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Comparative Evaluation of Endoscopic and Microscopic Tympanoplasty Techniques in Chronic Otitis Media: A Prospective Study.

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ABSTRACT

Chronic Otitis Media (COM) is a common condition requiring surgical intervention for disease eradication and hearing restoration. Tympanoplasty can be performed using either the traditional microscopic approach or the more recent endoscopic technique. This study aimed to compare the clinical outcomes of endoscopic and microscopic tympanoplasty. A prospective comparative study was conducted over one year on 40 patients diagnosed with mucosal type COM with large or subtotal perforations. Patients were randomly assigned into two groups: Group A (endoscopic tympanoplasty, n=20) and Group B (microscopic tympanoplasty, n=20). Preoperative and postoperative assessments included otoscopic examination and pure tone audiometry. Graft uptake, hearing improvement, operative time, and complications were evaluated over a 3-month follow-up period. Graft uptake was successful in 90% of patients in the endoscopic group and 85% in the microscopic group (p=0.63). Both groups showed significant hearing improvement with comparable mean hearing gain (14.6 dB vs. 13.9 dB; p=0.48). The mean operative time was significantly shorter in the endoscopic group (55.2 minutes) compared to the microscopic group (72.4 minutes; p<0.001). Postoperative complications were fewer in the endoscopic group. Endoscopic tympanoplasty is a safe and effective alternative to the microscopic approach, with comparable functional outcomes and reduced operative time.

Keywords: Endoscopic tympanoplasty, Chronic otitis media, Graft uptake

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INTRODUCTION

Chronic Otitis Media (COM) remains a significant cause of hearing impairment and morbidity worldwide, particularly in developing countries [1]. Surgical intervention, primarily tympanoplasty, is the mainstay of treatment aimed at eradicating disease and restoring hearing [2]. Traditionally, tympanoplasty has been performed using a microscope, providing binocular vision and depth perception. However, in recent years, the endoscopic approach has gained popularity due to its minimally invasive nature, wide-angle visualization, and ability to access hidden recesses of the middle ear without external incisions [3].

The endoscopic technique offers improved cosmetic outcomes, reduced postoperative discomfort, and potentially shorter operative times. However, it demands single-handed surgery, a steep learning curve, and may have limitations in complex middle ear pathologies. On the other hand, the microscopic approach, though time-tested, may require canalplasty and provides a limited field of view, especially in anterior perforations [4].

With advancements in endoscopic instrumentation and surgical training, it has become essential to evaluate whether the endoscopic approach can match or surpass the outcomes of the conventional microscopic technique [5]. This prospective study aims to compare the two techniques in terms of graft uptake rate, hearing improvement, operative time, and postoperative complications, thereby providing evidence to guide the optimal surgical approach in managing chronic otitis media.

METHODOLOGY

This prospective comparative study was conducted over a period of one year. A total of 40 patients diagnosed with mucosal type Chronic Otitis Media (COM) with large or subtotal central perforations were enrolled based on predefined inclusion and exclusion criteria. Informed consent was taken from all participants prior to their inclusion in the study.

The patients were randomly divided into two equal groups of 20 each. Group A underwent tympanoplasty using the endoscopic approach, while Group B underwent tympanoplasty using the conventional microscopic approach. All surgeries were performed by experienced ENT surgeons under local or general anesthesia, depending on the patient's clinical status and surgical requirement. The temporalis fascia was used as the graft material in both groups.

Preoperative assessment included a detailed history, otoscopic examination, pure tone audiometry (PTA), and high-resolution computed tomography (HRCT) of the temporal bone where indicated. Postoperative evaluation was done on the 7th day, 1st month, and 3rd month, assessing graft uptake by oto-endoscopy and hearing improvement by repeat PTA. The primary outcome measures were graft success rate and hearing gain; secondary outcomes included operative time and postoperative complications.

Data were compiled and analyzed using appropriate statistical tools. Mean values, standard deviations, and percentages were calculated. Comparison between the two groups was done using the chi-square test and independent t-test, with a p-value of <0.05 considered statistically significant. The results were interpreted to assess the efficacy and safety of the endoscopic technique relative to the microscopic method in tympanoplasty.

RESULTS

Table 1: Demographic Profile of Study Participants (n=40)

Parameter	Group A (Endoscopic) (n=20)	Group B (Microscopic) (n=20)	Total (n=40)
Mean Age (years)	32.6 ± 8.4	34.1 ± 7.9	33.4 ± 8.1
Male (%)	11 (55%)	12 (60%)	23 (57.5%)
Female (%)	9 (45%)	8 (40%)	17 (42.5%)
Laterality (Right)	13 (65%)	12 (60%)	25 (62.5%)
Laterality (Left)	7 (35%)	8 (40%)	15 (37.5%)

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Table 2: Graft Uptake at 3 Months Postoperatively

Outcome	Group A (Endoscopic)	Group B (Microscopic)	p-value
Successful Graft Uptake	18 (90%)	17 (85%)	0.63
Graft Failure	2 (10%)	3 (15%)	

Table 3: Hearing Improvement (Mean Air-Bone Gap in dB)

Time Point	Group A (Endoscopic)	Group B (Microscopic)	p-value
Preoperative	29.4 ± 6.3	30.1 ± 5.8	0.67
3 Months Post-op	14.8 ± 3.9	16.2 ± 4.1	0.24
Mean Hearing Gain	14.6 ± 2.7	13.9 ± 3.1	0.48

Table 4: Operative Time and Postoperative Complications

Parameter	Group A (Endoscopic)	Group B (Microscopic)	p-value
Mean Operative Time (minutes)	55.2 ± 6.7	72.4 ± 8.3	<0.001
Post-op Pain (VAS >4 on Day 1)	5 (25%)	9 (45%)	0.18
Wound Infection	1 (5%)	2 (10%)	0.55
Canal Edema	2 (10%)	3 (15%)	0.63

DISCUSSION

This prospective comparative study aimed to evaluate the outcomes of endoscopic versus microscopic tympanoplasty in patients with mucosal type chronic otitis media. A total of 40 patients were included and equally divided into two groups. The findings of our study contribute to the growing body of evidence supporting the feasibility and efficacy of endoscopic ear surgery as a viable alternative to the traditional microscopic approach [5, 6].

In terms of demographic distribution, both groups were comparable with no statistically significant differences in age, gender, or laterality of disease, indicating effective randomization. The mean age in the endoscopic group was 32.6 years and in the microscopic group was 34.1 years, which falls within the commonly affected age group for chronic otitis media, reflecting the socio-economic and occupational exposure that often contributes to disease persistence.

The primary outcome of graft uptake success at 3 months postoperatively was slightly higher in the endoscopic group (90%) compared to the microscopic group (85%), though the difference was not statistically significant (p=0.63). This suggests that both approaches are comparable in terms of surgical success. Our results are in line with several previous studies that reported graft success rates ranging between 85% and 95% for both techniques. The marginally higher success in the endoscopic group could be attributed to better visualization of hidden areas such as the anterior epitympanum and the sinus tympani, allowing more precise graft placement.

Regarding hearing improvement, both groups showed a significant reduction in the air-bone gap at 3 months postoperatively. The mean hearing gain was 14.6 dB in the endoscopic group and 13.9 dB in the microscopic group (p=0.48), indicating no significant difference. This reinforces the fact that both techniques are effective in restoring hearing in patients with COM. The slightly better outcomes in the endoscopic group could be due to minimal manipulation of middle ear structures and preservation of canal wall anatomy.

One of the most notable findings in our study was the significantly shorter operative time in the endoscopic group (mean 55.2 minutes) compared to the microscopic group (mean 72.4 minutes) with a p-value <0.001. This is consistent with previous studies reporting that endoscopic tympanoplasty, being transcanal and requiring no postauricular incision or canalplasty, often results in reduced surgical time. This has implications not only for surgical efficiency but also for reducing anesthesia exposure, especially in high-risk patients.

Postoperative complications were slightly more in the microscopic group, including higher postoperative pain and more frequent canal edema and wound infections, although these differences were not statistically significant [7-9]. The minimally invasive nature of endoscopic surgery likely contributes to reduced tissue trauma and faster postoperative recovery. However, the need for single-handed instrumentation and loss of binocular vision remain limitations of the endoscopic approach, which requires adequate training and experience [10, 11].

CONCLUSION

In conclusion, our study supports that endoscopic tympanoplasty is an effective, safe, and cosmetically superior alternative to microscopic tympanoplasty, offering comparable graft success and hearing outcomes with reduced operative time and fewer complications. Further multicentric studies with larger sample sizes and longer follow-up durations are recommended to substantiate these findings.

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