

# Endoscopic vs Microscopic Myringoplasty: A Comparative Study of 100 Cases

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## ABSTRACT

**Introduction:** The surgical procedure of myringoplasty is performed for the repair of tympanic membrane perforations. This study aims to compare endoscopic myringoplasty with microscopic myringoplasty surgery based on uptake of graft, hearing improvement in terms of pure tone audiograms performed preoperatively and postoperatively, complications in the postoperative period, and subjective cosmetic results.

**Materials and methods:** Between January 2019 and December 2019, 100 patients were subjected to myringoplasty, 50 performed endoscopically and 50 performed microscopically. Results were compared 3 months following the surgery.

**Results:** This article reveals that there was no statistically significant difference between the two groups regarding the success rate. In this study, the endoscopic myringoplasty group shows fewer incidences of postoperative pain and better cosmetic results.

**Conclusion:** Most of the disadvantages of the microscope can be overcome by an endoscope by virtue of its wide-angled telescopic and magnified view. However, the endoscope has the disadvantages of a comparative lack of depth perception and one-handed technique. These can be easily overcome with practice. Thus, endoscopic myringoplasty may be a good alternative to microscopic myringoplasty.

**Clinical significance:** The study gives significant insight into the comparative outcomes of endoscopic and microscopic myringoplasty.

**Keywords:** Endoscopic, Microscopic, Myringoplasty, Postaural approach, Temporalis fascia.

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## INTRODUCTION

Chronic suppurative otitis media (CSOM) is a common ear disease that is defined as a permanent abnormality of the pars tensa or pars flaccida that usually results from an earlier episode of acute necrotizing otitis media, negative middle ear pressure, or secretory otitis media.<sup>1</sup> The treatment of choice for the closure of the perforation<sup>2</sup> is a surgical intervention in the form of tympanoplasty. Myringoplasty is performed when there is a tympanic membrane (TM) perforation without any ossicular damage. A high rate of closure is possible if the surgery is performed efficiently as evidenced by the relevant medical literature. Our study thus aims to compare endoscopic myringoplasty with microscopic myringoplasty surgery based on uptake of graft, hearing improvement in terms of pure tone audiograms performed preoperatively and postoperatively, complications in the postoperative period, and subjective cosmetic results.

Also, there is a great paucity of prospective studies with control with a large sample size comparing multiple variables on this subject in the medical literature.

## MATERIALS AND METHODS

The subjects for this study were involved in the inpatient cases of CSOM (mucosal disease) from the Department of Otorhinolaryngology, Dr Baba Saheb Ambedkar Medical College and Hospital. Ethical clearance from the institutional ethical committee was obtained before the initiation of the study. Written informed consent was taken from all the patients included in our study. A total of 100 patients with mucosal CSOM having a central perforation of the TM were selected and were randomly divided into two equal groups of 50 patients each. All the patients were subjected to myringoplasty under local anesthesia by the same team of surgeons. In the first group (group I), endoscopic

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myringoplasty was done and in the second group (group II) microscopic myringoplasty was done.

The inclusion criteria included:

- Patients of mucosal type of CSOM with dry central perforation without any evidence of active infection of the upper respiratory tract or external auditory canal.
- Patients of mucosal type of CSOM (inactive) with an AB Gap of <40 dB on PTA.
- Dry ear for at least 3 months previously.
- Patients of both sexes >17 years of age.

On the other hand, the exclusion criteria included:

- Patients with an ongoing ear discharge or with a history of an episode of ear discharge in the preceding 3 months.
- Patients having a mixed or sensorineural type of hearing loss or an AB gap of >40 dB on PTA.
- Patients with a history of previous middle ear surgery.

- CSOM patients with ossicular chain abnormalities (preoperative or intraoperative).
- Patients with clinical evidence of cholesteatoma, granulations, or glue in the middle ear.

All the patients who were diagnosed with chronic otitis media, mucosal type were subjected to a thorough history and clinical examination, otoscopy, and hearing assessment by pure tone audiometry.

All patients were given premedication with intramuscular injections of 30 mg Fortwin, 10 mg Phenergan followed by local anesthesia using 2% lignocaine with 1 in 200,000 adrenaline injections. Autologous temporalis fascia graft was used and underlay grafting as done in all the patients.

### Technique of Endoscopic Myringoplasty (Monitor Visualized)

We used an 18 cm long, 4 mm wide zero degrees Hopkin's rod endoscope for the procedure. A supraaural incision in the hairline just above the helix was used in all patients to harvest the temporalis fascia graft. After introducing the endoscope through the EAC, the edges of the perforation were freshened. A circular incision was made about 5 mm lateral to the annulus extending between 12-o'clock and 6-o'clock position. The tympanomeatal flap was raised and the annulus was elevated followed by denuding the handle of the malleus. Underlay technique was used to place the temporalis fascia graft and the tympanomeatal flap was repositioned. The graft and the flap were stabilized by putting gel foam. The wound was sutured with 3-0 silk.

### Technique of Microscopic Myringoplasty

Wilde's incision was given in the postaural region after infiltrating local anesthetic, following which meatotomy was done to expose the external auditory canal. The pinna was retracted anteriorly using a Mollison's retractor and the margins of the perforation were freshened. The tympanomeatal flap was elevated and the malleus handle was skeletonized. The temporalis fascia graft was placed underlay. The tympanomeatal flap was repositioned over the temporalis fascia. Gel foam was used to stabilize the graft and the flap. Postaural wound was sutured in layers.

All the patients were discharged on the second day following surgery and were advised oral antibiotics and analgesics for 7 days.

### Follow-up

All the patients were followed up after the surgery on the 7th and 14th days. Sutures were removed after 1 week.

They were subjected to PTA between 12 weeks and 24 weeks to assess the hearing outcome, i.e., the improvement of hearing objectively.

An intact and mobile TM with hearing improvement as evidenced by the closure of the air-bone gap  $\leq 10$  dB at 3 months postoperatively was considered a successful outcome, whereas the presence of a defect in TM or air-bone gap  $>10$  dB or both at 3 months was considered to be a failure. Persistence of any postoperative pain and assessment of scar were done at week 1, week 3, and 3 months. The cosmetic outcome was calibrated as poor (visible scar) or satisfactory (no or minimally visible scar) at the end of 3 months.

## RESULTS

Our study sample included a total of 100 patients of CSOM-mucosal disease that were divided into two equal groups randomly.

Group I comprised of patients who underwent endoscopic myringoplasty, consisted of 27 male and 23 female patients and

Group II comprised of patients who underwent microscopic myringoplasty, comprising 21 female patients and 29 male patients.

The mean age with standard deviation was  $33.92 \pm 13.44$  with the minimum age being 17 years and the maximum being 68 years.

### Graft Uptake

In our study, we recorded an intact graft at 3 months postoperatively in 46 of our 50 (92%) EAM patients, i.e., group I.

The number of successful cases in group II (MAM) was 45 out of 50 (90%) (Fig. 1).

These data were statistically evaluated using Mantel-Haenszel  $\chi^2$ , i.e., Chi-square test and Fisher's exact  $p$  value test. The resultant  $p$  value was found to be 0.69 ( $\chi^2 = 0.159$ , d.f. = 1, F.E.P = 0.5).

This value, being  $>0.05$  is statistically not significant.

### Hearing Improvement

In our study, the hearing outcome was analyzed in all patients using postoperative pure tone audiometry. An improvement of 10 dB or more in AB Gap in two consecutive frequencies, assessed by a repeat audiogram (PTA) done at the end of 3 months when compared with the preoperative air conduction threshold, was taken as an improvement in hearing.

In group I, though 46 patients with surgical success had subjective improvement in hearing, as per our criteria of audiological success, only 34 patients had an improvement in hearing.

Similarly, in group II, although all 45 patients with surgical success claimed better hearing after surgery, only 36 patients had a 10 dB improvement in two consecutive frequencies (Fig. 2).

Statistical analysis of these data using Mantel-Haenszel  $\chi^2$ , i.e., Chi-square test and Fisher's exact  $p$  value test for confirmation resulted in a  $p$  value of 0.484.

This value is not statistically significant ( $p > 0.05$ ).

Hence, we conclude that both groups had comparable audiological success rates.

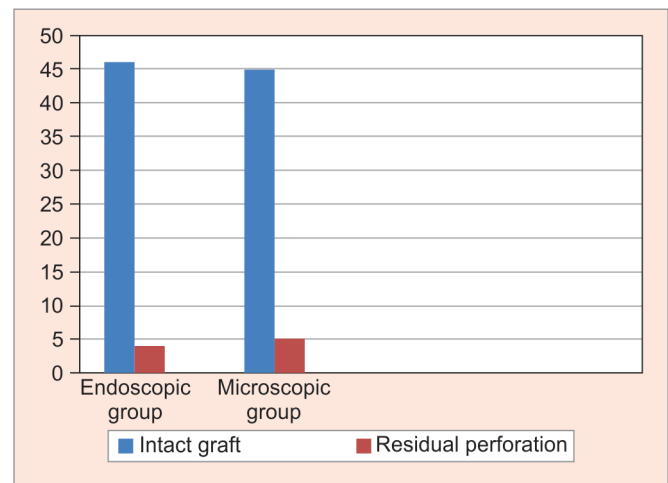
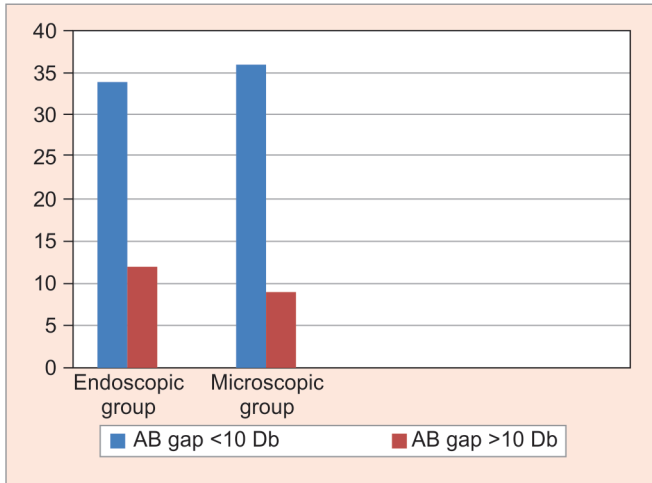
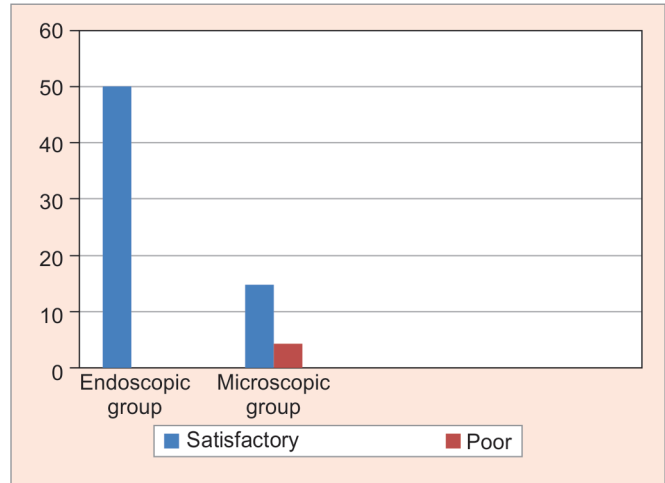


Fig. 1: Comparison of graft uptake within the two groups



**Fig. 2:** Comparison of hearing outcomes in patients with graft uptake within the two groups



**Fig. 3:** Comparison of cosmetic outcomes in patients with graft uptake within the two groups

### Postoperative Complication Rate

The incidence of postoperative complications was quantitatively analyzed in terms of wound problems, postoperative pain, and wet ear.

In this study, five patients had wound problems from group II, which had wound gaping in postaural scar out of which three healed by secondary intention whereas two had to undergo resuturing.

No such complications were noted in group I. Hence, patients undergoing EAM had significantly lower wound problems than patients undergoing MAM.

The postoperative pain score was assessed using the WILDA's pain assessment guide. It was found to be 5 in the case of microscopic myringoplasty when compared with 4 in the case of endoscopic myringoplasty, on day 7. Patients of group I reported a pain scale of 2 at week 3, whereas group II patients reported a scale of 3 pain even after the 3rd week.

However, there was no significant difference in terms of the failure of graft uptake from the two groups.

### Cosmetic Outcome

At the end of 3 months, the objective analysis revealed that none (0%) of the patients in the endoscope group had a visible scar; hence, satisfactory cosmetic outcome. However, 35 (70%) patients had a visible scar and in 15 (30%) patients, the scar was minimal, in the microscope group (Fig. 3).

## DISCUSSION

In this study, we found that graft uptake success rate and hearing improvements of EAM and MAM were comparable, suggesting that EAM for myringoplasty can be a good alternative to MAM.

The study conducted by Harugop et al. showed similar results to ours. In their study, 82% of patients had a successful outcome in the endoscope group and 86% of patients had a successful outcome in the microscope group.<sup>3</sup> According to Garcia et al., in terms of the surgical outcome at 3 months following surgery, complete closure of the perforation was observed in 86.4% of patients (endoscopic myringoplasty).<sup>4</sup>

Patel et al. in their study found that at 3 months follow-up in the endoscopic myringoplasty group 45.45% of the patients had postoperative A–B gap in the range of 0 to 10 dB while 50% of the patients had a postop A–B gap in the range of 11–20 dB. While in the microscopic tympanoplasty group, 45.45% of the patients had a postop A–B gap in the range of 0–10 dB while 36.36% of the patients had a postop A–B gap in the range of 11–20 dB.<sup>5</sup> Kumar et al. in their study observed similarly that the average AB gap in the microscopic group postoperatively was 16.05 dB and in the endoscopic group it was 15 dB. Also, the average postoperative gain in the microscopic and endoscopic groups was 13.96 dB and 15.03 dB, respectively.<sup>6</sup>

The endoscopic technique, however, has added advantages like less postoperative pain and morbidity and better cosmetic results. By avoiding postaural incision in the endoscope group, there is less need to dissect normal tissues, reduced intraoperative bleeding, reduced incidence of postoperative pain, and better cosmetic results. Avoiding the postaural route also reduces the risk of displacement and asymmetry of the pinna. In the endoscope group, temporalis fascia could be harvested through a smaller incision in the temporal region minimizing tissue dissection. Quraishi and Jones, in their endoscopic myringoplasty series, have also reported reduced postoperative pain and morbidity.<sup>7</sup> In the study reported by Lakpathi and Sudarshan Reddy, 100% of patients in the endoscope group rated their cosmetic result as excellent. However, in the microscope group, 20% of patients rated their cosmetic result as satisfactory, and only 30% of patients rated their cosmetic result as excellent. Gadag in their study reported a better postoperative recovery in the endoscopic group.<sup>8</sup>

Owing to the panoramic, wide-angle, and magnified views, endoscopic myringoplasty is useful even in challenging cases, such as anterior TM perforation. Also, visualization of other structures such as round window niche, Eustachian tube orifice, incudostapedial joint is easier. The need to frequently adjust the patient's head or to do canaloplasty is minimized, thereby saving operative time. Two separate studies by Tarabichi<sup>9</sup> and Usami et al. also reported similar results.<sup>10</sup>

Also, an endoscope is easily transportable, unlike a microscope. It makes it ideal for use in-ear surgery camps.

However, the transcanal approach using endoscope has some limitations:

- The one-handed technique makes simultaneous dissection and suction maneuver impossible, thereby increasing the dissection time. An endoscopy stand can be used to solve this problem that can fix the endoscope in the desired position so that both hands are free to operate.
- The one-handed surgical technique is likely to be associated with a steeper learning curve.
- There is also a lack of depth perception that may pose a potential risk of damage to the surrounding structures that are not included in the visual field.<sup>11</sup>

Our study involved 50 patients operated upon using the endoscopic technique and 50 patients using the microscopic technique. Also, a simple randomization technique was used while deciding the technique of myringoplasty in the two different groups of our patients. In group I, in two patients, thick mucoid discharge was noted intraoperatively hence was converted to cortical mastoidectomy. This was another limitation of endoscopic surgery that another postaural incision had to be made in case mastoid exploration was required.

## CONCLUSION

The authors conclude that the results of endoscopic myringoplasty in terms of graft take up and hearing outcomes are comparable with that of microscope myringoplasty. Regarding cosmesis, wound healing and postoperative pain, the endoscopic technique had distinctively superior results.

Despite a steep learning curve, the endoscope has the advantage of bringing the surgeon's eye to the tip of the scope right onto the structure being visualized. The wide angle of the endoscope helps in visualizing the TM in one frame. Also, a magnified image can be achieved by just getting close to the vital structures. Hence, it seems worthwhile exploring this option due to its obvious advantages. However, it has some disadvantages in terms of loss of depth perception and one-handed technique. These can be easily overcome with practice.

We feel that the endoscope can be used more and more in middle ear surgeries including myringoplasty. With comparable results to the microscopic techniques and the distinctive added advantages, the endoscope is likely to gain popularity in performing middle ear surgeries. The endoscope seems to be beneficial in a wide array of middle ear surgeries and should increase the utilization of transcanal over post-auricular procedures.<sup>12,13</sup> Literature review already suggests that endoscopic and endoscope-assisted surgical techniques are increasingly being employed in the surgical management of cholesteatoma. Utilization of endoscopes definitely helps in good visualization of residual cholesteatoma in hidden sites, such as the epitympanic spaces, sinus tympani, facial recess, and hypotympanum. The endoscopic technique hence, is

the future of myringoplasty, tympanoplasty, and other middle ear surgeries.

## CLINICAL SIGNIFICANCE

The results of the study suggest that the use of an endoscope is an excellent tool in performing routine middle ear surgeries like tympanoplasty. The results of endoscopic tympanoplasty are significantly similar to those of conventional microscopic tympanoplasty. It also has an added advantage of a transcanal approach, thereby avoiding a postaural incision and its associated complications.

## REFERENCES

1. Browning G, Merchant S, Kelly G, et al. Chronic otitis media. In Gleeson M, ed. Scott Brown's otorhinolaryngology and head & neck surgery. 7. London: Hodder Arnold; 2008. pp. 3395–3445.
2. Tan HE, Santa Maria PL, Eikelboom RH, et al. Type I tympanoplasty meta-analysis: a single variable analysis. *Otol Neurotol* 2016;37(7):838–846. DOI: 10.1097/MAO.0000000000001099.
3. Harugop AS, Mudhol RS, Godhi A. Comparative study of endoscope assisted myringoplasty and microscope assisted myringoplasty. *Indian J Otolaryngol Head Neck Surg* 2008;60(4):298–302. DOI: 10.1007/s12070-008-0099-5.
4. Garcia LB, Moussalem GF, Andrade JSC, et al. Transcanal endoscopic myringoplasty: a case series in a university center. *Braz J Otorhinolaryngol* 2016;82(3):321–325. DOI: 10.1016/j.bjorl.2015.05.012.
5. Patel J, Aiyer RG, Gajjar Y, et al. Endoscopic tympanoplasty vs microscopic tympanoplasty in tubotympanic csom: a comparative study of 44 cases. *Int J Res Med Sci* 2015;3(8):1953–1957. DOI: 10.18203/2320-6012.ijrms20150307 Lakpathi G. Comparative study of ndoscope assisted myringoplasty and microscopic myringoplasty. *Indian J Otolaryngol Head Neck Surg* 2016;68(2):185–190.
6. Kumar M, Kanaujia SK, Singh A. A comparative study of endoscopic myringoplasty vs conventional myringoplasty. *Int J Otorhinolaryngol Clin* 2015;7(3):132–137. DOI: 10.5005/jp-journals-10003-1209.
7. Quraishi MS, Jones NS. Day care myringoplasty using tragal perichondrium. *Clin Otolaryngol* 1995;20(1):12–14. DOI: 10.1111/j.1365-2273.1995.tb00004.x.
8. Gadag R. Comparative study of outcomes of microscopic versus endoscopic myringoplasty. *Medica Innovativa* 2016;5(1):3–6.
9. Tarabichi M. Endoscopic middle ear surgery. *Ann Otol Rhinol Laryngol* 1999 Jan;108(1):39–46. DOI: 10.1177/000348949910800106.
10. Usami S, Iijima N, Fujita S, et al. Endoscopic-assisted myringoplasty. *ORL* 2001;63(5):287–290. DOI: 10.1159/000055759.
11. Choi N, Noh Y, Park W, et al. Comparison of endoscopic tympanoplasty to microscopic tympanoplasty. *Clin Exp Otorhinolaryngol* 2017;10(1):44–49. DOI: 10.21053/ceo.2016.00080.
12. Kozin ED, Gulati S, Kaplan AB, et al. Systematic review of outcomes following observational and operative endoscopic middle ear surgery. *Laryngoscope* 2015;125(5):1205–1214. DOI: 10.1002/lary.25048.
13. Jyothi AC, Shrikrishna BH, Kulkarni NH, et al. Endoscopic myringoplasty versus microscopic myringoplasty in tubotympanic CSOM: a comparative study of 120 cases. *Indian J Otolaryngol Head Neck Surg* 2017;69(3):357–362. DOI: 10.1007/s12070-017-1147-9.