

## Research Article



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# **EVALUATING THE BENEFITS OF TYMPANOPLASTY USING CARTILAGE-PERICHONDRIUM COMPOSITE IN PATIENTS SUFFERING FROM PERSISTENT SUPPURATIVE OTITIS MEDIA**

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## **ABSTRACT**

**Background:** The preferred material for repairing atelectatic tympanic membranes and recurring tympanic membrane perforations is cartilage-perichondrium composite grafts. However, there is a dearth of information in the literature currently available on this topic.

**Aim:** The purpose of this study was to evaluate the results and effectiveness of cartilage-perichondrium composite graft tympanoplasty in patients who had perforations in their tympanic membranes. The research also assessed tympanic membrane closure success rates, surgical hearing results, and comorbidities.

**Methods:** During the research period, cartilage-perichondrium composite graft tympanoplasty was used to treat 220 patients with clinical signs of chronic suppurative otitis media (CSOM). The information was evaluated in terms of tympanic membrane closure success rates, postoperative hearing outcomes, complications, and effectiveness.

**Results:** The research participants' total graft ingestion was 99.09%. An air-bone closure of up to 20 dB was attained in 86.11%, 72.22%, and 70.58% of study participants in type I, type II, and type III tympanoplasty, respectively. 97.26% of patients who had various forms of tympanoplasty obtained a hearing level of 30 dB or below, which is regarded as socially acceptable hearing.

**Conclusion:** The current study comes to the conclusion that a cartilage-perichondrium composite graft is a dependable and effective method of tympanic membrane restoration. Excellent closure rates and better hearing outcomes are the effects of this treatment, which enhances the participants' quality of life.

**Keywords:** AB gap closure, cartilage-perichondrium composite graft, CSOM, tympanic membrane, tympanoplasty

## **INTRODUCTION**

The transmission of sound waves and the preservation of the middle ear's regular function depend heavily on the tympanic membrane. Since cartilage grafts were first used in middle ear reconstruction, their function has changed significantly. Originally used only for oculoplasty to support fascia grafts in the 1950s, they are now used as the only reconstruction material in cartilage-perichondrium composite grafts for membrane reconstruction. The preferred material for reconstructing atelectatic tympanic membranes and recurrent perforations is often cartilage-perichondrium composite grafts. 1, 2

There are now 23 different techniques for cartilage tympanoplasty, such as subtotal perforations, in-lay butterfly cartilage tympanoplasty, composite chondro-perichondrial clip tympanoplasty, and special cartilage tympanoplasty special total pars

tensa cartilage perichondrium composite grafts, The triple C method, foils, thin plates, and thick plates that are not covered by the perichondrium, as well as cartilage-perichondrium composite island grafts, palisades, stripes, and slices with perichondrium connected on the ear canal side. In every instance, the graft changes with the disease to accommodate its evolving function.<sup>3,4</sup>

The current study sought to determine the success rates of cartilage-perichondrium composite graft tympanoplasty in achieving closure of tympanic membrane perforations and to evaluate postoperative hearing outcomes in order to thoroughly evaluate the effectiveness and results of this procedure in repairing tympanic membrane perforations. The research also evaluated the frequency of complications associated with tympanoplasty using cartilage-perichondrium composite grafts.

## **MATERIALS AND METHODS**

By evaluating the success rates of cartilage-perichondrium composite graft tympanoplasty in achieving closure of tympanic membrane perforations and postoperative hearing outcomes, the current prospective and retrospective mixed study sought to thoroughly evaluate the effectiveness and results of this procedure in repairing tympanic membrane perforations. The incidence of problems associated with cartilage-perichondrium composite graft tympanoplasty was also evaluated in this study. The research participants came from the Institute's ENT Department. Prior to participation, all individuals gave their written and verbal informed permission. 220 participants with tympanic membrane perforation, both male and female, were evaluated for the research. The study's inclusion requirements were long-standing ear discharge and a healthy cochlear reserve. with and without cholesteatomas or granulations, with and without tympanosclerotic patches, with and without tympanic membrane perforation, and tympanosclerotic patch excision. In order to treat granulation and cholesteatoma, these patients had mastoidectomy and tympanoplasty. Study participants with otogenic intracranial problems were excluded.

After the research participants were finally included, each subject had a thorough clinical history and examination using a standardized proforma that had been prepared specifically for the study. Pre-operative audiometric evaluations, including pure tone audiometry (PTA), were performed on all individuals. Every individual had their perforation evaluated by otoscopy and examined under a microscope. After that, each participant had the required preoperative evaluation completed. Tympanoplasty was performed under general anaesthesia on children and under local anaesthesia on adults.

The individuals had surgery using either an endaural or post-aural technique. After slicing the cartilage with the cartilage slicer, the tragal cartilage was harvested, and tympanoplasty was performed using a cartilage-perichondrium composite island transplant carried out using the underlay approach. On the seventh to tenth day following surgery, all participants had their sutures removed. Antibiotics were provided to the subjects for a duration of six weeks. At three to six months, the individuals were asked back for follow-up and to document the post-operative observations.

SPSS (Statistical Package for the Social Sciences) software version 16.0 (SPSS Inc., Chicago, USA) was used to statistically analyze the collected data in order to evaluate descriptive measures and the chi-square test. The findings were presented as frequency, percentages, mean, and standard deviation. The p-value of <0.05 was considered statistically significant.

## **RESULTS**

By evaluating the success rates of cartilage-perichondrium composite graft tympanoplasty in achieving closure of tympanic membrane perforations and postoperative hearing outcomes, the current prospective and retrospective mixed study sought to thoroughly evaluate the effectiveness and results of this procedure in repairing tympanic membrane perforations. The incidence of problems associated with cartilage-perichondrium composite graft tympanoplasty was also evaluated in this study. There were 220 participants in the research, 39.09% (n=86) of whom were male and 88.18% (n=194) of whom were female. The research participants ranged in age from 10 to 62 years old, with a mean age of 32.48±6.82 years. Out of the 220 participants, 56 developed granulations or cholesteatoma, and 164 had central perforation.

Deafness was the most prevalent presenting symptom, occurring in 98.18% (n=216) of the research participants, followed by diarrhea in 92.72% (n=204) and ear discomfort in 42.72% (n=94) of the participants. According to the research's findings, any graft used to repair a tympanic membrane perforation that remained intact three months after surgery was regarded as having been taken by the participants, which was observed and reported by 99.09% (n=218) of the study participants. When evaluating the A-B bone closure in various tympanoplasty types three months after surgery, 30.55% (n=44) and 16.66% (n=6) of the participants with type I and type II tympanoplasty had an AB of 0–10.

55.55% (n=80), 55.55% (n=20), 70.58% (n=24), and 66.66% (n=4) of the participants having type I, type II, type III, and type IV tympanoplasty, respectively, had air bone gap closure of 11–20. 12.5% (n=18), 16.66% (n=6), 29.41% (n=10), and

33.33% (n=2) of the participants having type I, type II, type III, and type IV tympanoplasty, respectively, had 21-30 air-bone gap closure. 3% (n=2) and 11.11% (n=4) of the participants having type I and type II tympanoplasty, respectively, had an A-B gap closure of >30 (Table 1).

Overall air-bone closure in dB was seen in 22.72% (n=50) of the study participants, 58.18% (n=128) of the participants, and 16.36% (n=36) of the participants with an AB gap closure of 0-10, 11-20, and 21-30 and air-bone gap closure of >30 was seen in 2.7% (n=6) study subjects as shown in Table 2.

## DISCUSSION

220 participants of both sexes were enrolled in the current study: 39.09% (n=86) were men and 88.18% (n=194) were women. The research participants ranged in age from 10 to 62 years old, with a mean age of 32.48±6.82 years. Out of the 220 participants, 56 developed granulations or cholesteatoma, and 164 had central perforation. Deafness was the most prevalent presenting symptom, occurring in 98.18% (n=216) of the research participants, followed by diarrhoea in 92.72% (n=204) and ear discomfort in 42.72% (n=94) of the participants. These findings were similar to those of the research conducted by Singh M et al. (2003) and Desarda K.K et al. (2005), in which the authors evaluated participants using demographic information similar to that of the current study.

In the current study, 99.09% (n=218) of the respondents indicated that any graft utilized to treat a tympanic membrane perforation that remained intact for three months after surgery was a graft. These outcomes were in line with research by O. Ben Gamra et al. (2007) and Vaidya S. et al. (2014), who found that participants with tympanic membrane perforation had a high rate of graft uptake and acceptability. The findings of the study demonstrated that 30.55% (n=44) and 16.66% (n=6) of the participants with type I and type II tympanoplasty had an AB of 0-10 on the A-B bone closure assessment three months after surgery.

55.55% (n=80), 55.55% (n=20), 70.58% (n=24), and 66.66% (n=4) of the participants having type I, type II, type III, and type IV tympanoplasty, respectively, had air bone gap closure of 11-20. 12.5% (n=18), 16.66% (n=6), 29.41% (n=10), and 33.33% (n=2) of the participants having type I, type II, type III, and type IV tympanoplasty, respectively, had 21-30 air-bone gap closure. 1.3% (n=2) and 11.11% (n=4) of the participants having type I and type II tympanoplasty, respectively, had an A-B gap closure of >30. These results were consistent with the findings of two other investigations, one by Varshney S et al. (2010) and the other by Vijayendra H et al. (2006), where the authors proposed comparable A-B bone closure in various tympanoplasty types as in the current study.

Concerning the overall air-bone closure in study subjects in dB, AB gap closure of 0-10 was seen in 22.72% (n=50) subjects, 11-20 was seen in 58.18% (n=128) subjects 16.36% (n=36) of the research participants had air-bone gap closure of 21-30, while 2.7% (n=6) had air-bone gap closure of >30. The present study's findings were consistent with those of Patil K et al. (2014) and Demirpehlivan IA et al. (2011), who observed comparable overall air-bone closure in their participants.

## Conclusions

Taking into account its drawbacks, the current study comes to the conclusion that cartilage-perichondrium composite grafting is a dependable and effective method of tympanic membrane restoration. Excellent closure rates and better hearing outcomes are the effects of this treatment, which enhances the participants' quality of life. For additional conclusions, greater sample sizes and extended monitoring are required in future longitudinal investigations.

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| S. No | Air bone gap closure (AB) | Type I |       | Type II |       | Type III |       | Type IV |       |
|-------|---------------------------|--------|-------|---------|-------|----------|-------|---------|-------|
|       |                           | N      | %     | n       | %     | n        | %     | n       | %     |
| 1.    | 0-10                      | 44     | 30.55 | 6       | 16.66 | -        | -     | -       | -     |
| 2.    | 11-20                     | 80     | 55.55 | 20      | 55.55 | 24       | 70.58 | 4       | 66.66 |
| 3.    | 21-30                     | 18     | 12.5  | 6       | 16.66 | 10       | 29.41 | 2       | 33.33 |
| 4.    | >30                       | 2      | 1.3   | 4       | 11.11 | -        | -     | -       | -     |

**Table 1: A-B gap closure in different types of tympanoplasty at 3 months postoperatively**

| S. No | AB gap closure | Number (n) | Percentage (%) |
|-------|----------------|------------|----------------|
| 1.    | 0-10           | 50         | 22.72          |
| 2.    | 11-20          | 128        | 58.18          |
| 3.    | 21-30          | 36         | 16.36          |
| 4.    | >30            | 6          | 2.7            |

**Table 2: Overall air-bone closure in study subjects in dB**