

Research Article



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CARTILAGE PERICHONDRIUM COMPOSITE GRAFT TYMPANOPLASTY OUTCOMES IN PATIENTS WITH PERSISTENT SUPPURATIVE OTITIS MEDIA

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ABSTRACT

Background: For the reconstruction of atelectatic and recurring tympanic membrane perforations, cartilage-perichondrium composite grafts are the preferred material. The available literature on this topic, however, is lacking in detail.

Aim: The purpose of the current study was to evaluate the results and effectiveness of tympanic membrane perforation individuals' cartilage-perichondrium composite graft tympanoplasty. The research also assessed the success rates of tympanic membrane closure, postoperative hearing results, and comorbidities.

Methods: During the research period, 220 participants who had been treated with cartilage-perichondrium composite graft tympanoplasty for chronic suppurative otitis media (CSOM) were evaluated clinically. The effectiveness, results, complications, postoperative hearing outcomes, and success rates of tympanic membrane closure were evaluated in relation to the data.

Results: The study individuals' total graft ingestion was 99.09%. An air-bone closure of up to 20dB was obtained in 86.11%, 72.22%, and 70.58% of research individuals after type I, type II, and type III tympanoplasty, respectively. A socially acceptable hearing threshold of 30 dB or below was attained by 97.26% of the participants undergoing various tympanoplasty procedures.

Conclusion: The results of this study indicate that the cartilage-perichondrium composite graft is a dependable and effective method for closing tympanic membrane holes. Excellent closure rates and better hearing outcomes from this treatment increase the participants' quality of life.

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

INTRODUCTION

The ear's tympanic membrane is essential for both sound wave transmission and the preservation of the middle ear's regular operation. Since cartilage grafts were first used in middle ear reconstruction, their function has changed significantly. Originally, they were only used for oculoplasty, which supported the fascia graft in the 1950s. Now, they are the only reconstruction material used in cartilage-perichondrium composite grafts for membrane reconstruction. The material of choice for reconstructing atelectatic tympanic membranes and recurrent perforations is often cartilage-perichondrium composite grafts.^{1, 2}

In high-risk patients, such as those with chronic tubal dysfunction, atelectatic cases, recurrent perforations, nasal allergies, poor middle ear mucosa, subtotal or complete perforations, bilateral perforations, and paediatric instances, the use of

cartilage as a graft has become more common within the past ten years. Because of its mechanical characteristics, which offer increased resistance to reperforation and retraction, cartilage has been shown to be an excellent transplant in these circumstances. It is well-accepted in the middle ear and has a modest metabolic rate (4,5). Reduced vibratory characteristics of cartilage transplant have been a source of concern due to its thickness and stiffness. Numerous researches have demonstrated that this issue may be solved by slicing the cartilage.

Composite chondro-perichondrial clip tympanoplasty is one of the 23 cartilage tympanoplasty techniques now in use. Other procedures include: in-lay butterfly cartilage tympanoplasty in special circumstances; subtotal perforations; special total pars tensa cartilage perichondrium composite grafts; cartilage-perichondrium composite island grafts; and slices, foils, thin plates, and thick plates that are not covered in perichondrium on the side of the ear canal. In every instance, the graft modifies its pathophysiology to suit its evolving function. The current study, which evaluated the success rates of cartilage-perichondrium composite graft tympanoplasty in achieving closure of tympanic membrane perforations as well as postoperative hearing outcomes, sought to comprehensively assess the efficacy and outcomes of this procedure in repairing tympanic membrane perforations. The study evaluated the frequency of complications associated with tympanoplasty using a cartilage-perichondrium composite graft.

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 aimed to comprehensively assess the efficacy and outcomes of the procedure in repairing the tympanic membrane perforations. The study evaluated the frequency of complications associated with tympanoplasty using a cartilage-perichondrium composite graft. The research participants came from the Institute's Department of ENT. Prior to participation, informed permission was obtained from all individuals, both verbally and in writing. 220 patients with tympanic membrane perforations of both genders were evaluated for the research.

Participants with high cochlear reserve, persistent ear discharge with tympanic membrane perforation, tympanosclerotic patch with or without cholesteatoma/granulations, and participants with tympanosclerotic patch excision were the inclusion criteria for this study. These patients underwent mastoidectomy and tympanoplasty procedures to treat cholesteatoma and granulation. Study participants with otogenic intracranial problems met the exclusion criteria.

Following the final inclusion of the research participants, each subject had a thorough clinical history and examination using a prepared, organised proforma that was created specifically for the study. Pre-operative audiometric evaluations, including PTA (pure tone audiometry), were performed on each individual. Otoscopy was used to measure each subject's perforation, and a microscope was used to examine each one.

A mandatory preoperative evaluation was then completed on each patient. Tympanoplasty was performed under local anesthesia on adult patients and general anesthesia on kid subjects. 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. All individuals had their sutures removed between the seventh and tenth day following surgery. Antibiotics were given to the subjects for duration of six weeks. After three to six months, the individuals were brought back for a follow-up visit and to document their post-operative observations.

With SPSS, the collected data were statistically examined (Statistical Package for the Social Sciences) software version 16.0 (SPSS Inc., Chicago, USA) for assessment of descriptive measures and chi-square test. The results were expressed as mean and standard deviation and frequency and percentages. 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 aimed to comprehensively assess the efficacy and outcomes of the procedure in repairing the tympanic membrane perforations. The study evaluated the frequency of complications associated with tympanoplasty using a cartilage-perichondrium composite graft. There were 220 participants in the research, 39.09% of whom were male (n = 86) and 88.18% of whom were female (n = 194). The research participants ranged in age from 10 to 62 years old, with a mean age

of 32.48 ± 6.82 years. Of the 220 participants, 164 had a central perforation, and 56 showed signs of cholesteatoma or granulations.

Deafness was the most prevalent presenting symptom in 98.18% (n=216) of the individuals, followed by diarrhoea in 92.72% (n=204) and ear discomfort in 42.72% (n=94) of the cases, respectively. According to the research's findings, any graft utilised to repair a tympanic membrane perforation that was observed to remain intact three months after surgery was regarded as having been taken; this was observed and reported in 99.09% (n=218) of the study individuals.

When the A-B bone closure in various tympanoplasty types was evaluated 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, showed signs of 21–30 air-bone gap closure. 1.3% (n = 2) and 11.11% (n = 4) of participants having type I and type II tympanoplasty, respectively, had A-B gap closure of >30 (Table 1).

AB gap closure of 0–10 was seen in 22.72% (n=50) of research participants for total air-bone closure in dB, while 11–20 was observed in 58.18% (n=128) of study participants. Air-bone gap closure of 21–30 was seen in 16.36% (n=36) study subjects, and air-bone gap closure of >30 was seen in 2.7% (n=6) study subjects as shown in Table 2.

DISCUSSION

There were 220 participants in the current study, 39.09% of whom were male (n = 86) and 88.18% of whom were female (n = 194). The research participants ranged in age from 10 to 62 years old, with a mean age of 32.48 ± 6.82 years. Of the 220 participants, 164 had a central perforation, and 56 showed signs of cholesteatoma or granulations. Deafness was the most prevalent presenting symptom in 98.18% (n=216) of the individuals, followed by diarrhoea in 92.72% (n=204) and ear discomfort in 42.72% (n=94) of the cases, respectively. These statistics were comparable to those from studies conducted in 2003 by Singh M et al. and in 2005 by Desarda K.K et al., where authors evaluated patients using demographic data similar to those of the current study.

Based on observations and reports from 99.09% (n=218) research participants, it was determined that any graft utilised to repair a tympanic membrane perforation that remained intact after three months after surgery qualified as the graft being taken. The present study's outcomes aligned with the research conducted by O. Ben Gamra et al. (2008) and Vaidya S et al. (2014), who noted elevated graft uptake and acceptability in their participants suffering from tympanic membrane perforation.

The study's findings demonstrated that, when evaluating the A-B bone closure in various tympanoplasty procedures three months after surgery, 30.55% (n=44) and 16.66% (n=6) of the individuals had an AB score of 0–10 with type I and type II tympanoplasty.

Based on observations and reports from 99.09% (n=218) research participants, it was determined that any graft utilised to repair a tympanic membrane perforation that remained intact after three months after surgery qualified as the graft being taken. The present study's outcomes aligned with the research conducted by O. Ben Gamra et al. (2008) and Vaidya S et al. (2014), who noted elevated graft uptake and acceptability in their participants suffering from tympanic membrane perforation.

The study's findings demonstrated that, when evaluating the A-B bone closure in various tympanoplasty procedures three months after surgery, 30.55% (n=44) and 16.66% (n=6) of the individuals had an AB score of 0–10. 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, Of the 36 research participants, 16.36% (n=36) had air-bone gap closure of 21–30, while 2.7% (n=6) had air-bone gap closure of >30. These findings were consistent with those of Patil K et al. (2011) in 2014 and Demirpehlivan IA et al. (2011), whose research participants had similar overall air-bone closure to that of the current study.

CONCLUSION

The current study shows that the cartilage-perichondrium composite graft is a dependable and effective method for healing tympanic membrane perforations, taking into account its limitations. This method produces outstanding closure

rates and enhances hearing results, which raises the participants' quality of life. To draw additional conclusions, longer monitoring periods and greater sample numbers are required in future longitudinal investigations.

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TABLES

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