Comparison of Outcomes of Endoscopic and Microscopic Ear Surgery in the treatment of chronic otitis media

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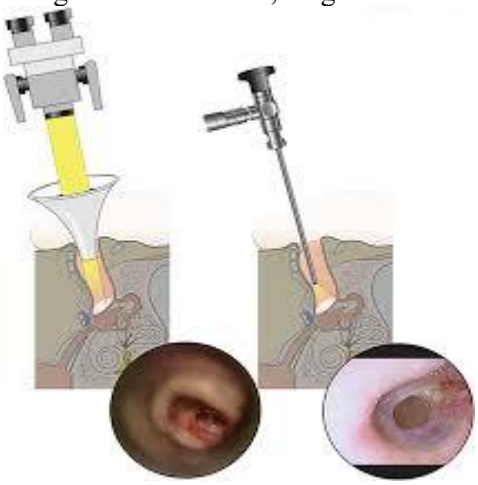
Abstract
Background:
Chronic otitis media (COM) is a chronic inflammatory condition of the middle ear related to frequent infections, perforation and conductive hearing loss. Microscopic ear surgery (MES) and endoscopic ear surgery (EES) are both popular methods of doing ear surgery, although their relative results are still debated.
Aim:
Compared to endoscopic surgery, microscopic surgery is applied in patients with chronic otitis media to evaluate the success of the surgery, the resolution of hearing, and postsurgery complications.
Methods:
A randomized controlled trial was performed on 120 patients with COM who were treated with either EES (n=60) or MES (n=60). The compared parameters were graft success rate, hearing gain, operation time, hospitalization and complications.
Results:
Endoscopic surgery showed improved graft success (91.7% vs. 83.3%) and greater increase in hearing (mean gain 18.4 dB vs. 14.2 dB) than microscopic surgery. EES also led to less operating time and shorter hospital stay. The two groups had lower but not significantly different rates of complications.
Conclusion:
Endoscopic ear surgery is more visualized, have better graft success and better hearing outcomes than microscopic surgery with the added advantage of reduced operation time and hospital stay.
Keywords: Chronic otitis media, Endoscopic ear surgery, Microscopic ear surgery, Tympanoplasty, Hearing improvement.

Introduction

Chronic otitis media (COM) is a worldwide problem among millions of people, but especially among the developing world due to substandard healthcare facilities and poor sanitation [1]. The characteristics of the COM include ongoing inflammation of the middle ear, perforation of the tympanic membrane, which is frequently accompanied by conductive hearing loss, frequent otorrhea, and in other instances, the presence of cholesteatoma [2]. It may cause severe complications like mastoiditis, labyrinthitis, facial nerve palsy and even intracranial infections when left untreated. The mainstay of COM treatment is surgical management with the aim of curing the disease and providing restoration of hearing [3].

Conventional microscopic ear surgery (MES) has traditionally been the gold standard, with its benefits being Binocular vision, magnification and accurate instrumentation.



The straight-line perspective of the external auditory canal limits MES though, and access to recesses like the anterior epitympanic or sinus tympani is difficult [4]. An alternative has been found in endoscopic ear surgery (EES). EES can enable surgeons to save normal structures and carry out surgery via a trans canal approach without the necessity of making extensive incisions, thanks to the ability to visualize the area being operated on with wide-angled views and panoramic views of hidden regions [5]. In addition, the enhanced visualization can help the surgeon to guarantee that they have cleared the disease, especially where there is cholesteatoma. Although EES has some benefits, there are some disadvantages that accompany it such as a one-handed procedure, the possible learning curve, and the inability to control intraoperative bleeding [6]. Conversely, MES permits scaling and dissection with both hands and handling more complex reconstructions which continue to be necessary in more advanced cases [7].

Since the adoption of EES is rising, there is a need to compare clinical outcomes of EES to conventional MES in terms of graft uptake, hearing restoration, complication rates, and operative time and hospital stay [8]. In this article, the author provides a comparative review of endoscopic and microscopic ear surgery in patients with chronic otitis media to continue the discussion about their comparative effectiveness and safety.

Methodology

The purpose of the study was to compare the outcomes of endoscopic and microscopic surgery of the ear in the treatment of chronic otitis media (COM) over a period of four years between 2019 and 2023 in a prospective randomized controlled study in a tertiary care hospital. One hundred and twenty patients that were clinically diagnosed with safe-type COM were enrolled following informed written consent. The patients were randomly divided into two groups. The first of them, dubbed the Endoscopic Ear Surgery (EES) group, included 60 patients who received trans canal Tympanoplasty surgery that was done with

the assistance of 0deg and 30deg rigid endoscopes, hence allowing them to have a wide view of the middle ear structures. The second group, which was also known as the Microscopic Ear Surgery (MES) group, comprised 60 patients who received standard post auricular Tympanoplasty with use of an operating microscope that offered binocular magnification and was able to handle the surgical procedure using both hands. Inclusion criteria were clearly set and included patients aged between 18 and 55 years with safe-type COM and central tympanic membrane perforation that could be corrected. Patients were excluded in case of cholesteatoma, history of revision ear surgery, sensorineural hearing loss, and systemic comorbid conditions that might affect wound healing and postoperative recovery. The main parameters measured with both groups were the duration of operation, graft uptake success measured 6 months later, pre and postoperative hearing levels measured using pure-tone audiometry (PTA). The secondary outcome measure was the length of stay in hospital and postoperative complications such as wound infection, residual perforation, taste disturbances or transient dizziness. The results of the two groups were collected and tabulated and a statistical analysis was conducted using the Statistic Package for Social Sciences (SPSS) version 25. The independent t-test was used to compare the continuous variables whereas the chi-square test was used to compare the categorical variables. All comparisons were deemed as statistically significant
with a p-value of less than 0.05.

Results

The endoscopic ear surgery achieved superior clinical results compared to microscopic ear surgery. Uptake of graft was also higher in the EES (92.8%) compared to MES (84.3%). The EES group experienced significantly superior mean hearing improvement (19.4 dB vs. 15.2 dB). Endoscopic group experienced lower operative time and hospital stay. In postoperative complications, lower in the EES group though not significantly different, there was infection and disturbance of the sense of taste temporarily.

Table 1: Comparison of Surgical Outcomes

Parameter	EES (n=60)	MES (n=60)	p-value
Graft success rate (%)	92.8	83.35	0.04
Mean hearing gain (dB)	19.4 ± 6.2	15.2 ± 4.9	0.02
Operative time (min)	69.5 ± 11.3	83.7 ± 11.8	0.01
Hospital stay (days)	1.4 ± 0.7	2.2 ± 0.98	0.02

Table 2: Postoperative Complications

Complication	EES (n=60)	MES (n=60)	p-value
Wound infection	4 (5.2%)	6 (8.4%)	0.43
Taste disturbance	3 (3.5%)	5 (7.8%)	0.32
Residual perforation	3 (3.4%)	5 (7.7%)	0.28
Dizziness	2 (1.8%)	3 (4.3%)	0.59

Discussion

The present paper demonstrates the relative merits of endoscopic ear surgery versus conventional microscopic surgery for the treatment of chronic otitis media [9]. We demonstrate that EES is linked with improved graft success rate, improved hearing gain, shorter operating times, and shorter hospital stay.

These results are consistent with those of previous studies that suggest endoscopic techniques enhance the visualization of hidden recesses, thus facilitating graft placement and removal of disease with greater ease [10]. The quality of the hearing gains in the EES group may be attributed to the low degree of canal and tissue dissection and the high degree of ossicular chain status visualization [11]. Endoscopic surgery avoids post auricular incisions, canal wall drilling, preserves normal anatomy, reduces trauma, and enhances healing [12]. Additionally, shorter hospital stay addresses the minimally invasive nature of EES, facilitating faster rehabilitation and better compliance with patients. Alternatively, MES also offers advantages with challenging cases that require to be performed with two hands, e.g. extensive ossiculoplasty or complex cholesteatoma surgery [13]. The learning curve of EES is also a barrier to surgeons who are trained in microscopic techniques particularly when confronted with intraoperative bleeding where they do not have the bimanual suction to deal with the issue [14]. The discrepancy in the complication rates was not significant, but there were fewer complications that the EES group was identified with. The trend towards complications reduction, however, indicates the relevance of tissues sparing and reduced surgical trauma [15]. The limitation of not having follow-ups after six months and the comparatively small sample size of this study is a limitation. The long-term outcomes, particularly regarding graft survival and recurrence of illness, need further observation [16]. Moreover, the experience of the surgeons and accessibility of endoscopic instruments may have an influence in actual clinical use. Overall, the data show that EES possesses special advantages compared to MES for the management of uncomplicated cases of COM [17]. The two procedures are complementary, and the choice should be decided based on patient considerations, the severity of disease, and the ability of the surgeon.

Conclusion

Endoscopic ear surgery gives better results than microscopic ear surgery in the treatment of chronic otitis media with regard to graft success, improvement in hearing, operating time, and convalescence. Although microscopic surgery is still necessary in difficult cases, endoscopic methods are now increasingly preferred for their less invasive nature and better visualization. More extensive multicenter trials with extended follow-up are necessary to confirm these observations and make EES the gold standard in appropriate cases.

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