

A Comparative Study of Endoscopic Myringoplasty vs Conventional Myringoplasty

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ABSTRACT

Objective: To evaluate the efficacy of endoscopic myringoplasty and comparison with conventional myringoplasty.

Materials and methods: Sixty cases of clinically diagnosed chronic suppurative otitis media with dry central perforation were taken into account of which 30 cases were undergone endoscopic myringoplasty and 30 cases undergone conventional myringoplasty. All patients were followed up on 3rd, 7th, 15th day, 6th weeks, 3rd and 6th months after surgery.

Results: The tympanic membrane's perforation healing rate was 86% (26/30), in conventional group of myringoplasty and 83% (25/30) in endoscopic group of myringoplasty and average hearing gain in conventional group was 13.96 dB and in endoscopic group was 15.03 dB.

Conclusion: The surgical outcome of endoscope assisted myringoplasty in terms of graft uptake and hearing improvement was comparable to the conventional microscope assisted myringoplasty, but in terms of cosmesis and postoperative recovery patients in the endoscope group had better results.

Keywords: Chronic suppurative otitis media, Endoscopic, Myringoplasty.

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INTRODUCTION

Tympanoplasty refers to any operation involving reconstruction of the tympanic membrane and/or the ossicular chain. Myringoplasty is a tympanoplasty without ossicular reconstruction. The most widely used and accepted method is underlay graft of temporalis fascia or sometimes perichondrium. The basic procedure is to excise the rim of the perforation so that there is a raw

surface from which new tissue will grow. The introduction of the operating microscope has enhanced the outcome of myringoplasty by improving the accuracy of the technique.

The operating microscope provides a magnified image in a straightline; hence the surgeon cannot visualize the deep recesses of the middle ear in a single operating field.¹ With the introduction of the endoscope into other branches of surgery, there have been attempts at its utilization in otology. The first published description of imaging of the middle ear by endoscopy was by Mer et al in 1967.

The use of a rigid endoscope for myringoplasty has a significant advantage as it is simple to use, not only for the examination, but also for the repair of the tympanic membrane perforation. This provides a magnified vision, and hence enables the surgeon to change rapidly from a close-up to a wide angle view, just by going closer or by withdrawing the scope. Further, it provides an all-round vision to the surgeon, who can rotate the angled endoscope to visualize the deep anterior canal wall, anterior recess, anterior marginal perforations, sinus tympani, facial recess, hypotympanum and the attic (Fig. 1).²

Endoscopic tympanoplasty follows the principles of minimal invasive surgery as the tympanomeatal flap is not raised, hence there is no trauma to the canal wall, but the surgeon is still able to examine the middle ear and exclude a cholesteatoma. Very few studies have been



Fig. 1: Middle ear status

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done previously in which endoscopes were used in ear surgery. So, a study was conducted in which endoscopic myringoplasty was compared with conventional microscopic myringoplasty.

MATERIALS AND METHODS

After taking approval from the departmental ethics committee, 60 cases were taken and randomly divided into two groups of 30 each for endoscopic and conventional myringoplasty.

Inclusion Criteria

- Dry nondischarging ear for 3 weeks
- Age 18 to 45 years
- Central perforation < 5 mm
- Demonstrable conductive hearing loss

Exclusion Criteria

- Age < 18 years
- Discharging ear
- Large perforation
- Revision myringoplasty
- SNHL
- Cholesteatoma
- Tympanosclerosis

All the patients were operated under local anesthesia (xylocaine 2% with 1:100,000 adrenaline) and intravenous sedation. For conventional myringoplasty postaural incision is made through the subcutaneous tissue and periosteum.

Temporalis fascia graft is harvested, periosteum is elevated and meatotomy was done. Pinna is retracted anteriorly by Mollison's mastoid retractor. The edges of perforation are freshened and the undersurface of drum remnant or annulus denuded. Tympanomeatal flap is elevated, middle ear structures are visualized. Middle ear is then packed with gelfoam and the graft material is placed medial to the perforation after trimming the graft to its required size and shape and after making a slit for the malleus so the graft placed medially and brought up along the sides of malleus and lateral attic wall. Tympanomeatal flap is repositioned in its original place, canal is filled with antibiotics soaked gelfoam. Postaural wound closed in layers. Ear canal is packed with gelfoam and the outer meatal orifice is plugged with antibiotic soaked gauze, mastoid dressing is applied. For endoscopic myringoplasty zero degree, 17 cm long, 2.7 and 4 mm wide Hopkin's rod endoscope was used. All surgeries were done by visualization using the monitor. All endoscope assisted myringoplasties were done through the permeal route. All patients had a 3 cm

incision in the hairline just above the helix to harvest the temporalis fascia graft. For freshening the margins of the perforation the endoscope was introduced through the external auditory canal and the edges of the perforation were freshened with a sickle knife (Fig. 2). Using a serrated circular knife, the mucosa of the medial surface of the tympanic membrane remnant in the vicinity of the perforation was carefully sacrificed to prepare a bed for the graft. Elevation of the tympanomeatal flap—in all the 30 cases we used the posteriorly based flap. An incision was taken 5 mm from the tympanic annulus from 12'clock to 6'clock position for left ear and 6'clock to 12'clock position for right ear with a circular knife (Fig. 3). The tympanomeatal flap was elevated and placed anteriorly with the flag knife and circular knife (Fig. 4). Dried temporalis fascia was placed by underlay technique (Fig. 5) and the tympanomeatal flap was replaced. Gelfoam was placed to stabilize the graft.

Postoperative care antibiotic, analgesics and oral decongestants are administered for 14 days. Mastoid dressing applied for 3 to 6 days. Antibiotic ear drops advised for 3 weeks for three times a day. All patients



Fig. 2: Freshening the margin of perforation



Fig. 3: Canal wall incision



Fig. 4: Tympanomeatal flap elevation



Fig. 5: Placement of graft

were followed up in outpatient on 3rd, 7th, 15th day, 6th weeks, 3rd and 6th months after surgery and were assessed for graft uptake and hearing improvement on audiometry. Objective assessment was done by endoscopic examination and local examinations. The subjects of both groups have been followed up in the given duration and the immediate as well as delayed results in terms of efficacy, benefit and postoperative complication were compared. Subjective assessment of the patients for cosmetic results were done based on different questionnaires in both the groups.

RESULTS

In our study of 60 cases of central tympanic membrane perforation endoscopic myringoplasty group 25/30 (83%) patients had successful graft uptake after 6 months. Average time taken in conventional myringoplasty was 90 minutes range (60–120 minutes) while time taken in endoscopic group of myringoplasty was 102 minutes range (60–140 minutes) (Table 1). In our study 4/30 patients of microscopic group require

Table 1: Time taken in surgery

Time (minutes)	Conventional myringoplasty	Endoscopic myringoplasty
60–80	10	4
81–100	14	8
101–120	6	14
121–140	0	4

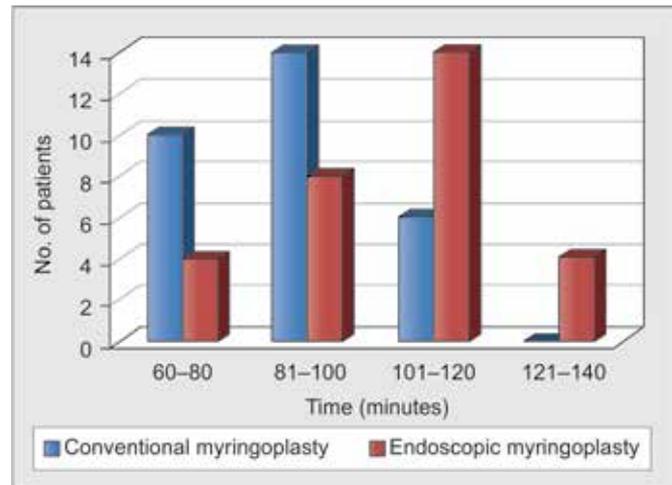
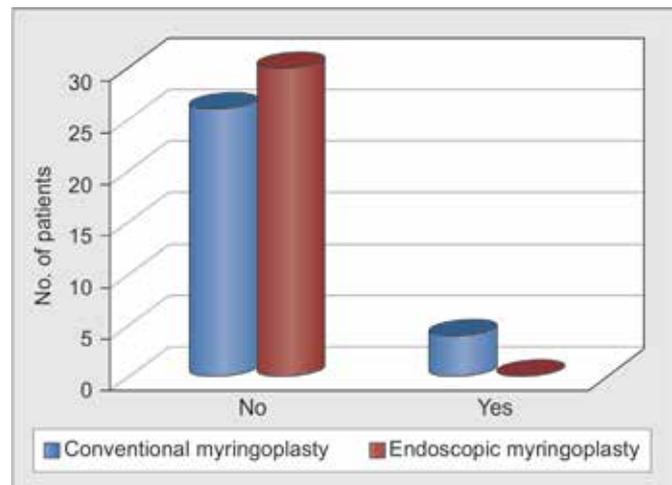


Table 2: Patients undergoing canaloplasty

Canaloplasty	Conventional myringoplasty	Endoscopic myringoplasty
Yes	4	0
No	26	30

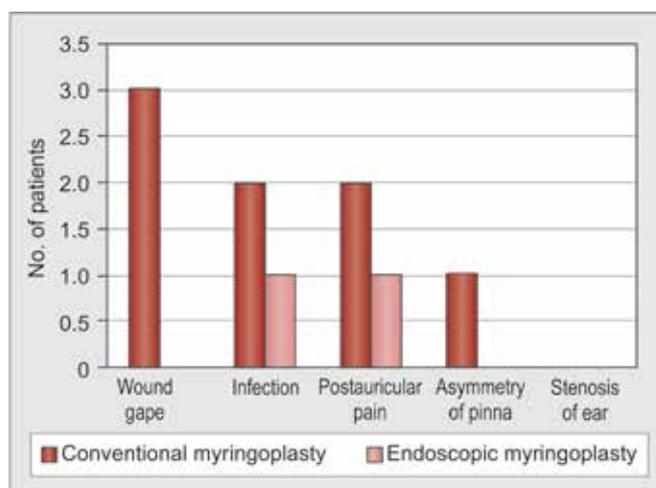


canaloplasty while none of the patient in endoscopic group requires canaloplasty (Table 2). Patients present with postoperative complication like wound gape in 3/30 (10%) in microscopic group while none in endoscopic group (Table 3). Average hospital stay time in microscopic myringoplasty group was 5 days while average hospital stay time in endoscopic myringoplasty group was 2.8 days (Table 4). In conventional group 4/30 (14%) patients graft was not taken while in endoscopic myringoplasty 5/30 (17%) graft was not taken and advice revision surgery (Table 5). In our study, average preoperative hearing loss



Table 3: Postoperative complication

Complication	Conventional myringoplasty	Endoscopic myringoplasty	χ^2 -test	p-value
Wound gape	3 (10%)	0 (0%)	1.404	0.2361
Infection	2 (6.66%)	1 (3.33%)	0.3509	0.5536
Postauricular pain	2 (6.66%)	1 (3.33%)	0.3509	0.5536
Asymmetry of pinna	1 (3.33%)	0 (0%)	1.017	0.3132
Stenosis of ear	0 (0%)	0 (0%)	—	—



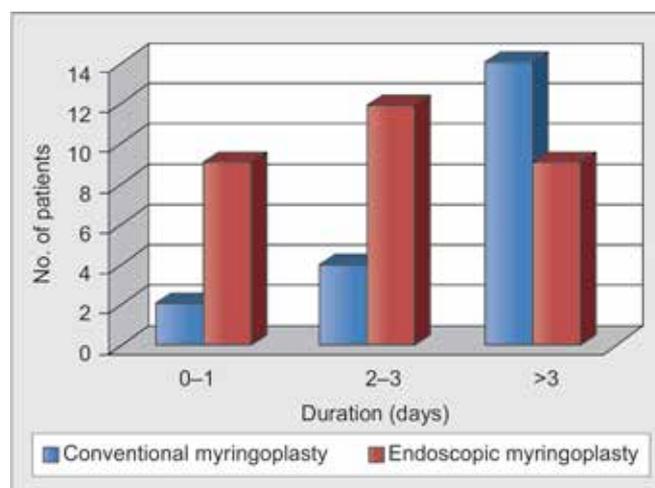
(air-bone gap) in conventional myringoplasty group was 31.53 dB while in endoscopic myringoplasty group 30 dB. Postoperatively, average air bone gap in conventional myringoplasty group was 16.03 dB while in endoscopic myringoplasty group it was 15 dB. Average hearing gain in conventional myringoplasty group is 13.96 dB and in endoscopic myringoplasty group is 15.03 dB (Table 6). In all the patients in the endoscopic group rated their cosmetic result as excellent where as in the conventional group 10 (33.3%) patient rated their cosmetic result as excellent, 16 (53.3%) patients rated their cosmetic result as satisfactory and four (13.3%) patients rated their cosmetic result as poor (Table 7). So, endoscopic group of patients had better cosmetic result compared to conventional myringoplasty groups.

DISCUSSION

In our study of 60 cases, the age of patient varied between 18 and 45 years, the take up rate of graft for different age group was the same which suggests that age did not made any difference in take up rate. Harugop³ in their study found that average time taken during microscopic myringoplasty is 106 minutes (80–135 minutes) and in endoscopic group it takes on average 128 minutes (90–180 minutes). In our study, average time taken in conventional group of myringoplasty was 90 minutes range (60–120 minutes) while time taken in endoscopic group of myringoplasty was 102 minutes range (60–140 minutes).⁴ In the microscopy group,

Table 4: Postoperative stay in hospital

Duration (days)	Conventional myringoplasty	Endoscopic myringoplasty
0–1	2	9
2–3	4	12
>3	14	9



5/30 patients required canaloplasty due to canal overhangs and 4/30 required canal wall curettage for ossicular assessment, whereas none of the patients in the endoscopy group required these procedures. In our study of 30 patients of microscopic groups, five patients require canaloplasty due to shagging of canal wall or narrow canal, whereas none of the patients of endoscopic group require canaloplasty, it is because the endoscope brings the surgeon's eye to the tip of the scope. Karhuketo

Table 5: Graft uptake status

Technique	Six weeks		Three months		Six months	
	No.	Percentage	No.	Percentage	No.	Percentage
Conventional myringoplasty	24	80	24	80	26	86
Endoscopic myringoplasty	22	73	25	83	25	83

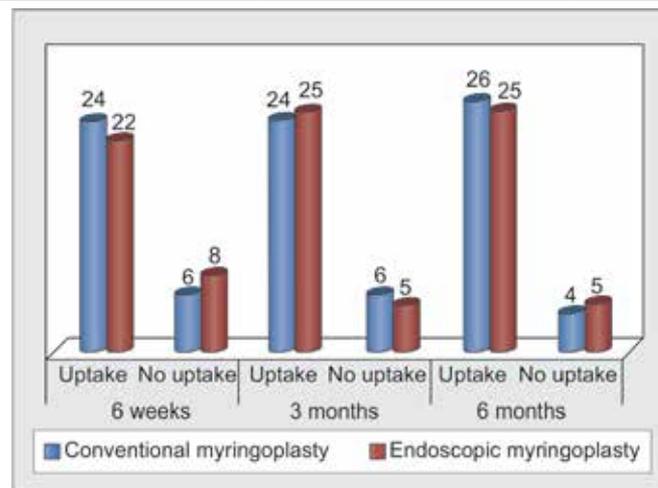


Table 6: Pure tone audiometry results

Average conductive hearing loss (dB)	Conventional myringoplasty		Endoscopic myringoplasty	
	Pre-operative	Post-operative	Pre-operative	Post-operative
0–10	0 (0%)	5 (16.6%)	0 (0%)	9 (30%)
11–20	2 (6.66%)	22 (73.3%)	4 (13.3%)	18 (60%)
21–30	12 (40%)	3 (10%)	15 (50%)	3 (10%)
31–40	16 (53%)	0 (0%)	11 (36.6%)	0 (0%)

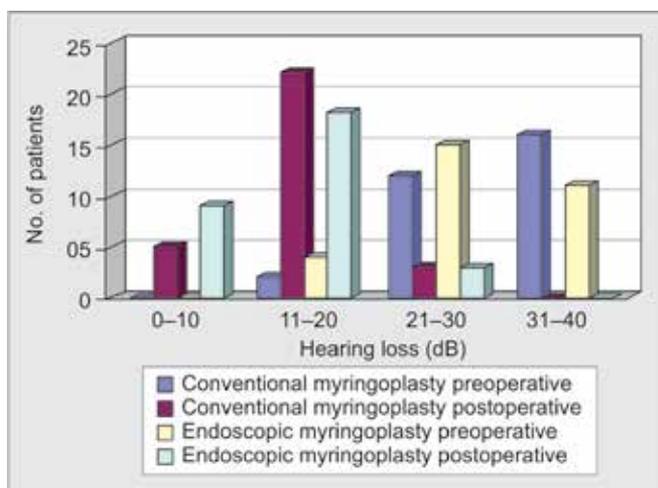
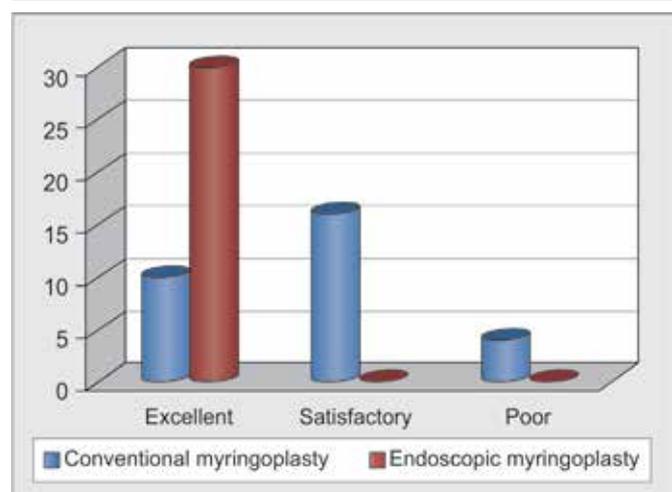


Table 7: Subjective cosmetic result

Result	Conventional myringoplasty	Endoscopic myringoplasty
Excellent	10	30
Satisfactory	16	0
Poor	4	0



et al⁵ have emphasized that endoscopic myringoplasty fulfills the criteria of minimally invasive surgery, with the least trauma to normal tissue and that almost excludes pre- and postoperative complications. In our study 8/30 (26%) had postoperative complication in conventional group and 2/30 (6.66%) had postoperative complication in endoscope group. Harugop et al³ observe that in the endoscope group patients returned to routine activity

in 2.4 days and those in the microscope group took 5.4 days for the same. In our study, we find average hospital stay time in microscopic myringoplasty group was 5 days while average hospital stay time in endoscopic myringoplasty group was 2.8 days. Raj⁶ in his study he found that endoscopic myringoplasty are comparable to the conventional myringoplasty done under operating microscope. There was 90% graft uptake rate in endoscopic group as compared to 85% in microscopic group.



Yadav⁷ in his study of endoscopic myringoplasty 40 out of the 50 patients had an intact tympanic membrane in the 8th postoperative week, accounting for an 80% success rate. Lade et al⁴ in his study to ascertain the feasibility of transcanal endoscopic underlay myringoplasty using temporalis fascia and compare the results with microscopic myringoplasty. A graft uptake rate of 83.3% was observed in both groups postoperatively after 24 weeks. In our study, percentage of successful graft uptake in conventional group is 86% while in endoscopic group 83% which is consistent with above literature. Yadav⁷ in his study of 50 patients none of the patients had an air-bone gap < 10 dB prior to surgery, but postoperatively at 8 weeks, 34 patients had an improved air-bone gap < 10 dB and 13 were in the range of 11 to 20 dB. Preoperatively, 35 patients had an air-bone gap in the range of 21 to 30 dB, whereas the same level was found in three cases postoperatively. In the 8th week, 47 patients had an air-bone gap < 20 dB. Thus, out of the patients with a healed perforation, 80% showed an air-bone gap below 10 dB in the 8th postoperative week and 16% had an air-bone gap in the range of 11 to 20 dB, while 4% still had an air bone gap in the range of 21 to 30 dB.

Lade et al⁴ mean air-bone gap pre and postoperatively in the endoscopy group was 28.5 and 18.13 dB, respectively, whereas these values were 32.4 and 16.9 dB, respectively, in the microscopy group. In our study, average preoperative hearing loss (air-bone gap) in conventional myringoplasty group was 31.53 dB while in endoscopic myringoplasty group was 30 dB. Postoperatively, average air bone gap in conventional myringoplasty group was 16.03 dB while in endoscopic myringoplasty group it was 15 dB. Average hearing gain in conventional myringoplasty group is 13.96 dB and in endoscopic myringoplasty group is 15.03 dB. Harugop³ at the end of 6 months all (100%) patients in the endoscope group rated their cosmetic result as excellent, whereas in the microscope group 10 (20%) patients rated

their cosmetic result as poor, 25 (50%) patients rated the cosmetic result as satisfactory and 15 (30%) patients rated their cosmetic result as excellent. Objective analysis of cosmesis was done by them at the end of 6 months and it revealed that in the endoscope group, none (0%) of the patients had a visible scar, whereas in the microscope group, 38 (75%) patients had a visible scar and in 13 (25%) patients the scar was not visible. In our study, we assessed the patient after 6 months postoperatively for visible scar and found in 4/30(13.3%) patients in conventional group and none in endoscopic group.

CONCLUSION

The surgical outcome of endoscope assisted myringoplasty in terms of graft uptake and hearing improvement was comparable to the conventional microscope assisted myringoplasty, but in terms of cosmesis and postoperative recovery patients in the endoscope group had better results.

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