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Original Research Article

An Assessment of Endoscopic Composite Cartilage Tympanoplasty in Chronic Otitis Media Patients

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Abstract

Aim: The aim of the present study was to determine the functional outcome of endoscopic composite cartilage tympanoplasty in patients having chronic otitis media (mucosal variety) with dry central perforation (small or medium).

Methods: This study was conducted to investigate the effectiveness of endoscopic composite cartilage tympanoplasty (type I) in treating chronic otitis media (mucosal variety) with dry central perforation (small to medium). The study comprised 100 patients who were treated at the Otolaryngology Department of Nalanda Medical College and Hospital, Patna, Bihar, India. The sample size was determined based on the projected availability of surgical cases over the 12-month study period.

Results: This study investigated 100 individuals, 62 of them were female and 38 male. Patients 12 and older were selected for this study. There were 22 cases in the 13-20 age group, 33 in the 21-30 age group, 37 in the 31-40 age group, and 8 over 40. The average age of patients in this study was 33.7±8.12 years. Most of our patients (65) had medium-sized perforation, whereas 35 had small perforation. From 100 cases investigated in this study, 46 patients had left ear surgery and 54 had right ear surgery. The pre-operative auditory threshold, Air Conduction Test (ACT) was 45.2±5.2 dB, while the post-operative ACT averaged 26.3±5.4 dB. The pre- and post-operative differences were statistically significant.

Conclusion: Our findings indicate that endoscopic composite cartilage type I tympanoplasty is a viable, secure, minimally invasive, and efficient surgery that produces favourable results.

Keywords: Cartilage, Endoscopic ear surgery, Tympanoplasty type I

Introduction

Chronic otitis media is an inflammatory process in the middle ear space that results in long term or more often , permanent changes in the tympanic membrane including perforation ,tympanosclerosis ,retraction pocket development or cholesteatoma. COM is of two varieties-(a) mucosal variety (b) squamous variety . Damage to the middle ear and tympanic membrane, including perforation, ossicular destruction, myringosclerosis, and external auditory neuropathy, is a common complication. Surgery is the standard treatment for chronic otitis media. The three primary aims of surgery are illness eradication, hearing mechanism repair and eradication of disease from middle ear cleft. As more precise tools and more refined surgical methods were available, endoscopic tympanoplasty gradually replaced classical microscopic tympanoplasty. It appears that many are hesitant to employ this method due to their lack of skill with the instruments and inability to use both hands simultaneously. [1]

Endoscopic transcanal surgery allows for numerous ear procedures to be performed through a little incision rather than a large incision behind the ear. An excellent graft material for endoscopic tympanoplasty is tragal cartilage. Cartilage is an ideal graft for endoscopic tympanoplasty because it is rather rigid, allowing for more precise hand placement and a lower risk of rejection or failure. [2] There will be no scarring or bleeding on the pitch as a result of the transcanal endoscopic procedure. Percentage of graft uptake is higher in endoscopic tympanoplasty than microscopic tympanoplasty in case surgery is done by experienced surgeon. [3] For a long time, people have been using composite

cartilage tympanoplasty. The functional and anatomical outcomes of endoscopic surgery are identical to those of surgery performed under a microscope. However, the EES technique has proven to be superior in terms of both its visibility and its ease of use. There has been no discernible change in the transmission of sound from the temporalis fascia to the cartilage, and the cartilage is robust enough to withstand the negative pressure in the middle ear. [4–7] In taking advantage of the tragal cartilage's natural qualities through a unique grafting design made the graft difficult to come free and easy to insert with one hand, which contributed to good graft uptake. Additionally, this technique lessens the likelihood of adhesion formation by decreasing the necessity of packing the middle ear. [8] Finding out how well endoscopic composite cartilage tympanoplasty works for patients with chronic otitis media (mucosal variety) with dry central perforation (small or medium) was the goal of this study.

Materials and Methods

At the Otolaryngology Department of Nalanda Medical College and Hospital , Patna, Bihar, India for one year, 100 patients suffering from chronic otitis media(mucosal variety) with dry central perforation(small or medium) were enrolled in this prospective interventional trial. The patients received endoscopic composite cartilage tympanoplasty (type I). The anticipated availability of surgical cases during the following twelve months informed the decision of the sample size.

The inclusion criteria were:

- Patients aging above 12 years;
- With chronic otitis media(mucosal variety) with dry central perforation (small or medium) for at least one and a half months;
- Having conductive hearing loss (air conduction threshold <45 dB in the affected ear); and
- Good tubal function and dry middle ear mucosa.

The exclusion criteria were:

- Large subtotal/total perforation;
- With active squamosal variety
- With persistently discharging ear not responding to medication;
- Pure sensorineural and mixed hearing loss in the affected ear; and

Methodology

At the Otolaryngology Department of Nalanda Medical College and Hospital , Patna, Bihar, India, 100 patients suffering from chronic otitis media (mucosal variety) with dry central perforations (small or medium) were enrolled in this prospective interventional trial. The patients underwent endoscopic composite cartilage tympanoplasty (type I). The anticipated availability of surgical cases during the following twelve months informed the decision of the sample size.

Every single patient who was considered had their medical history carefully examined for any signs of systemic disorders, chronic illnesses, long-term medications, or presenting complaints. The patients underwent a battery of diagnostic procedures, including a thorough clinical evaluation, otoscopy, oto-endoscopy, tuning fork testing, and X-ray (bilateral) mastoid (Schuller's view) of the ears. Each subject had a pure tone audiometry (PTA) test to determine their hearing ability. The pure-tone average for air conduction (ACT) and bone conduction (BCT) was determined by taking the average of thresholds at0.5,1,2, and 4 kHz. At one-month, three-month, and six-month intervals following surgery, audiometry and otoscopy were performed on all patients. The change in air conduction thresholds before and after the operation was used to assess the functional outcomes.

All statistical calculations were done using (Statistical package for the social science) SPSS, version 21 (SPSS Inc., Chicago, IL, USA).

Results

Table 1: Demographic data of the study

Variables	N	%
Age		
13-20	22	22
21-30	33	33
31-40	37	37
>40	8	8
Mean±SD	33.7±8.12	
Gender		
F	62	62
M	38	38
Duration of ear discharge		
<1year	17	17
1-5year	48	48

>5year	35	35
Decreased hearing		
<1year	12	12
1-5year	30	30
>5year	58	58

The mean age of patients in this study was 33.7±8.12 years. In our study, the duration of ear discharge ranged from less than 1 year to more than 5 years. Out of the total 100 cases, 17 cases had ear discharge for less than 1 year, 48 cases for 1-5 years, and 35 cases for more than 5 years. In this study, 30 cases reported decreased hearing for 1-5 years, and 58 cases had it for more than 5 years.

Table 2: Patients operated information

	N	%
Size of perforation		
Medium	65	65
Small	35	35
Operated site		
Left	46	46
Right	54	54

In this study of 100 cases, 46 patients were operated on in the left ear and 54 cases patients were operated on in the right ear.

Table 3: ACT wise comparison of the study

	Mean	SD	P VALUE
Pre	45.2	5.2	<0.002
Post	26.3	5.4	

The pre-operative ACT was 45.2±5.2 dB whereas postoperatively it was 26.3±5.4 dB and the difference between the pre- operative and post-operative values was found to be statistically significant.

Discussion

The fundamental hallmark of chronic otitis media (COM), a complicated multifactorial inflammatory and infectious disease, is middle ear mucosal inflammation with permanent tympanic membrane perforation and, occasionally, fixation or interruption of the ossicular chain. In treating chronic otitis media, the primary goals are to close the perforation in the tympanic membrane, get rid of the persistent infection, and, if needed, get the ossicular chain back to its integrity and mobility. Although endoscopic tympanoplasty (ET) has gained popularity since the late 1990s, microscopic tympanoplasty (MT) has been the usual procedure for treating perforated tympanic membranes since the 1950s. The MT technique leaves both surgeons' hands free and provides binocular vision together with a superb stereoscopic surgical view; but, its straight-line vision makes it somewhat difficult to see the middle ear through the ear canal. [9] To achieve sufficient visualisation and lighting, standard MT is therefore initially carried out with a post auricular incision, either with or without drilling of the bony canal. [10] An incision made postauricularly can result in surgical scarring, transient cutaneous feeling loss, and ear malposition. [11]

One hundred cases in all, 62 female and 38 male, were examined. Patients in this study were chosen more than twelve years old. Daneshi and colleagues [12] conducted their study on nine individuals, with a mean age of 37.9 years. In our study , there were 8 cases over 40 years old, 22 cases between 13 and 20 years old, 33 cases between 21 and 30 years old, and 37 cases between 31 and 40 years old. The patients in this trial were 33.7±8.12 years old on average. In 87 cases of endoscopic cartilage tympanoplasty, Kaya et al. [13] reported the outcomes, and 55 of the cases were female and 32 were male. A previously linked factor to the graft success rate, age may affect the outcomes. [14] Studies having comparable age distributions across the two groups (ET and MT) were considered in the current study. Previous research indicated that the grafting technique rather than the surgical procedure is probably more responsible for the similar graft success rate. [15]

Still, the subgroup with full-thickness cartilage grafts showed a little better hearing outcome than the temporalis fascia graft group in a number of trials and meta-analyses. [16] Furthermore, as Gerber et al. proved, cartilage does not block sound transmission. [17] There was no difference in the audiometric outcomes between the cartilage and

temporalis fascia grafts according to four meta-analyses [18-21] and one comprehensive review. [22] Furthermore study in this area is required. Comparable hearing gains in ET and MT confirmed earlier research indicating that, for patients with COM who need tympanoplasty, an endoscopic method can be a viable substitute for a microscopic procedure. Within our study, ear discharge lasted anything from less than a year to more than five years. Of the 100 cases in all, 17 had an ear discharge lasting less than a year, 48 between one and five years, and 35 beyond five years. Thirty cases reported hearing loss for one to five years, while fifty-eight cases reported it for longer than five years. In our study, 65 patients had medium-sized perforations, the greatest number of subjects; 35 patients had small perforations. Within this 100-case study, 46 patients had left ear surgery and 54 patients had right ear surgery.

In the present study pre-operative ACT was 45.2±5.2 dB whereas postoperatively it was 26.3±5.4 dB; the difference between the two values was shown to be statistically significant. Another work used endoscopic cartilage tympanoplasty with both full thickness and partial thickness tragal grafts. Before surgery, the full thickness group's average hearing was 40.80±7.46 dB, and the partial thickness group's was 39.40±7.95 dB. Average hearing in the full-thickness group was 26.72±8.08 dB at two months following surgery, while in the partial thickness group it was 26.40±8.60 dB. Both groups' hearing improved to a comparable and statistically significant degree from their pre-surgery levels (p value = 0.012 for the full-thickness group and p value = 0.018 for the partial thickness group). [23]

Conclusion

With less invasive transcanal endoscopic tympanoplasty, the surgeon can avoid surgical scarring ,transient loss of cutaneous sensation and malposition of the ear .The procedure also has fewer postoperative complications and a shorter recovery period than conventional tympanoplasty, with comparable results in terms of graft success rates and Air Bone Gap (ABG).

We deduced from our work that type I tympanoplasty with endoscopic composite cartilage graft is a practical, safe, minimally invasive, and successful operation.

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