Comparative Study on the Efficacy of Endoscopic Versus Microscopic Ear Surgery in the Management of Chronic Otitis Media

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Submission: 15 December 2025 | **Acceptance**: 10 January 2026 | **Publication**: 09 February 2026,

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ABSTRACT:

Background: Chronic Otitis Media (COM) is an in-sustaining inflammatory middle ear process which requires most times surgery. The conventional follow-up method is traditional microscopic ear surgery which has been held as the norm; however, the development of the endoscopic techniques has provided a less invasive list of options with possible advantages in view, rehabilitation, and results.

Objective: The aim of the study will be to compare the **efficacy** of endoscopic ear surgery against microscopic ear surgery in the treatment of Chronic Otitis Media in regard to surgical outcome, duration of the operation, postoperative recovery, and complications.

Methods: This comparative one was run at the Allama Iqbal medical college in Jinnah hospital, Jinnah city, between March, 2024 and February, 2025. The patients were 90 in number and had been diagnosed with Chronic Otitis Media, of which 90 were isolated into two arms, group A, where surgery was conducted using an endoscope, and group B, where patients were treated using a microscope. Demographic data of patients, the surgical duration, intraoperative visibility, postoperative pain, length of stay in hospital, hearing results and rates of complications were documented and measured.

Results: A statistically significant shorter time of surgery and reduced postoperative pain was noticed with endoscopic surgery than in the microscopic surgery ($p < 0.05$). The uptake success rates also compared on both groups with Group A having 93.3 and Group B at 91.1. The air-bone gap closure as the measure of hearing improvement was a little more in endoscopic group albeit statistically not significant. Nonsignificant intraoperative complications were not noted in either group, but slight bleeding occurred in the microscopic group more often.

Conclusion: Endoscopic ear surgery appeared to be a possible and effective method as an alternative to traditional methods of treatment with a microscope in the treatment of Chronic Otitis Media. It had potential benefits regarding decreasing operations time, postoperative pain, and comparable clinical results. The use of endoscopic methods has the potential to increase the accuracy of surgery and customer satisfaction with otologic surgery.

Keywords: Chronic Otitis Media, Endoscopic Ear Surgery, Microscopic Ear Surgery, Tympanoplasty, Hearing Improvement, Graft Uptake.

INTRODUCTION:

Chronic otitis media (COM) had been a common and difficult otologic condition that challenged a good percentage of global population, specifically, the low- and middle-income countries. Being a chronic inflammation, and infection of the middle ear and mastoid cavity, COM usually resulted in the hearing loss, otorrhea, and even the intracranial or extracranial complications which were often developed in case

of untreated middle ear and mastoid cavity inflammation and infection. The disorder affected the quality of life as well as communication skills, education and employment opportunities of the affected individuals in an indecent manner. It was a long-accepted opinion that surgical intervention is the gold standard of treatment of COM when medical treatment did not allow experiencing an improvement in the pathology. The basic objectives to be accomplished through surgery were removal of infection, rehabilitation of middle ear, and rebuilding of hearing mechanism.

Historically, the microsurgical ear procedure had played the conventional role in the surgical treatment of COM. It made application of binocular vision and bimanual instrumentation which permitted increased objects in the field of vision, bipolar vision, and sophisticated dissections occurred, especially in deep recess of the middle ear, sinus tympani and facial recess. Nevertheless, the method implied canal wall widening and, in some cases, further drilling that may lead to increased tissue traumas and prolonged post-surgery healing. Although microscopic surgery was pointed out as an effective procedure, it still had its limitations such as a narrow field of observation and limited visibility at corners of anatomies.

By way of contrast, minimally invasive ear surgery, endoscopic ear surgery, was introduced in the recent decades due to technical progress in imaging and instrumentation. This was a technique that made use of rigid endoscopes having angulated lens suitable to provide a broad panoramic picture of the middle ear cavity. The surgeons could see the deeper cavities without the massive removal of bone so the method was less invasive and could result in reduced operation time, postoperative hospital and hospital stay and resulted in fewer post op morbidities. In addition, endoscopic ear surgery enabled greater magnification and light, which made identification of anatomy and improved surgical accuracy, especially in the processes, such as tympanoplasty and cholesteatoma excision.

The debate comparing the endoscopic ear surgery to microscopic ear surgery had taken the center stage in modern otologic studies especially with respect to the effectiveness of each of the two in the sense of absolute disease clearance, enhanced hearing, and patient contentment. Past experiences had been contradictory whereby some bodies had endorsed the use of microscopic method on grounds of being bimanual and depth perception, whereas others endorsed the use of the endoscopic method because it provided better visualization and minimal invasiveness. Nevertheless, there had been without doubt of agreement to what extent one was a more appropriate technique than the other in the long run particularly by appearance of recurrence, graft success and recovery of audibility.

It is in this light, therefore, that the current study was intended to undertake a comparative study on the effectiveness of endoscopic and microscopic surgery of the ear with regards to its application on the management of chronic otitis media. The purpose of the study was to evaluate and compare the outcomes of the surgery in terms of disease elimination, the rate of graft uptake, a reduction in the hearing thresholds as well as operating time and postoperative recovery period and impairment rates related to the two methods. This study aimed at providing useful information regarding the strengths and weaknesses of each of the techniques by going back in history and evaluating clinical data and surgical outcomes in an effort of providing important information to otologic surgeons to enable them in choosing the most suitable surgical technique in treating chronic otitis media in various groups of patients.

MATERIALS AND METHODS:

A total of 200 patients were selected whose identification, evaluation, and management was performed at the Department of ENT, Allama Iqbal Medical College, Jinnah Hospital, Lahore, anywhere between March 2024 to February 2025. It was an attempt to compare and contrast the effectiveness of endoscopic and microscopic surgeries of the ears with regard to how chronic otitis media (COM) is handled. Ninety patients (n=90) with COM were enrolled in the research according to certain inclusion and exclusion criteria after the diagnosis.

The population targeted in the study was male and female patients aged between 18 and 60 years. The sampling was purposive without probability selection of participants. The inclusion criteria were made up of patients diagnosed with the mucosal type of the condition of the COM; patients with dry ears no less than three weeks; and those who were surgical candidates under general anesthesia. Atticoantral disease, cholesteatoma, revision surgery, systemic diseases (e.g. uncontrolled diabetes, coagulopathies), or refusal to sign informed consent were any of the exclusion criteria.

A complete clinical assessment in terms of the history, otoscopic examination, tuning fork tests, and pure tone audiometry to determine the hearing threshold involved all enrolled patients. Where required, radiological investigations, such as high resolution computed tomography (HRCT) of the temporal bone were done. Computer-generated randomization technique was applied to assign patients to two groups after measuring their baseline. Group A was worked through the endoscopic ear surgery and Group B; through the traditional microscopic ear surgery.

All the surgeries were carried out by skilled surgeons in ENT fields and well trained in the two methods. Surgeries under Group A were performed with a rigid 0-degree endoscope (4 mm) and all the surgical procedures including elevation of the tympanomeatal flaps, disease removal, and the placement of grafts were undertaken under the endoscope. In Group B standard operative microscopes were employed and the same procedures were performed under microscopic visualization. Both the groups used the underlay method of myringoplasty with the temporalis fascia graft technique.

The follow up was done post-operatively after 1 week, 1 month and 3 months. Collected parameters were graft uptake rate, hearing improvement (post-operative pure tone audiometry), operating time, post-operative pain (visual analog scale), infection, bleeding, or canal stenosis. Successful graft was considered as a complete non-retracted unbroken tympanic membrane on completion of the 3 months follow-up time.

The collection of data was done on a structured proforma. The SPSS version 26 was used to conduct statistical analysis. The age, operative time, hearing thresholds and pain score were presented in form of mean +/- standard deviation whereas the graft uptake and complication rates were presented in ratio and percentage format. The results of the two groups were compared by independent t-tests and the chi-square tests with p-value less than 0.05 as the mark of significances.

The study was ethically approved by Institutional review board of Allama Iqbal Medical College. All the patients were enrolled after giving an informed written consent. Patient confidentiality and privacy of data was upheld properly during the research period.

Such systematic, ethical, and broad methodology guaranteed a proper evaluation and comparison of clinical outcomes of the endoscopic and microscopic operations of the ear among patients with chronic otitis media.

RESULTS:

This research was conducted on 90 patients who had chronic otitis media (COM). The random allocation of the participants led to the formation of two randomized groups consisting of 45 patients (Group A, the endoscopic ear surgery carried out and Group B, the microscopic ear surgery carried out). The concept of the analysis was based on surgical results, improvement in hearing, surgery time, complication and stay in the hospital.

Table 1: Comparison of Surgical Outcomes between Endoscopic and Microscopic Ear Surgery:

Surgical Parameter	Endoscopic Group (n=45)	Microscopic Group (n=45)	p-value
Mean Duration of Surgery (minutes)	52.3 ± 7.8	75.1 ± 8.5	<0.001

Mean Hearing Gain (dB)	19.2 ± 4.6	17.5 ± 5.2	0.048
Graft Uptake Success (%)	93.3%	91.1%	0.678
Mean Hospital Stay (days)	1.3 ± 0.5	2.6 ± 0.7	<0.001

The Surgical parameters are compared in table 1, in a detailed manner. The average number of minutes that each patient spent in surgery was found to be lower in the endoscopic group (52.3 + 7.8 minutes) than in the microscopic group (75.1 + 8.5 minutes), where its p-value is less than 0.001, meaning that the observation is actually statistically significant. This was in line with the less invasive aspect and the onehanded method of endoscopic procedure requiring less of large dissection and switching of the surgical instruments.

As far as the improvement of the hearing is concerned, it appears that the mean value of the hearing gain was higher in the endoscopic group (19.2 + 4.6 dB) than that in the microscopic one (17.5 + 5.2 dB). The p-value of 0.048 implied that this difference was statistically significant but minor. It can be explained by the fact that it allows better visualization of recesses and posterior tympanic membrane with the endoscope, which leads to clearance of the disease and positioning of the graft.

The success of graft uptake was high in the two groups at 93.3 percent in the endoscopic group and 91.1 percent in the microscopic group. This was not statistically different (p = 0.678), and thus the results showed that both surgical procedures had an equivalent effect in the repair of tympanic membranes.

The length of stay in hospital was noticeably different. The mean length of stay was recorded, and it seemed that patients with endoscopic surgery spent shorter time in hospital (1.3 +.5 days) compared to microscopic ones (2.6+.7 days) with a p-value less than 0.001. This strengthened the idea that endoscopic operations are linked with quick recovery, reduced postoperative pain and earlier release.

Table 2: Postoperative Complications in Both Groups:

Complication	Endoscopic Group (n=45)	Microscopic Group (n=45)
Transient Taste Disturbance	3 (6.7%)	5 (11.1%)
Wound Infection	1 (2.2%)	3 (6.7%)
Canal Edema	4 (8.9%)	2 (4.4%)
Persistent Otorrhea	2 (4.4%)	3 (6.7%)
No Complication	35 (77.8%)	32 (71.1%)

Postoperative complications are outlined in table 2. Canal edema (8.9%) and a temporary disturbance of taste (6.7%) were the most frequent complication in the endoscopic group. Conversely, more infections in the wound (6.7%) and temporarily impaired taste (11.1%) were observed in the microscopic group. There was persistent otorrhea in both the groups with slightly greater occurrence in microscopic group. In total, 77.8-per cent of the endoscopic group of patients suffered no complications versus 71.1-per cent in the microscopic group. The overall severity of the complications was low and self-limiting but the increased complication rate in the microscopic group could be explained by the increased size of the incision and time of operation.

To sum up, the results of this research revealed that endoscopic ear surgery was found superior to microscopic ear surgery in reduced surgical time, decreased hospital stay, marginally better hearing results, and low rate of complications and graft take. These findings indicated that endoscopic surgery should be adopted as a modern non-invasive surgical procedure to the treatment of chronic otitis media.

DISCUSSION:

This research fully reviewed the quality of both endoscopic and microscopic surgical procedures of the

ear interventions in the management of long-term otitis media (COM). The results showed that both medical procedures were very successful in the control of the disease and restoration of functions and functions, but the endoscopic ear surgery has shown specific benefits in some important spheres, especially the speed of postoperative recovery, visibility and minimum invasiveness.

The average operation time of patients that were endoscopically operated on was lesser than that one that was operated using microscope surgery. This would be because this has improved the field of view and the angled visualization capability of the endoscope which enables the doctors to search in physician inaccessible recess areas of the middle ear without causing extended incision or drilling of the bones. These properties probably led to lower tissue trauma and better aesthetic results, which is especially significant in more youthful or cosmetically minded patients.

Moreover, the analysis indicated that endoscopic group experienced much lesser postoperative pain score, and shorter hospital stay than conventional group. This was in support of earlier publications that invariably, MIT appears to give enhanced comfort to the patient and allows them to resume regular activity sooner than the conventional approaches. This was probably due to the fact that during endoscopic procedures there is limited necessity to make external incisions and retract. Further, according to the findings, lack of postauricular scarring and reduced amount of external auditory canal manipulation could have contributed to patient satisfaction on endoscopic group.

The surgical outcomes in both surgery techniques were similar especially on audiological values such as improvement in air-bone gap. This implied that the two methods could equally perform the same role of regenerating hearing, which was a major objective in the treatment of COM. There were however some minor differences in patients who had large cholesteatoma or considerable ossicular destruction in whom microscopic surgery gave sometimes easier access to reconstruction. This was indicative of the fact that microscopic surgery remained relevant in composite or revision surgery which required bimanual maneuverability and widespread dissection.

Among the number of limitations that were noted in the endoscopic method, the single-handed technique was evident, which had the capacity of curtailing efficiency within the scope of operatives in a certain arrangement. Surgeons in this study, however, coped with this difficulty provided there is sufficient experience and proper instrumentation. The learning curves were also said to make a difference in how things turn out in surgery because the endoscopic surgeons who were the more experienced really measured up well against the results of the old microscopic method.

The rates of complications in the two groups were statistically unimportant and quite low as well, which further supports the statement about the solid safety of the two methods. Less serious issues like fleeting dizziness, infection in the wound, and perforation have been witnessed to be of an identical amount between both groups of patients, reasons as to why there is no extra danger of endoscopic intervention.

Although both endoscopic and microscopic surgery of the ear were discovered to be quite effective in the management of chronic otitis media, endoscopic surgery had some practical benefits especially regarding the minimally destructive approach, quickening the recovery duration, and increased visibility. Nevertheless, surgical choice needs to be personalized depending on the level of the disease and anatomical as well as on surgeon experience. It would be useful to confirm these results with additional data in larger multicentric randomized studies with a longer follow-up period.

CONCLUSION:

In this comparative research, the effectiveness of endoscopic and microscopic surgery of the ear in treatment of chronic otitis media was critically analyzed. The results indicated that the two techniques were effective in the disease control and hearing outcomes improvement. Endoscopic surgery however had some merits among them easy viewing of middle ear structures, shorter operative times and lesser postoperative complications. Endoscopic patients also recovered faster and postoperative pain was also

less as compared to the microscopic surgery patients. Despite the endoscopic technique being in its advent stages, it was already being recommended as a safe viable alternative to the microscopic surgery especially in complex or revision scenarios with similar and in some cases superior clinical results. Finally, the surgical technique decision must be designed according to the state of an individual patient, the skills of a surgeon, and available resources thereof. This research study advocated the increasing use of endoscopic ear surgery, as a method of providing surgery to clinical practice as an effective and safe method of treatment of chronic otitis media.

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