 dB in 19 patients, 11-20 dB loss in 6 patients, 21-30 dB in 2 patients, 31-40 dB hearing loss in 1 patients and two patients had 41-50 dB hearing loss as shown in **Table 4**.

TABLE 4: PRE & POST OPERATIVE AIR BONE GAP (A-B) GAP IN TRAGAL CARTILAGE WITH PERICHONDRIUM (GROUP B) PATIENTS

AVERAGE A-B GAP(dB)	PRE-OPERATIVE	POST-OPERATIVE
<10	0	19
11-20	8	6
21-30	11	2
31-40	4	1
41-50	7	2

In this study, in case of group A, drum closure was in 26 patients out of 30 patients and in case of group B drum closure was in 24 cases out of 30 cases. described in **Table 5**

TABLE 5: POST OPERATIVE DRUM CLOSURE

POST-OPERATIVE ASSESSMENT	(Gr. A)Tragal perichondrium	(Gr B)Tragal cartilage with perichondrium
DRUM CLOSURE	26	24
PERFORATION	4	6

DISCUSSION:

Otitis media4 is a general term used to describe any inflammatory disease of the mucous membrane lining the middle ear cleft. Tympanoplasty is the main surgical treatment FOR perforated tympanic membrane. It is defined as any operation involving reconstruction of the tympanic membrane and/ or the ossicular chain[5]. Over the years different grafting materials have been introduced right from pig's bladder membrane by Benzer in 1640 to canal wall skin by Willium House and Sheehy. [6] In 1952 the procedure was publicized and popularized by Wullstein[7] using split-thickness skin grafts. Zollner 2 begun his work in 1952 .In 1963 Salen & Jancen used cartilages as graft material.

Goodhill8 used perichondrium for grafting the tympanic membrane in the 1960s. Strahan recorded a 86% tragal perichondrium graft uptake rate9 Eviator noted that graft take rate with tragal perichondrium by underlay method was 90.47%.10 In 2008 Engin Dursun et al of Turkey underwent a comparative study using tragal perichondrium, paper patch and fat using underlay technique and tragal perichondrium had overall closure rate was 86.7%.11Dhabolkar et al achieved a success rate of 80% graft uptake rate by tragal perichondrium in underlay tympanoplasty.[4] In our study in 26 patients out of 30 patient tragal perichondrium grafts were taken. We got the success rate of underlay tympanoplasty using tragal perichondrium graft was 86.67%. There were only 4 failure cases.**(Table 5)**.

Andreas Neumann et al performed Type III Tympanoplasty applying the palisade cartilage technique. Care was taken to obtain the cartilage graft in a way that allowed perichondrium to adhere only on one side. They got 100% graft take rate and the low rate of recurrent perforations (1.6%). 12 Anand et al done butterfly inlay tympanoplasty using tragal cartilage with perichondrium attached on its both sides. They got a graft take up rate of 90%.[13]

From the study of Xiao-wei et al in seventy-four ears the tragal perichondrium/cartilage were used as graft material. Graft take was successful in all patients. Successful closure occurred in 92% of the ears.[14]

In our study we got that there were six failure cases out of 30 patients in Group B. We achieved about 80% success rate where we used tragal cartilage with perichondrium as grafting material **(Table 5)**.

Hearing improvement

Dornhoffer showed an average postoperative A-B gap 6.8 dB achieved in 22 patients by using tragal perichondrium graft.15 According to Dabholkar et al study report of 25 patients who underwent perichondrium graft tympanoplasty, 75% had hearing improvement.[4]

According to the study conducted by Engin Dursun et al., hearing improvement was assessed using the audiogram results obtained at the end of third month, postoperatively. Air bone gap was calculated as the average difference between air conduction and bone conduction at 0.5, 1, 2, and 4 kHz. that 10.2 dB (±2.03 dB) in the perichondrium group.[11]

When we used tragal perichondrium as graft material we got that in 22 patients post operative air bone gap was below 10 dB. Three patients had A-B Gap between 10 – 19 dB. Other patients were above 20dB. Our aim of post operative air bone gap below 10 dB was achieved in 73.3% of cases. But hearing improvement found in 83.33% cases. **(Table 3)**

Page et al compared pre-operative and postoperative audiograms of 175 patients who underwent tympanoplasty by perichondrium & cartilage graft. In their cases postoperative audiograms were better in 49% of cases, identical in 16% and worse in 11%.[16]

Anand et al done tympanoplasty using tragal perichondrium and cartilages and got hearing improvement of 5-10 db was found in 4 patients, 4-15 db in 6, 16-20 db in 4, 21-25 db in 3 and 26-30 db in1 patient. 2 patients did not improve at all.[13]

Cavaliere et al got the overall average pre-operative pure-tone average air-bone gap was 43.79 ± 7.07 dB, whereas the after cartilage tympanoplasty post-operative (1 year after surgery) pure-tone average air-bone gap was 10.43 ± 5.25 dB .[17]

When we used tragal cartilage with perichondrium as graft material we got that only 19 patients post operatively achieved the A-B gap <10 dB in tragal perichondrium & cartilage tympanoplasty. **(Table 4)**

CONCLUSION:

From the present study we may conclude that tragal perichondrium, tragal cartilage with perichondrium provide viable autograft material and achieved comparable & excellent drum closure and good hearing restoration (post operative air bone gap < 10 dB). But the limitation of our study was the small sample size thus a large scale randomized control study is necessary.

ILLUSTRATION OF PHOTOGRAPHS:

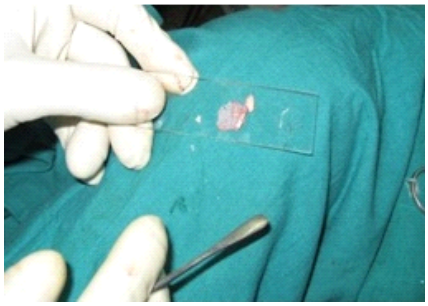

Fig.1 : PREPARATION OF TRAGAL PERICHONDRIUM GRAFT

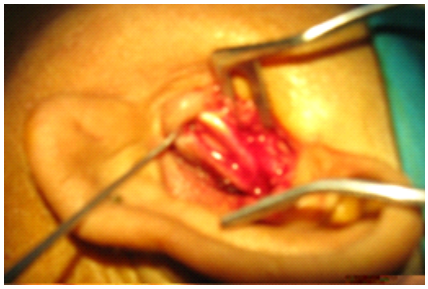

Fig.2 HARVISTING OF TRAGAL PERICHONDRIUM & CARTILAGE GRAFT

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