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Original Research Article

Comparison of surgical outcomes of tympanoplasty assisted by conventional microscopic method and endoscopic method

Mohammed Shoeb*, Vinod Gite, Samir Bhargava, Shashikant Mhashal

Department of ENT, HBT Medical College, Mumbai, Maharashtra, India

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***Correspondence:**
Dr. Mohammed Shoeb,
E-mail: drshoebmohammed@gmail.com

ABSTRACT

Background: The introduction of the operating microscope has significantly enhanced the outcome of tympanoplasty by improving the accuracy of the technique. The operating microscopy provides a magnified image in straight line; hence the surgeon can't visualize the deep recesses of the middle ear in single operating field. This is overcome by use of rigid endoscope for tympanoplasty. In rigid endoscopy view is better but surgeons 2 hands are not free so manipulation here is difficult.
Methods: 30 cases of safe CSOM from each group viz microscopic assisted (MES) & endoscopic assisted (EES) were selected operated by full cuff (superiorly based tympanomeatal flap technique) and compared for graft uptake, hearing improvement & complications.
Results: Graft uptake rate was 93.33% in both groups. In our study the pre operative mean air bone gap of the patients was 37.23+5.79 db after surgery at 6 months came down to 17.17+3.31 db hence after calculating the mean air bone gap closure it came down to be 20.4+4.85. Which showed a significant improvement in the hearing (p value 1.493E-23 which is less than 0.05). 6.67% cases from both groups showed failure of graft uptake.
Conclusions: The graft uptake, hearing improvement, Complications produced by each of the techniques in large, subtotal, and anterior moderate perforations by each technique is comparable i.e. both techniques have same results.

Keywords: Tympanoplasty, Endoscopic tympanoplasty, Microscopic tympanoplasty, Otoendoscope

INTRODUCTION

Otitis media is an important and a highly prevalent disease of the middle ear and poses serious health problem worldwide especially in developing countries where large percentage of the population lack specialized medical care, suffer from malnutrition and live in poor hygienic environmental conditions.[1]

There were various new techniques tried in desire to overcome the problems encountered in the reconstruction of the tympanic membrane. Among these problems are poor exposure to vital areas of the tympanic cavity like sinus tympani, difficulty in removing all squamous epithelium in the area to be covered by the graft and the subsequent formation of epithelial pearls, development of disease sequelae such as tympanosclerosis or the appearance of cicatricle tissue, blunting of the anterior canal recess, postoperative migration of the tympanic membrane graft away from the handle of the malleus and retraction of the grafted tympanic membrane, delayed epithelisation of the graft, early or late acute middle ear infection and eventual graft failure, too thick or too thin neotympanum and hearing loss.

Introduction of operating microscope significantly enhanced surgical results by improving the accuracy of the technique. But the operating microscope provides magnified images in a straight line extending from the objective lens. Many deep recesses within the temporal

bone cannot be visualized directly without the surgeon taking measures to increase surgical exposure.[2]

The use of rigid endoscope in the management of dry central perforation of the drum represented a significant advance in middle ear surgery. The magnified vision provided, the ability to change rapidly from close up to wide angled (just by going closer or withdrawing the scope) and the possibility of an all-round vision just by rotating the angled scopes are indispensable advantages of the endoscope. Thus, the deep anterior canal wall, anterior recess, anterior marginal perforations, sinus tympani, facial recess, hypotympanum and attic are visualized by rotating the angled scopes.[3-6]

Very few studies have been conducted till date to correlate the outcomes of microscopic assisted and endoscopic assisted tympanoplasty. Hence this study is to compare the outcomes of tympanoplasty by conventional microscopic assisted method and endoscopic assisted method.

Aims and objectives

1. To assess and compare the graft uptake in large, subtotal, and anterior moderate perforations by each technique (viz; conventional microscopic assisted & endoscopic assisted type 1 superiorly based circumferential tympanomeatal flap tympanoplasty).
2. To assess and compare the hearing improvement by each of the technique.
3. To assess and compare the complications produced by each of the technique.

METHODS

Design of the study was prospective comparative study.

Study period was from April 2014-June 2015.

Study population

The study population comprised of 60 subjects (30 subjects of each group viz conventional microscopic assisted and endoscopic assisted respectively) at our hospital.

Inclusion criteria

- Chronic suppurative otitis media of tubotympanic type with anterior, large and subtotal perforations.
- Age group of patients between 10 to 60 years of both the sexes.

Exclusion criteria

- Cases of chronic suppurative otitis media of atticoantral type.
- Cases of chronic suppurative otitis media with ossicular discontinuity, ossicular fixation or very narrow canal & sensory neural hearing loss.
- Cases of chronic suppurative otitis media with extensive disease (cholesteatoma) requiring exteriorizing procedure like modified radical Mastoidectomy.

After the approval from ethics committee, patients falling into the inclusion criteria were chosen for the study. All patients participating in the study underwent an audiometric assessment before surgery and at 3 months and 6 months after surgery. The surgery was done under local or general anesthesia by postaural route for conventional microscopic assisted method and endomeatal or permeatal for endoscopic assisted method. We took a 2 cm incision in the hair to harvest the graft for endoscopic assisted group, whereas the conventional microscope technique requires a 5 cm long post aural incision.

Surgical technique

Endoscopic assisted superiorly based circumferential tympanomeatal flap tympanoplasty (EES)

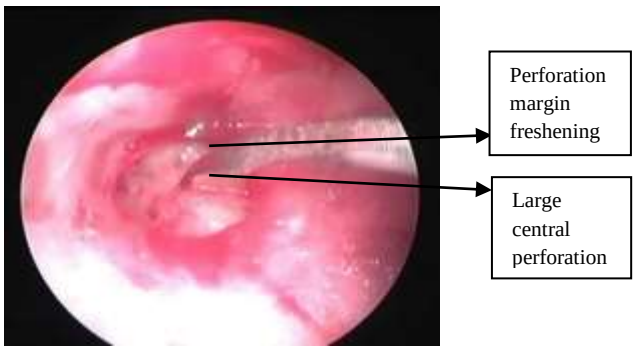

Figure 1: Removal of the epithelium from the margins.

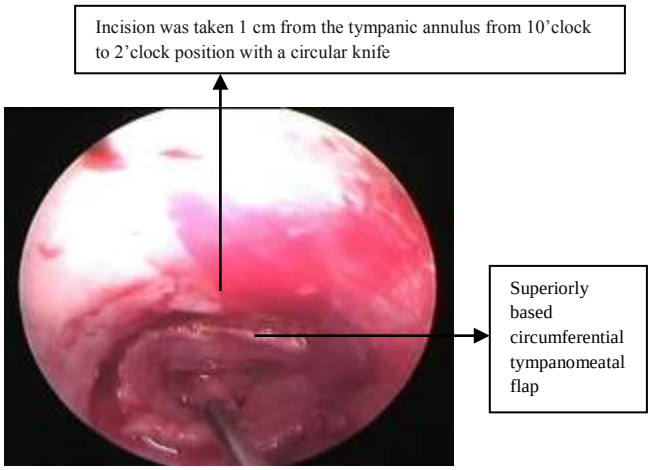

Figure 2: Raising of tympanomeatal flap.

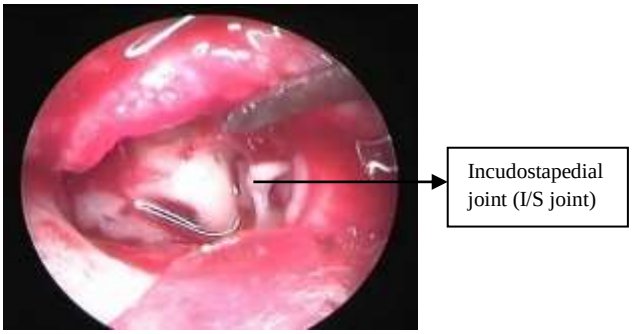

Figure 3: Middle ear examination.

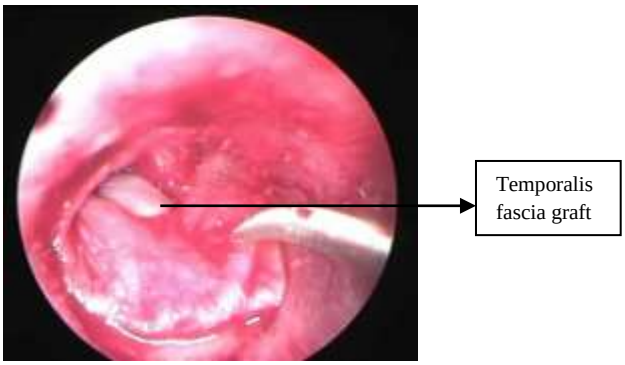

Figure 4: Placement of the temporalis fascia graft.

RESULTS

Graft uptake in both group microscopic assisted tympanoplasty (MES) & endoscopic assisted tympanoplasty showed no statistical difference.

Table 1: Graft uptake rate in microscopic assissted tympanoplasty and endoscopic assisted tympanoplasty.

Graft Uptake				
		Present	Absent	Total
Surgery (type)	MES	28	2	30
	EES	28	2	30
	Total	56	4	60
	P value	1 which is more than 0.05 (P value <0.05: significant, P value >0.05: not significant)		

AIR BONE GAP improvement was statistically significant in both compared to pre-operative air bone gap. But individual groups showed no significant differences

Air bone gap in individual groups at 3 months & 6 months (MES= microscopic assisted/ EES= endoscopic assisted group).

Table 2: Mean air bone gap in both groups pre surgery and at 3 & 6 months.

	Pre sx (MES)	Post sx (MES) @ 3months	Post sx (MES) @ 6months	Pre sx (EES)	Post sx (EES) @ 3months	Post sx (EES) @ 6months
Mean air bone gap in db	38.87	18.13	17.47	35.6	17.4	16.87
Standard deviation	4.88	2.59	1.96	6.31	4.99	4.32
P-value	1.07492E-12 which is less than 0.05 (Values: mean± S.D.; P value <0.05: significant P value >0.05: not significant)		2.64394E-12 which is less than 0.05 (Values: mean± S.D.; P value <0.05: significant P value >0.05: not significant)		1.03724E-09 which is less than 0.05 (Values: mean± S.D.; P value <0.05: significant P value >0.05: not significant)	8.97355E-10 which is less than 0.05 (Values: mean± S.D.; P value <0.05: significant P value >0.05: not significant)

Table 3: Comparison of air bone gap improvement in both groups at 3 & 6 months.

	Post sx (MES) @ 3months	Post sx (EES) @ 3months	Post sx (MES) @ 6months	Post sx (EES) @ 6months
Mean air bone gap in db	18.13	17.4	17.47	16.87
Standard deviation	2.59	4.99	1.96	4.32
P-value	0.617708589 which is more than 0.05 (Values: mean± S.D.; P value <0.05: significant P value >0.05: not significant)		0.628276048 which is more than 0.05 (Values: mean± S.D.; P value <0.05: significant P value >0.05: not significant	

Complication rate

No significant difference between individual groups.

Table 4: Complication (failure rate) in both groups.

		Complications		
		Present	Absent	Total
Surgery (type)	MES	2	28	30
	EES	2	28	30
	Total	4	56	**60**
	P value	1 which is more than 0.05 (P value <0.05: significant, P value >0.05: not significant)		

DISCUSSION

In the individual groups viz MES and EES we attained drum healing or graft uptake 93.33% in both groups. In our study the pre-operative mean air bone gap of the patients was 37.23±5.79 db after surgery at 6 months came down to 17.17±3.31 db hence after calculating the mean air bone gap closure it came down to be 20.4±4.85.which showed a significant improvement in the hearing (p value 1.493E-23 which is less than 0.05).while in the individual group viz MES and EES the pre-operative mean AB gap was 38.87±4.88 db and 35.6±6.31 respectively and post-operative at 6months mean AB gap was 17.47±1.96 db and 16.8±74.32 db respectively. When compared with the pre-operative mean air bone gap the post-operative mean air bone gap showed significant improvement. But inter - comparison between MES and EES of the post-operative mean AB gap at 6 months post-surgery showed no statistical significant difference.

Yadav S.P, S. Agarwal et al studied Endoscopic assisted myringoplasty carried out in 50 patients aged 18-45 years, using temporalis fascia graft.[7] Over all graft uptake and improvement in conductive deafness as air bone gap closure was achieved in 80% of cases, they concluded that endoscopic myringoplasty is equally effective, less morbid and very cost effective in small central perforation; however it is not effective in large perforation. In our study graft uptake rate and air bone gap improvement was equally better in both groups.

Raj A, Maher R et al on endoscopic trans canal myringoplasty and compared the outcomes with that of myringoplasty using microscope, showed that graft uptake is 90% in endoscopic method and 85% in microscopic method but there was no significant differences between the gain in the air bone gap in either group.[8]

Study conducted by Harugop AS, Mudhol RS, Godhi A, on a comparative study of endoscopy assisted myringoplasty and microscopy assisted myringoplasty done between 2003 to 2006 concluded that surgical outcome of endoscopy assisted myringoplasty was comparable to the conventional microscopic assisted myringoplasty but in terms of cosmetics post-operative recovery the patient in endoscope group had better result.[9]

Karchuketo TS studied the endoscopic assisted myringoplasty in 30 ears of 29 patients with different sized perforation & concluded that the post-operative air bone gap was less than 10 dB in 90% cases.[10] Hence endoscopic assisted myringoplasty is reliable and simple procedure with the benefit of minimal trauma to the healthy tissue.

Ahmed El- Guindy (Tanta, Egypt), has evaluated the role of the rigid endoscope in the management of 36 cases of dry central perforation of the tympanic membrane.[11] The graft take rate was 91.7% and air bone gap was closed to less than l0dB in 83.3%. In our study graft uptake rate was (93.3%) better than his study.

6.67% developed the complication. Comparing the complications in the patients who got operated by MES and EES technique respectively it showed no statistical significant difference between the two (p value of 1 which is more than 0.05).

Similar observations were made in two separate studies by Tarabichi M and Usami S, Iijima N, Fujita S et al.[12,13] With angled endoscopes, it is possible to visualize other structures like round window niche, eustachian tube orifice, Incudostapedial joint etc. that are difficult to observe through the operating microscope. Authors Raj A, Meher R reported similar observations in their study. Endoscopic ear surgery is a one handed technique. The scope has to be held in the left hand and only the right hand is free to operate. This becomes especially cumbersome when there is excessive bleeding. Excessive bleeding can be managed easily in microscope assisted ear surgery where one hand can be used to suck the blood and simultaneously the other hand can be used to operate; but only one hand is available to do both the jobs in endoscopic ear surgery. We confirm these observations which were reported in studies by Tarabichi M and Karhuketo TS, Ilomaki JH, Puhakka HJ.[12] This problem can be solved by developing or use of a stand for the scope which will fix it in the desired position so that both the hands will be free to operate. Another disadvantage of the endoscope is that even a small amount of blood can totally obscures the view of the operating field by soiling the scope. Meticulous haemostasis is therefore a must in endoscopic ear surgery. We found that it was difficult to operate directly off the endoscope. It produced neck strain and backache. Therefore at all times we used the monitor. For this, the camera had to be fixed to the scope. This increased the weight of the scope, thereby producing left arm fatigue. This disadvantage of the endoscope can also be solved by developing a stand for the scope. Endoscope provides monocular vision which leads to loss of depth perception compared to the binocular vision

provided by the microscope.[14] Therefore we were extra careful to ascertain that the graft had been lifted enough to make contact with the edges of the perforation. The difficulty associated with the loss of depth perception will be noticed more by a beginner. For an experienced endoscopic sinus surgeon there will be no difficulty. Endoscopic ear surgery requires investment in endoscope, camera and monitor. But for a surgeon doing endoscopic sinus surgeries, there will be no added cost as the same scope can be used for ear surgeries as well. Savlon is routinely used as a defogging agent in endoscopic ear surgeries. Safety of Savlon in the middle ear has not been established. More studies need to be done to evaluate the absorption of Savlon through the round window niche and its subsequent effect.

CONCLUSION

The graft uptake, hearing improvement, Complications produced by each of the techniques in large, subtotal, and anterior moderate perforations by each technique is comparable i.e. both techniques have same results.

Recommendation

The telescopic, wide angle, magnified view of the endoscope overcomes most of the disadvantages of the microscope. In our study, the success rate of endoscope assisted myringoplasty was comparable to that of microscope assisted myringoplasty. In terms of cosmesis endoscope produced superior results without added expenditure. Loss of depth perception and one handed technique are some of the disadvantages of the endoscope that can be easily overcome with practice.

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

REFERENCES

1. Kumar N, Chilke D, Puttewar MP. Clinical Profile of Tubotympanic CSOM and Its Management With Special Reference to Site and Size of Tympanic Membrane Perforation, Eustachian Tube Function and Three Flap Tympanoplasty. Indian Journal of Otolaryngology and Head & Neck Surgery. 2012;64(1):5-12.
2. Dennis SP. Endoscopic assisted middle ear surgery In: Glasscock ME III, Gulya AJ, editors. Surgery of the ear. 5th ed. Hamilton: Elsevier; 2003: 325-334.
3. Patil RN. Endoscopic tympanoplasty-Definitely advantageous (preliminary reports). Asian Journal of Ear, Nose and Throat. 2003;1:25.
4. Tarabichi M. Endoscopic transcanal middle ear surgery: Indian Journal of Otolaryngology Head Neck Surg. 2010;62(1):6-24.
5. Mc Kennan KX, Endoscopic "second look" Mastoidectomy to rule out residual epitympanic mastoid cholesteatoma. Laryngoscope. 1993;103:810-4.
6. Thomas JH, Tanyeri H. surgical technique to facilitate endoscopic second look Mastoidectomy. Laryngoscope. 1999;109:1023-7.
7. Yadav SPS, Agarwal N, Julaha M, Goel M. endoscope assisted myringoplasty. Singapore med J. 2009;50(5):510-2.
8. Raj A, Meher R Endoscopic transcanal myringoplasty: A study. Indian journal of otolaryngology and head and neck surgery. 2001;53(1):47-9.
9. Harugop AS, Mudhol RS, Godhi A. Comparative study of endoscope assisted myringoplasty and microscope assisted myringoplasty. Indian Journal of Otolaryngology and Head & Neck surgery. 2008;60(4):298-302.
10. Karchuketo TS, Ilomäki JH, Puhakka HJ. Tympanoscope-Assisted Myringoplasty. ORL. 2001;63:353-8.
11. El Guidy A. Endoscopic transcanal myringoplasty. J Laryngol Otol. 1992;106:493-5.
12. Tarabichi M. Endoscopic middle ear surgery. Ann Otol Rhinol Laryngol. 1999;108:39-46.
13. Usami S, Lijima N, Fujita S, Takumi Y. Endoscopic-Assisted myringoplasty. ORL. 2001;63:287-90.
14. Glasscock, Shambaugh. Tympanoplasty. In: Glasscock and Shambaugh, eds. Surgery of the Ear. 5th edition. 2003: 350-370.

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