



AUDIOLOGICAL OUTCOME OF ENDOSCOPIC VS MICROSCOPIC TYMPANOPLASTY

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ABSTRACT **Background:** Chronic otitis media is one of the most common disease observed in ENT clinic. Tympanoplasty is a procedure to eradicate the disease in middle ear and reconstruct the hearing mechanism. Microscope provides a magnified image in straight line extending from the objective lens. Endoscopy provides a wide view that enables minimally invasive access to all areas. **Objective:** Our study aims to compare the audiological results of endoscopic tympanoplasty with microscopic tympanoplasty. **Methods:** Study included 50 patients who were randomized into group A microscopic tympanoplasty & group B endoscopic tympanoplasty. Hearing improvement was assessed & results were statistically compared. **Results:** There were 25 patients in each group with different sizes of perforation. Hearing improvement was assessed pre and postoperatively and outcome was significant in both groups. **Conclusion:** The hearing outcome is similar in both microscopic and endoscopic tympanoplasty.

KEYWORDS : Microscopic tympanoplasty, Endoscopic tympanoplasty, Minimally invasive surgery.

INTRODUCTION

In the intricate realm of ear surgery, the choice between microscopic and endoscopic tympanoplasty represents a pivotal decision that surgeons must carefully weigh. Tympanoplasty is reconstructing the middle ear cavity and sound-conducting tympano-ossicular system^[1] performed to address chronic otitis media. The traditional approach involves utilizing an operating microscope with a post-aural approach.

There has been a growing adoption & refinement of Endoscopic tympanoplasty, emerging as a minimally invasive transcanal approach^[2]. The microscopic approach falls short in achieving complete visualisation of the eardrum, middle ear cleft & attic. The endoscopic approach offers enhanced visualization of concealed areas of the middle ear cavity such as the anterior & posterior epitympanic spaces, facial recess, sinus tympani, hypotympanum and visibility of the tympanic membrane in narrow, curved external ear canal^[15-16].

Over time, alternative surgical approaches, graft materials & techniques have been introduced in ear surgery. Fascia temporalis remains the most commonly used graft material owing to its accessibility, easy availability and high success rates^[3-4].

The microscopic technique is generally considered a safe procedure, but endoscopic approach is potentially even safer, given the absence of external incisions, which helps prevent postoperative wound infections and hematoma formation. In addition it offers improved visualization & better cosmetic results. The duration of surgery varies based on the surgeon's expertise. However, endoscopic surgery has its drawbacks, such as the limitation to one-handed manoeuvres, which can be less efficient. Direct traumas or thermal damage & in cases of significant bleeding, view of the endoscope may be compromised.^[5a]

Hearing restoration is crucial for a better quality of life. There is limited data comparing the success rates & improvement in hearing between endoscopic & microscopic tympanoplasty. This study compares the outcome of tympanoplasty performed with a microscope versus an endoscope in terms of hearing improvement for individuals with chronic otitis media having conductive hearing loss.

MATERIALS & METHODS

This randomised controlled study was conducted in CIMS, Chikkamagaluru from Feb 2023-Oct 2023.

Sample size is 25 in Microscopic Tympanoplasty group and 25 in Endoscopic tympanoplasty group. Calculated using formula: $N = 2(Z\alpha + Z\beta)^2 \sigma^2 / d^2$

Inclusion Criteria:

1. Patients having Chronic otitis media – inactive mucosal disease with conductive hearing loss.
2. Age between 20-60 years

Exclusion Criteria:

1. Sensorineural / mixed hearing loss.

2. Chronic otitis media squamosal disease.

A complete history & otolaryngologic examination was performed on all patients. Most of the patients were in the age group of 20-30 years (56%) and 31-40 years (36%) in the present study. In group 1, 48% (12) patients were in the age group of 20-30 years whereas in group 2, 64% (16) patients were in the age group of 20-30 yrs.

Mean age of the study population was 24.52 ± 7.271 years. Most common symptom in patients was hearing loss (90%) & ear discharge (80%), 4 patients had tinnitus & 2 patients were asymptomatic.

Otomicroscopy was done to look for cholesteatoma, site of perforation & status of the middle ear mucosa. Size of perforation varied and Group 1 patients mainly had large central perforation (48%) while majority of group 2 patients had medium sized perforation (48%). Subtotal perforation was least common with 3 patients (12%) in group 1 and 1 patient (4%) in group 2.

Tuning fork tests and Pure tone audiogram (PTA) done to assess the type of deafness, cochlear reserve and intensity of deafness.

The patient was counselled preoperatively regarding the nature of the problem, proposed treatment, expected outcome and potential complications.

Carl- Zeiss Operating Microscope was used in Microscopic tympanoplasty. A post aural William Wilde's Incision was taken & Temporalis fascia graft harvested.

In endoscopic tympanoplasty 0° or 30° , 17 cm long, 2.7mm wide Karl-Storz rigid endoscope was used & approach was permeal. A 2 cm hairline incision was taken & temporalis fascia graft harvested. Edges of the perforation is freshened. Incision taken 5mm from tympanic annulus, 12-6'0 clock position with circular knife. Tympanomeatal flap is elevated and ossicular, middle ear status is assessed.

Graft is placed by underlay technique in both methods. Gelfoam packing of EAC & mastoid dressing done. Postoperatively antibiotics, analgesics, decongestants were given for a week. Patient was discharged on 2nd post-operative day or as soon as patient had no complaints in both groups. Patients were then followed weekly for a month and at 3rd month.

RESULTS

Pre & post operative hearing assessment with PTA was done for all patients and values were compared between 2 groups.

Table 1: Pre Operative Hearing Loss

Hearing loss	GROUP I	GROUP II	Total
<25 dB	1(4%)	4(16%)	5(10%)
26-40 dB	13(52%)	14(56%)	27(54%)
41-55 dB	9(36%)	6(24%)	15(30%)

56-70 dB	2(8%)	1(4%)	3(6%)
71-90 dB	0(0%)	0(0%)	0(0%)
>90 dB	0(0%)	0(0%)	0(0%)

Pre-operative A-B Gap of group 1 patients were mostly in the range of 21-30dB (56%) and in group 2 patients mainly between 11-20dB (12%).

Postoperative hearing was assessed at 3 months and values were compared between the 2 groups.

Hearing outcome at 3 months in 14(56%) patients of group 1 and in 13 (52%) patients of group 2 was between 26-40 dB. PTA value of 6(24%) patients in group 1 and 10(40%) patients in group 2 was <25 dB.

Table 2: Post Operative Hearing At 3 Months

PTA VALUE	GROUP I	GROUP II
<25 dB	6(24%)	10(40%)
26-40 dB	14(56%)	13(52%)
41-55 dB	4(16%)	2(8%)
56-70 dB	1(4%)	0(0%)
71-90 dB	0(0%)	0(0%)
>90 dB	0(0%)	0(0%)

Post-operative A-B gap of 12(48%) patients of group 1 and 13(52%) patients of group 2 was between 11-20dB and 8(32%) patients in group 1 and 11(44%) patients in group 2 had value between 0-10dB.

Table 3: Post Operative A-b Gap

AB GAP	GROUP 1	GROUP 2
0-10 DB	8(32%)	11(44%)
11-20 DB	12(48%)	13(52%)
21-30 DB	5(20%)	1(4%)

The mean pre and post op value of PTA in group 1 was 39.95 ± 10.75 and 36.9 ± 10.9 respectively, with p value of <0.001 which is considered significant. The mean pre and post op value of PTA in group 2 was 35.03 ± 10.09 and 30.71 ± 7.62 respectively, with a p value of <0.001 which is considered significant.

Comparing the 2 groups, mean post op PTA value of group 1 is 36.9 ± 10.9 and group 2 is 30.71 ± 7.62 and p value between 2 groups is 0.024 which is not considered significant.

The mean pre and post op value of ABG in group 1 was 23.62 ± 6.57 and 17.8 ± 6.14 respectively, p value of <0.001 which is considered significant. The mean pre and post op value of ABG in group 2 was 20.48 ± 7.8 and 16.4 ± 3.33 respectively, p value of <0.001 which is considered significant. Comparing the 2 groups, mean post op ABG value of group 1 is 17.8 ± 6.14 and group 2 is 16.4 ± 3.33 and p value between 2 groups is 0.236 which is not considered significant.

DISCUSSION

Traditionally, middle ear procedures are performed under microscopic observation, but there is an increasing shift towards endoscopic approaches^[7-9].

The microscopic approach offers a stereo-view & bimanual operation, but limited to linear visualization impeding deep recess observation in the middle ear. In comparison, endoscopes offer a magnified view of the surgical field without the constant need for image adjustment & rotational movement offers a panoramic views of deep, hidden regions of the middle ear. It enhances visualization of the critical structures such as tubal orifice, incudostapedial joint & round window niches. In Type 1 tympanoplasty the reconstruction is limited to the repair of tympanic membrane perforation which implies that the ossicular chain is intact, mobile in the absence of middle ear disease^[10-11].

An essential outcome for patients is improved hearing. No significant difference in hearing outcomes between microscopic and endoscopic tympanoplasty was found in our study, as the fundamental repair remains constant despite differences in technique. This aligns with findings from studies conducted by G. Lakpathi et al., A S Harugop et al.^[16].

Significant hearing improvements reported in pediatric patients undergoing endoscopic tympanoplasty and cases of endoscopic ear surgery for cholesteatoma removal in some studies^[15].

Studies by Dunder et al., Huang et al., Sinha et al., states that postoperative air-bone gap improvement is significant after tympanoplasty, regardless of the chosen technique & concludes that no major difference exists in air-bone closure between microscopic & endoscopic methods^[12-14].

CONCLUSION

Our study show that the hearing improvement in both microscopic & endoscopic tympanoplasty were similar as the surgical technique differed and final outcome remained the same.

Conflicts Of Interest

None

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