Pravara Med Rev; March 2025, 17 (01), 36-39
DOI: 10.36848/PMR/2025/00000.40144

Original article

A Comparative Study of Tympanoplasty Outcomes in Chronic Otitis Media: Endoscopic VS. Microscopic Approach

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Abstract

Introduction: *Tympanoplasty remains a definitive procedure for chronic suppurative otitis media (CSOM). Recently, endoscopic tympanoplasty has gained popularity due to its minimally invasive approach and enhanced visualization. Our study aimed to compare outcomes of transcanal endoscopic surgery (TES) with conventional microscopic surgery (CMS) in patients with mucosal CSOM.*

Materials and Methods: *This comparative observational study was conducted with 60 CSOM patients equally divided into two groups undergoing either transcanal endoscopic surgery (TES) or conventional microscopic surgery (CMS). Clinical outcomes assessed included graft uptake rate, residual perforation, surgical duration, postoperative audiological improvement (air-bone gap), complication rates, and patient satisfaction. Data were analyzed using SPSS software, employing chi-square and t-tests for comparisons.*

Results: *Both groups had comparable graft uptake rates (TES: 93.3%, CMS: 90%, p=0.640) and audiological improvements (TES: 90%, CMS: 86.7%, p=0.688). Operative duration was significantly shorter in TES (32.7 ± 4.2 mins) than CMS (45.9 ± 5.8 mins, p=0.001). Postoperative pain scores were lower (p=0.002), and patient satisfaction was higher (p=0.004) in the TES group.*

Conclusion: *TES offers outcomes comparable to CMS but with shorter operative time, improved patient comfort, and higher satisfaction, suggesting it as a favorable alternative for tympanoplasty.*

Keywords: *Chronic otitis media, Endoscopic Tympanoplasty, Microscopic Tympanoplasty*

Introduction

Chronic Suppurative Otitis Media (CSOM) remains a prevalent health concern, characterized by persistent otorrhea and tympanic membrane perforation, potentially leading to conductive hearing loss and recurrent infections. (1) Tympanoplasty is widely accepted as the definitive surgical intervention for reconstructing the tympanic membrane, eliminating middle ear disease, and restoring auditory function. (2,3) Conventionally, microscopic tympanoplasty has been the gold standard due to its well-established outcomes and ease of intraoperative maneuvering. However, recent advancements in otological surgery have introduced transcanal endoscopic tympanoplasty, offering superior visualization of middle ear anatomy, minimally invasive access, and potential for enhanced patient outcomes. (4,5,6)

Despite growing acceptance, the comparative efficacy of transcanal endoscopic surgery (TES) and conventional microscopic surgery (CMS) remains debated. While TES offers advantages such as improved visualization of hidden anatomical recesses, minimal invasiveness, and reduced operative time, concerns about the learning curve, precision, and long-term outcomes persist. Conversely, CMS provides enhanced binocular vision, depth perception, and familiarity among surgeons but may involve increased invasiveness and postoperative discomfort. (7)

Our study aims to compare clinical and audiological outcomes between TES and CMS in patients with chronic suppurative otitis media (CSOM), assessing operative success rates, complications, and patient satisfaction to inform optimal surgical approach selection.

Materials and Methods

This comparative observational study was conducted at the Department of Otorhinolaryngology at a tertiary care hospital. The study included 60 patients diagnosed with chronic suppurative otitis media (CSOM) presenting with mucosal type tympanic membrane perforations, who attended the ENT outpatient department from January 2023 to December 2024. Patients were divided into two equal groups of 30 each: Group A underwent Transcanal Endoscopic Tympanoplasty (TES), while Group B underwent Conventional Microscopic Tympanoplasty (CMS). Written informed consent was obtained from all participants, and ethical approval was secured from the Institutional Ethics Committee before initiating the study.

Patients were carefully selected based on specific inclusion and exclusion criteria. Inclusion criteria were age between 18 to 60 years, unilateral mucosal-type CSOM, dry ear for at least 6 weeks, and conductive hearing loss documented by pure-tone audiometry. Exclusion criteria included patients with previous ear surgeries, sensorineural hearing loss, active otitis externa, cholesteatoma, complicated CSOM, or patients with comorbidities that contraindicated surgery. Detailed preoperative evaluations, including pure-tone audiometry, otoscopy, and routine blood investigations, were performed for all patients.

The selected patients underwent tympanoplasty, divided equally into two groups (n=30 each). Group A underwent TES (Transcanal Endoscopic Surgery), and Group B underwent CMS (Conventional Microscopic Surgery). Surgeries were performed under general anesthesia by experienced surgeons to maintain procedural uniformity. Postoperative care was standardized, including antibiotic administration, analgesics, and follow-up instructions. Outcomes assessed included graft uptake rates, postoperative audiometric improvement, operative time, complications such as residual perforation, graft displacement, infections, and patient satisfaction measured at intervals of 1, 3, and 6 months postoperatively.

Data were collected systematically and analyzed using SPSS version 23. Descriptive statistics such as mean, standard deviation, frequency, and percentages were calculated. Inferential statistics involved chi-square tests and independent t-tests to compare outcomes between TES and CMS groups. Statistical significance was determined at a p-value of <0.05.

Results:

Table 1: Demographic Profile of the Study Participants (N=60)

Parameter	TES Group (n=30)	CMS Group (n=30)	P-value
Mean age (years)	32.4 ± 10.5	34.1 ± 9.8	0.514
Gender			
- Male	17 (56.7%)	16 (53.3%)	0.795
- Female	13 (43.3%)	14 (46.7%)	
Laterality			
Right	18 (60%)	17 (56.7%)	0.793
Left	12 (40%)	13 (43.3%)	

Table 2) **Clinical Outcomes**

Clinical Outcomes	TES Group (n=30)	CMS Group (n=30)	P-value
Mean surgical duration (min)	52.7 ± 12.3	65.4 ± 11.2	0.001*
Graft uptake rate (at 6 months)	28 (93.3%)	27 (90%)	0.640
Residual perforation	2 (6.7%)	3 (10%)	0.640
Operative complications	3 (10%)	5 (16.7%)	0.424

*Statistically significant

Table 3) **Audiometric Outcomes (Mean ± SD)**

Audiometric Outcomes (Mean ± SD)	**TES Group (n=30)**	**CMS Group (n=30)**	**P-value**
Preoperative AB Gap (dB)	29.6 ± 5.8	30.1 ± 6.3	0.747
Postoperative AB Gap (at 6 months)	13.2 ± 4.1	12.8 ± 4.9	0.693
Mean AB Gap closure (dB)	16.7 ± 3.5	17.2 ± 4.1	0.617
Hearing Improvement			
≥10 dB improvement	27 (90%)	26 (86.7%)	0.688

AB Gap: Air-Bone Gap; dB: decibel

Table 4) **Complications & Patient Satisfaction**

Complications & Patient Satisfaction	**TES Group (n=30)**	**CMS Group (n=30)**	**P-value**
Postoperative pain (VAS)	2.1 ± 0.8	3.6 ± 1.2	0.002*
Infection rate	1 (3.3%)	3 (10%)	0.301
Vertigo	2 (6.7%)	4 (13.3%)	0.389
Patient satisfaction score	8.8 ± 1.1	7.5 ± 1.3	0.004*

*Statistically significant. AB = Air-Bone; VAS = Visual Analog Scale.

Discussion

This comparative observational study was conducted to evaluate the outcomes of Transcanal Endoscopic Surgery (TES) versus Conventional Microscopic Surgery (CMS) in patients with mucosal-type chronic suppurative otitis media (CSOM). The study included 60 patients, equally divided into two groups of 30 each, undergoing either transcanal endoscopic surgery (TES) or conventional microscopic tympanoplasty (CMS). The primary objectives were to compare surgical outcomes, audiological improvements, postoperative complications, and patient satisfaction between the two surgical techniques. (8)

In terms of patient demographics, both groups were comparable, reflecting a homogeneous distribution of age, gender, and ear laterality. The mean age was 32.4 ± 10.5 years in the TES group and 34.1 ± 9.8 years in the CMS group, which was statistically insignificant (p=0.514). Gender distribution and the affected ear laterality were also comparable, indicating well-matched cohorts for unbiased comparison. This demographic similarity provided confidence that observed differences between groups could be attributed to surgical techniques rather than confounding patient-related factors.

Analysis of surgical outcomes demonstrated notable differences between TES and CMS. The graft uptake rate, a primary indicator of surgical success, was high in both groups, with the TES group achieving a slightly higher uptake rate of 93.3% compared to 90% in the CMS group; however, this difference was not statistically significant (p=0.640). The residual perforation rate was slightly lower in the TES group (6.7%) than the CMS group (10%), though this difference was not statistically significant (p=0.640). A significant finding was the shorter operative duration observed in the TES group (mean 32.7 ± 4.2 minutes) compared to the CMS group (mean 45.9 ± 5.8 minutes) (p=0.001). These results align well with previous studies reporting that endoscopic approaches are less time-consuming due to direct visualization and the minimally invasive approach reducing surgical dissection and instrument handling time1,2.

Audiological improvements were evaluated by comparing pre- and postoperative air-bone (AB) gaps at 6 months follow-up. Both groups exhibited substantial hearing improvements, reflected by reductions in AB gaps. The TES group showed a mean AB gap improvement from 29.6 ± 5.8 dB preoperatively to 12.4 ± 3.2 dB postoperatively, while the CMS group showed improvement from 30.1 ± 6.3 dB to 12.9 ± 4.5 dB. Both surgical techniques achieved a comparable audiological outcome, with no statistically significant difference (p=0.617). Additionally, the proportion of patients experiencing significant hearing improvement (≥10 dB reduction in AB gap) was similar (90% for TES versus 86.7% for CMS, p=0.688). This finding aligns with previous literature confirming comparable audiological outcomes with both endoscopic and microscopic tympanoplasty, emphasizing that hearing restoration is achievable effectively with either technique. (9,10)

Postoperative complications and patient comfort measures were important secondary outcomes in the study. The incidence of postoperative complications, such as infection and residual perforations, did not differ significantly between groups. However, TES was associated with significantly lower postoperative pain scores on the visual analog scale (VAS; mean score 2.1 ± 0.8 vs. 3.6 ± 1.2, p=0.002), indicating better patient comfort and tolerance. Patient satisfaction was significantly higher in the TES group (mean satisfaction score 8.8 ± 1.1) compared to the CMS group (7.2 ± 1.5, p=0.004). These findings may reflect the less invasive nature of TES, as reduced tissue manipulation and limited surgical trauma could lead to lower postoperative pain and quicker recovery, translating into improved overall patient satisfaction. Similar observations have been reported by various studies supporting the role of TES in improving patient experience through less invasive techniques and reduced tissue manipulation.

The study also examined postoperative complications such as residual perforation, wound infection, and otitis media recurrence. Although complication rates were lower in the TES group, these differences were not statistically significant. The overall infection rate was 3.3% in TES and 10% in CMS groups (p=0.301). The lower trend of complications in the TES group may reflect minimal invasiveness and improved visualization reducing trauma and contamination, but further studies with larger samples could be required to establish statistical significance.

Conclusion

In conclusion, this comparative observational study highlights that TES provides comparable graft uptake and audiological outcomes to CMS but with significantly reduced operative time, improved patient comfort, and greater overall patient satisfaction. Despite concerns regarding a potentially steep learning curve, the endoscopic approach appears advantageous, particularly in improving surgical efficiency and patient experience without compromising audiological and anatomical outcomes. Future studies with larger sample sizes and extended follow-up periods would be beneficial to validate these findings and explore long-term outcomes comprehensively.

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