

Original Research Article

A study to evaluate and compare the outcomes of endoscope versus microscope assisted myringoplasty

K. Sharath Babu^{1*}, R. Shankar²

¹Department of ENT, Gadag Institute of Medical Sciences, Gadag

²Department of Preventive Medicine, VMKVMCH, Salem

Received: 08 March 2021

Revised: 16 April 2021

Accepted: 19 April 2021

*Correspondence:

Dr. K. Sharath Babu,

E-mail: drksarath@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: In microscope assisted middle ear procedures surgeons can only observe the parts of the tympanic cavity, the hidden areas, such as the facial recess and sinus tympani, would not be visualised which needs to be exposed for performing tympanoplasty. The aim of the study was to compare the outcomes of microscope versus endoscope assisted myringoplasties in terms of duration of the procedure, graft take up, improvement in hearing and incidence of any complications.

Methods: A prospective comparative study was conducted for a period of one year. A total of 72 patients with CSOM were randomised into two groups of 36 each. Group A patients (n=36) underwent traditional myringoplasty under a microscope and group B patients (n=36) endoscopic assisted myringoplasty was performed. Post-operatively all the patients were followed up for a period of one year. During the follow-up period patients were assessed for the graft take up, hearing improvement, incidence of complications and recurrence rate between the two groups.

Results: Successful graft uptake was observed in 88.8% among patients underwent microscope assisted myringoplasty and it was 94.4% in endoscopic assisted myringoplasty. The mean duration of surgery was 123 mins in microscopic assisted group compared to 92 mins in endoscopic assisted group and the difference was found to be statistically significant. Similarly, the cosmetic results and the post-operative pain were more favorable for endoscopic assisted group than microscopic assisted group and the difference was found to be statistically significant.

Conclusions: Endoscopic assisted procedure could be considered as a better alternative for microscopic assisted myringoplasty.

Keywords: Chronic suppurative otitis media, Microscopic assisted myringoplasty, Endoscopic assisted myringoplasty

INTRODUCTION

Chronic suppurative otitis media (CSOM) being one of the most common disease presenting in ENT department, the prevalence in India ranges between 4 and 33%.¹ Chronic ear discharge is the usual presentation of CSOM which when not managed properly would lead onto

permanent perforation and hearing loss. Surgical intervention would be required for most of the patients which would provide a dry ear and improvement in hearing.^{2,3} The traditional method followed for CSOM surgery is myringoplasty which is performed under a microscope. Because of certain deficiencies such as the view provided by the microscope, it would be difficult to

view the lesions that were hidden in the anterior epitympanic recess and tympanic sinus, which when left unnoticed can lead to residual lesions or recurrence of cholesteatoma.⁴

In early 1990s, Thomassin was the first person to propose and perform endoscopic surgery for middle ear.⁵ The advantage of using an endoscope is that it can reach and provide us the views which the microscope could not visualise. Normally using the microscope, surgeons can only observe the parts of the tympanic cavity, the hidden areas, such as the facial recess and sinus tympani would not be visualised which needs to be exposed for performing tympanotomy. In such cases endoscope can directly and clearly helps us to locate these areas using a camera lens with adjustable angles.⁶ Fewer studies done earlier have proven that treatment for CSOM either by performing full endoscopic surgery or myringoplasty with the assistance of endoscopy had significantly reduced the incidence of residual lesions and the recurrence rate.⁷⁻⁹

Many studies had been conducted to highlight the advantages of endoscopic procedure but very few studies had been done to compare the outcome of myringoplasty and endoscopic surgeries as a single study. So the present study was undertaken to compare the outcomes of microscope versus endoscope assisted myringoplasties in terms of duration of the procedure, graft take up, improvement in hearing and incidence of any complications.

METHODS

A prospective comparative study was conducted for a period of one year from May 2018 to April 2019 in the department of otorhinolaryngology at a tertiary care hospital in Haldwani. The study was started after getting approval from the institutional ethical committee. Patients diagnosed as CSOM, inactive mucosal type and requiring surgical intervention were included as our study subjects and patients who were not willing for the surgery, patients with sensorineural hearing loss, aged <6 years or >65 years, relapse cases and patients with sinonasal pathology were excluded from the study. A non-random quota sampling was followed to derive the required number of sample and it was based on the study period. So, for a period of one year a total of 72 patients who were satisfying our inclusion and exclusion criteria were taken as our study sample and were randomised into two groups of 36 each. Group A patients (n=36) underwent traditional myringoplasty under a microscope and group B patients (n=36) endoscopic assisted myringoplasty was performed.

Microscope assisted tympanoplasty was performed by a postaural approach, by making a curvilinear incision and

firstly temporalis fascia graft was harvested and was allowed to dry. Tympanomeatal flap is freed from the handle of malleus by dissecting the middle ear mucosa. Then the completely dried temporalis fascia graft of appropriate size was introduced through the ear canal and it was insinuated under the handle of malleus. The tympano meatal flap was repositioned in such a way that it covers the free edge of the graft and the graft was sealed by using gel foam.

Endoscope assisted myringoplasty was performed using 00 endoscope of 4 mm diameter. Transmeatal approach was followed for performing the procedure. The edges of the perforation were excised and the medial surface of the tympanic remnant in the vicinity of the perforation was carefully scarified to prepare the bed for the graft. Horizontal incision was made in temporal region and the temporalis fascia graft was harvested and then it was inserted to overlap the medial surface of the drum remnant. Similar to the previous procedure the graft was kept in position and sealed using gel foams.

Post-operatively all the patients were followed up for a period of one year. During the follow-up period all the patients were assessed for the graft take up, hearing improvement, incidence of early or late complications and recurrence rate between the two groups. All data were entered and analysed using SPSS version 24. Pre-operative values and post-operative clinical outcome between the two groups were evaluated using chi-square test, considering the confidence interval at 95% with $p < 0.05$ was inferred as statistically significant.

RESULTS

The total 72 study subjects were divided into two groups of 36 each and for one group it was microscope assisted (group A) and for the other group it was endoscopic assisted myringoplasty surgery (group B) was performed. The minimum age was 13 and the maximum age was 55 years in both the groups with a mean age of 22.6 and 23.2 years among group A and group B, respectively. Male and female distribution among both the groups was almost equal in number and no statistical significant difference was observed in gender and age group between the two groups (Table 1). There were almost equal numbers of study subjects in both the groups based on the side of the ear involvement (right/left) and in 22 patients it was bilateral involvement in which 12 patients were in microscopic assisted group (group A) and 10 were in endoscopic assisted group (group B). The average duration of CSOM among group A patients was 7.8 years and among group B it was 8.3 years and no statistical significant difference was observed between the two groups.

Table 1: Age and gender wise distribution of the study subjects.

Age groups (in years)	Group A (microscopic assisted) (n=36)		Group B (endoscopy assisted) (n=36)	
	Male (%)	Female (%)	Male (%)	Female (%)
<15	2 (11.7)	3 (16.6)	5 (26.3)	3 (17.6)
15-25	9 (52.9)	11 (61.1)	8 (42.1)	10 (58.8)
26-35	4 (23.5)	3 (16.6)	3 (15.7)	3 (17.6)
36-45	1 (5.8)	1 (5.5)	2 (10.5)	1 (5.8)
46-55	2 (11.7)	0	1 (5.2)	0
Total	17 (100)	18 (100)	19 (100)	17 (100)
Mean±SD	22.6±8.1		23.2±7.8	
P value	0.729			

Table 2: Distribution of the study subjects based on the size of perforation.

Size of perforation	Group A (%)	Group B (%)	P value
Small	8 (22.2)	9 (25)	0.715
Medium	15 (41.6)	17 (47.2)	0.682
Large	13 (36.1)	10 (27.7)	0.291
Total	36 (100)	36 (100)	

Table 3: Size of perforation and graft uptake among the study subjects.

Size of perforation	Graft uptake		P value
	Group A (%)	Group B (%)	
Small	7 (100)	9 (100)	1.000
Medium	14 (93.3)	16 (94.1)	0.892
Large	11 (78.5)	9 (90)	0.139

Table 4: Comparison of hearing loss before and after surgical procedure between the two groups.

Conductive hearing loss (in decibels)	Group A (n=36)		Group B (n=36)		P value
	Pre-operation (%)	Post-operation (%)	Pre-operation (%)	Post-operation (%)	
0-10	0	6 (16.6)	0	7 (19.4)	0.716
11-20	4 (11.1)	12 (33.3)	5 (13.8)	13 (36.1)	0.824
21-30	9 (25)	13 (36.1)	7 (19.4)	13 (36.1)	1.000
>30	23 (63.8)	5 (13.8)	24 (66.6)	3 (8.3)	0.0715

Table 5: Comparison of the mean duration of surgery between the two groups.

Duration of surgery	Group A (mean±SD)	Group B (mean±SD)	P value
Time (in mins)	123±17.3	92±13.8	<0.0001

Table 6: Post-operative complications between the two groups.

Post-operative events/complications		Group A (n=36) (%)	Group B (n=36) (%)	P value
Cosmetic results	Poor	0	0	<0.0001
	Satisfactory	26 (72.2)	3 (8.3)	
	Excellent	10 (27.7)	33 (91.6)	
Pain	Present	14 (38.8)	2 (5.5)	<0.001
	Absent	22 (61.1)	34 (94.4)	
Tympanic membrane retraction	Present	1 (2.7)	2 (5.5)	0.135
	Absent	35 (97.2)	34 (94.4)	
Recurrence at end of 6 months		3 (8.3)	1 (2.7)	0.0816

Based on the size the perforation was classified as small, medium and large and most of the perforations were medium and large and less than 25% of the perforations were small in both the groups and no statistical significant difference was observed between the two groups related to the size of tympanic membrane perforation (Table 2). After performing the myringoplasty surgery the graft uptake was observed and it was found that out of 72 patients the graft uptake was successful in 66 patients in whom it was seen in 32 patients among group A and 34 patients among group B. The graft uptake was 100% for small perforations and 94% for medium size perforation in both the groups, whereas in large size perforation the graft uptake was 78.5% in group A and 90% in group B, though there was some difference in large perforation graft uptake between the two groups it was not found to be statistically significant (Table 3). The hearing loss comparison between the two groups showed a statistical significant difference in hearing improvement post-operatively compared to the hearing loss in the pre-operative period. Most of the patients in both the groups had a hearing loss of more than 30 db in the pre-operative period, whereas in the post-operative period the hearing loss was found to be less than 30 db in majority of the study subjects in both the groups. As there was a significant improvement in hearing function in both the groups no statistically significant difference was observed between the two groups ($p>0.05$) (Table 4). The mean duration of surgery was 123 mins in microscopic assisted group compared to 92 mins in endoscopic assisted group and the difference was found to be statistically significant ($p<0.001$) (Table 5). The post-operative events/complications were assessed between the two groups. The cosmetic results was assessed based on the patients satisfaction and it was found to be excellent among patients who had underwent endoscopy assisted surgery whereas among microscopic assisted group majority of the patients had a satisfactory results and the difference was found to be statistically significant. Similarly the post-operative pain was totally absent in endoscopic assisted group whereas in microscopic assisted group only 61% of the patients had a totally absent pain and the difference was found to be statistically significant ($p<0.05$). Tympanic membrane retraction was seen in one patient in group A and two patients in group B and the recurrence was seen in 3 patients in group A and only one patient in group B but no statistical significant difference was observed between two groups related to TM retraction and recurrence ($p>0.05$) (Table 6).

DISCUSSION

Myringoplasty is a surgical procedure which is confined to the drum head without manipulation of the ossicles or middle ear. Specialized instruments like the ocular magnifying loops and the operating microscope opened up a new dimension to otology surgery. Endoscopic guided myringoplasty is a newer technique being used in the management of CSOM. Initially endoscopes were

used for diagnostic and teaching purpose of tympanic membrane and ear canal.^{10,11} Mer and colleagues introduced middle ear endoscopy in 1967, from then, endoscopes are increasingly used for various middle ear surgeries.¹² This study was undertaken with the objective of determining the advantages and disadvantages of endoscope when compared to the conventional operating microscope in myringoplasty surgery.

In our study 20-30 years was found to be the commonest age group for the occurrence of CSOM and among gender wise there was almost equal distribution between males and females. Similarly studies conducted by Kaur et al, Varshney et al, Lasini and Afolabi showed the same age group to be most commonly affected with CSOM and in their studies they found a slight female predominance.¹³⁻¹⁵

In the present study successful graft uptake was observed in 88.8% among patients underwent microscope assisted myringoplasty and it was 94.4% in endoscopic assisted myringoplasty group, whereas the studies done by Harugop et al, Lakpathi et al, Kumar et al, showed a slightly better uptake in the microscope assisted group compared to endoscopic group and in a study conducted by Shueb et al had found 93% successful uptake in both microscope assisted and endoscopic assisted group.¹⁶⁻¹⁹ Raj and Meher observed a similar type of result as that of our study showing a better graft uptake in endoscopic group than that of microscopic assisted group (90% versus 85%).²⁰

In the current study most of the patients in both the groups had a hearing loss of less than 30 db post-operatively which was found to be much better than their pre-operative hearing loss. Harugop et al in their study showed a similar pattern of hearing loss improvement in their patients in both the groups post-operatively.¹⁶ Lakpathi et al in their study showed 90 % of patients post operatively had an improvement in conductive hearing loss with an average between 0 and 20 db in both the microscopic as well as endoscopic groups.¹⁷

In our study the cosmetic results were assessed based on patients feedback and it was found that in more than 90% of the subjects in endoscopic assisted group the results were excellent whereas in microscopic assisted group more than 70% of the subjects had only a satisfactory results and a similar type of pattern was observed in the previously conducted studies. The post-operative pain was found to be more in the microscopic assisted group than the endoscopic group and a similar result was seen in the study done by Gadag et al.²¹ In most of the previously done studies the post-operative pain assessment was not done.

In the present study we found that the mean duration of surgery was found to be much less in the endoscopic assisted group compared to microscopic assisted group and a similar type of result was observed in the study

done by Patel et al and Huang et al, whereas the study done by Harugop et al showed the mean duration was more in endoscopic assisted group than that of microscopic assisted group and he quoted that surgeons skill and experience determines the duration of the procedure.^{16,22,23} We also found a lesser recurrence rate in the endoscopic assisted myringoplasty group during the follow up period of one year, studies done earlier haven't quoted about the recurrence as they didn't had a follow up of the patients for a longer duration.

Limitations

Sample size and the follow up period were the only limitation of the present study. A larger sample size and a longer duration of follow up would have made the study more valid.

CONCLUSION

The success rate between the two procedures in terms of graft uptake and complications did not show any difference, whereas the duration of surgery, cosmetic appearance, post-operative pain, recurrence rate and duration of surgery were more favorable towards endoscopic assisted procedure compared to microscopic assisted myringoplasty. Endoscope assisted myringoplasty would be a better alternate for microscopic assisted myringoplasty provided the operating surgeons get enough training for endoscopic procedures. As our study proves most of the advantages showed for endoscopic assisted procedures done by previous researchers endoscopes may be utilised for most of the middle ear surgeries like tympanoplasty, stapedotomy and cochlear implant.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kumaria MS, Madhavi J, Bala N, Raja KK, Jyothy MA. Prevalence and associated risk factors of otitis media and its subtypes in south Indian population. Egypt J Ear Nose Throat Allied Sci. 2016;17(2):57-62.
2. Li WC, Chiu NC, Hsu CH, Lee KS, Hwang HK, Huang FY. Pathogens in the middle ear effusion of children with persistent otitis media: implications of drug resistance and complications J Microbiol Immunol Infect. 2001;34:190-4.
3. Dhooge IJ. Risk factors for the development of otitis media. Curr Allergy Asthma Rep. 2003;3:321-5.
4. Harugop AS, Mudhol RS, Godhi RA. A comparative study of endoscope assisted myringoplasty and microscope assisted myringoplasty. Indian J Otolaryngol Head Neck Surg. 2008;60(4):298-302.
5. Thomassin JM, Korchia D, Doris JMD. Endoscopic-guided otosurgery in the prevention of residual cholesteatomas. Laryngoscope 1993;103(8):939-43.
6. Li B, Zhou L, Wang M, Wang Y, Zou J. Endoscopic versus microscopic surgery for treatment of middle ear Cholesteatoma: a systematic review and metaanalysis, Am J Otolaryngol Head Neck Med Surg. 2020;42(2):102451.
7. Ayache S. Otoendoscopy in cholesteatoma surgery of the middle ear: what benefits can be expected? Otol Neurotol. 2008;29(8):1085-90.
8. Badr-el-Dine M. Value of ear endoscopy in cholesteatoma surgery. Otol Neurotol. 2002;23(5):631-5.
9. Kumral TL, Uyar Y, Yıldırım G, Berkiten G, Mutlu AT, Kılıç MV. Does endoscopic surgery reduce recurrence of the petrous apex cholesteatoma? Indian J Otolaryngol Head Neck Surg. 2013;65(4):327-32.
10. Gaur RS, Tejavath P, Chandel S. Comparative study of microscopic-assisted and endoscopic-assisted myringoplasty. Indian J Otol. 2016;22(3):177-82.
11. Jyothi AC, Shrikrishna BH, Kulkarni NH, Kumar A. Endoscopic myringoplasty versus microscopic myringoplasty in tubotympanic csom: a comparative study of 120 cases. Indian J Otolaryngol Head Neck Surg. 2017;69(3):357-62.
12. El-Guindy A. Endoscopic transcanal myringoplasty. J Laryngol Otol. 1992;106(6):493-5.
13. Kaur M, Singh B, Verma BS, Kaur G, Kataria G, et al. Comparative evaluation between tympanoplasty alone & tympanoplasty combined with cortical mastoidectomy in non-cholesteatomatous chronic suppurative otitis media in patients with sclerotic bone. IOSR J Dental Med Sci. 2014;13(6):40-5.
14. Varshney S, Nangia A, Bist SS, Singh RK, Gupta N, Bhagat S. Ossicular status in chronic suppurative otitis media in adults, Indian J Otolaryngol Head Neck Surg. 2010;62(4):421-6.
15. Lasini AO, Afolabi AO. Mastoid surgery for chronic ear : a ten year review. J Head Neck Surg. 2008;2(2):41.
16. Harugop AS, Mudhol RS, Godhi A. Comparative study of endoscope assisted myringoplasty and microscope assisted myringoplasty. Ind J Otolaryngol Head Neck Surg. 2008;60(4):298-302.
17. Lakpathi G, Reddy S, Anand SL. Comparative study of endoscope assisted myringoplasty and microscopic myringoplasty. Indian J Otolaryngol Head Neck Surg. 2016;68(2):185-90.
18. Kumar M, Kanaujia SK, Singh A. A comparative study of endoscopic myringoplasty vs conventional myringoplasty. Int J Otorhinolaryngol Clin. 2015;7(3):132-7.
19. Shoeb M, Gite V, Bhargava S, Mhashal S. Comparison of surgical outcomes of tympanoplasty assisted by conventional microscopic method and endoscopic method. Int J Otorhinolaryngol Head Neck Surg. 2016;2:184-8.

20. Raj A, Meher R. Endoscopic transcanal myringoplasty: a study. *Indian J Otolaryngol Head Neck Surg.* 2001;53:47-9.
21. Gadag R. Comparative study of outcomes of microscopic versus endoscopic myringoplasty. *Medica Innovatica.* 2016;5(1):3-6.
22. Patel J, Aiyer RG, Gajjar Y, Gupta R, Raval J, Suthar PP. Endoscopic tympanoplasty vs microscopic tympanoplasty in tubotympanic CSOM: a comparative study of 44 cases. *Int J Res Med Sci.* 2015;3(8):1953-7.
23. Huang TY, Ho KY, Wang LF, Chien CY, Wang HM. A comparative study of endoscopic and microscopic approach type 1 tympanoplasty for simple chronic otitis media. *J Int Adv Otol.* 2016;12(1):28-31.

Cite this article as: Babu KS, Shankar R. A study to evaluate and compare the outcomes of endoscope versus microscope assisted myringoplasty. *Int J Otorhinolaryngol Head Neck Surg* 2021;7:988-93.