

Retrospective study of outcome of endoscopic transcanal myringoplasty using 0* nasal endoscope

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Abstract

Background: Myringoplasty is a very commonly done surgery in the field of otology. The endoscope is a new tool in the ear surgeon's basket. By the use of nasal endoscope in myringoplasty, revolutionary changes occurred in the field of otology with a very satisfying results. **Aim:** To evaluate the advantage of using 0* nasal endoscope for transcanal myringoplasty. **Study Design:** Retrospective study. **Methods:** A total of 100 patients underwent transcanal myringoplasty were included and followed up for a period of 6 months. **Statistical Analysis:** Chi-square test. **Results:** The wide angled, magnified and having a telescopic view of the 0* rigid nasal endoscopes certainly has a role in transcanal approach in myringoplasty especially in medium sized perforations. **Conclusion:** The graft uptake rate and hearing improvement using the endoscopic transcanal technique provides good results in terms of post-operative recovery and cosmesis.

Key Words: nasal endoscope.

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INTRODUCTION

Myringoplasty is one of the commonest operations performed on the middle ear. Over the last hundred years continued efforts have been made by otologists all over the world to attain perfect surgical outcome. Over the past few years now the endoscope has been used increasingly for otological inspection and surgery. Endoscopic or endoscope assisted myringoplasty is being performed increasingly by various surgeons for the past 10-15 years. The use of a 0*rigid nasal endoscope along with video camera and tvmonitor formyringoplasty has many advantages. It enables the surgeon to have a change of view from close angle to wide angle. Surgeon will be having an all-around vision. Endoscopic myringoplasty follows the minimally invasive surgical principle. So a

study was conducted in which 100 patients undergone endoscopic transcanal myringoplasty and the results and observations are discussed.

MATERIALS AND METHODS

A Retrospective study was conducted in about 100 patients attending ENT OPD with chronic suppurative otitis media mucosal disease during the period of august 2015-august 2016.

Inclusion Criteria: 15-40 years of age both sexes and Patients with small, medium and subtotalcentral perforation, Usage of temporalis fascia graft, Only underlay technique myringoplasty with no ossicular reconstruction and No evidence of active infection in nose, throat and paranasal sinuses.

Exclusion Criteria: Patients with total and attic perforation, Patients with sensorineural hearing loss and Revision cases.

Methodology

This prospective study was conducted in our tertiary care institute from august 2015 to august 2016 in 100 patients. Patients who were attending ENT OPD with complaints of ear discharge with hearing loss were assessed. The criteria for dry ear is taken as 6 months without discharge. Those patients were screened. Those patients with above said inclusion criteria were taken up for study after getting written and informed consent. According to the

quadrants occupied the size of the perforation were determined. The site of the perforation as anterior is taken with the handle of malleus as a landmark when more than seventy five percent of the perforation is found to be anterior to malleus handle and posterior when it involves posterior to handle of malleus. Degree and type of hearing loss were assessed by Tuning Fork Tests (TFT) clinically. PTA (Pure Tone Audiometry) was done. Pure tone average was calculated from the speech frequencies of 500 Hz, 1000 Hz and 2000 Hz respectively and A-B (Air-Bone) gap was also noted at the same frequencies. All cases were operated by visualizing through the monitor. A 17 cm long, 4 mm diameter, zero degree Hopkin's rod rigid nasal endoscope was used. All the cases were done under local anaesthesia using 1% xylocaine in 1:1,00,000 adrenaline. The patient is given premedication with 1ml of Fortwin and 1ml of Phenergan and 1ml of atropine which was given intramuscularly 45 minutes before surgery. All the cases were done through transcanal route. All the cases were done only with 0* nasal endoscope and at no point of time the operating microscope was used. Temporalis fascia is harvested in all the patients by making an incision of 2 cm in the hairline just above the helical region and its made to dry. First the size and site of the perforation was assessed using the endoscope and a four quadrant infiltration with local anaesthetic agent 1% xylocaine in 1:1,00,000 adrenaline was given 0.5 ml in each quadrant at 3'0, 6'0, 9'0, and 12'0 clock positions. After cleaning the external auditory canal with saline wash the margins of the tympanic membrane is refresh enedusing sickle knife. Tympanomeatal flap elevation using a Rosen's circular knife the tympanomeatal flap is elevated by making an incision 2 mm from the tympanic annulus superiorly from 12'0 clock and inferiorly from 6'0 clock and its connected laterally. The flap is elevated up to the fibrous annulus and using sickle knife the middle ear mucosa is incised from the annulus. Handle of malleus is skeletonised by sharp dissection. The ossicular continuity is checked by noticing the round window light reflex. The temporalis fascia which was already kept ready in a dried form and it was shaped to an appropriate size and was kept medial to the fibrous annulus in an underlay fashion. No middle ear gelfoam was kept in this study. The repositioning of the tympanomeatal flap is done. Antibiotic soaked small ear gauze was kept in the canal carefully and the mastoid dressing was applied. The patients were followed up at the first week, then at the first month, and then at the third and sixth month. Using the nasal endoscope with video camera and tvmonitor the patients were examined for the intactness of the graft during the visit. PTA were done at the end of first and the sixth month.

RESULTS

1. In this study of 100 patients there are 45 males (45%) and 55 females (55%)
2. The age limit among them is minimum of 15 years and maximum of 40 years with a mean age of 28.36 with a standard deviation of 7.69
3. In these 100 patients who undergone endoscopic transcanal myringoplasty 88 cases (88%) had intact graft and in 12 cases (12%) there was failure of the graft uptake at the end of 1st month of post-operative period. At the end of 6th month also the results were same.

So there was no significant difference in graft uptake in between 1st and 6th month of post-operative period. Reperforation occurred in all those 12 failure cases (12%). There were 21 cases of small perforations (21%) and 59 cases of medium sized perforations (59%) and 20 cases of subtotal perforations (20%). In this study the more cases were of medium sized perforations. In total 21 small perforation cases the graft was intact in 18 cases with a success rate of 85 %. In 59 cases of medium sized perforation the graft uptake was good in 56 cases with a success rate of 94 %. In the 20 cases of subtotal perforation the graft was intact in 14 cases with a success rate of 70 %. So there is a significant success rate in small and medium sized perforation when compared with the success rate in subtotal perforation. There was no significant difference in between 1st and 6th post-op month in between these groups. Hence in endoscopic technique using 0* nasal endoscope overall within these groups there was a significant success rate in cases of medium sized perforation. In the 100 cases of CSOM 27 cases presented with anterior perforation (27%) and 56 cases presented with posterior perforation (56 %) and 17 cases presented with perforation occupying all quadrants (17%). In these 27 cases of anterior perforation the graft was intact in 24 cases with a success rate of 89 %. In total of 56 cases of posterior perforation the graft uptake noticed in 53 cases with a success rate of 95 %. In the remaining 17 cases of perforation involving all quadrants the graft was intact in 11 cases with a success rate of 65 %. There was a significant success rate noticed in graft uptake in anterior and posterior perforations and there was no significant success rate in all quadrant perforation cases. So in endoscopic technique there was a significant success rate in anterior and posterior perforation cases. There was no significant difference in graft uptake in between 1st and 6th month of post-operative period. Middle ear mucosal status of these 100 patients were examined and normal middle ear mucosa was seen in 90 cases (90%) and the abnormal i.e. hypertrophied and edematous middle ear mucosa was seen in 10 cases (10%). In the total sample of 100 patients, the Middle Ear

Mucosal Status (MEMS) was found to be normal in 90 patients and in these 85 cases had an intact graft with a success rate of 94 %. In the remaining 10 cases the MEMS was found to be abnormal and in these group the graft was intact in 3 cases with a success rate of 30 % with a p value of 0.000 i.e. < 0.05. There was a significant difference in success rate in between these 2 groups. So endoscopic technique in our study gives better results in dry ear. There was no significant difference in graft uptake in between 1st and 6th month of post-operative period. So in cases of CSOM with dry perforation i.e. the normal middle ear mucosa the graft uptake was found to be better than those cases of abnormal middle ear mucosa. Alan *et all* during the study in the ear of 1982 with 206 patients had a success rate of 89 %. In that 206 patients 164 ears were found to have normal middle ear mucosa with a success rate of 91% while the other 42 patients had abnormal middle ear mucosa with a success rate of 70%. This was comparable with our study depicting that the status of the middle ear mucosa had an influence on the take-up rate of the graft. The mean PTA in the pre-operative period (PRE-OP) was 33.88 with a standard deviation of 2.50. The mean PTA in the post-operative period (POST-OP 1) was 24.52 with a standard deviation of 4.79 during the 1st month and 24.46 with a standard deviation of 4.80. There was a significant improvement in post-op PTA to that of pre-op PTA in both 1st and 6th month. The p value was 0.000 i.e. < 0.05. But there was no significant improvement difference in post-op PTA in 1st and 6th month. The mean pre-operative PTA in small perforation is 31.38 with a standard deviation of 2.22 and for medium perforation is 33.80 +/- 1.47 and for subtotal perforation its 36.75, +/- 2.29. The mean post-op PTA is 23.10 +/- 4.54 for small perforation and 23.81 for medium sized perforation and 28.10 for subtotal perforation. So there was a significant improvement in between pre-op and post-op PTA in all sizes of perforation with a significant p value of 0.000 i.e. < 0.05. But when compared within the groups the mean PTA in between pre-op and post-op was found to be better in medium sized perforation with a p value of 0.001 i.e. < 0.05 So in endoscopic transcanal myringoplasty using 0* nasal endoscope the medium sized perforations had a good improvement in hearing threshold. The mean pre-operative ABG in small perforation is 20.48 +/- 1.80 and 21.98 +/- 1.43 for medium sized perforation and for subtotal perforation its 24.25 +/- 2.12. The post-op mean ABG in small perforation is 13.19 +/- 4.02 and for medium sized perforation it is 13.75 +/- 3.25 and for subtotal perforation its 17-30 +/- 5.35. There was a significant improvement in ABG closure in medium sized perforation when compared with small and subtotal perforation with a significant p value of 0.001 i.e. < 0.05.

But there was no significant improvement in ABG in between the first and sixth month of the post-operative period in all cases of perforation.

ABG Closure

In these 100 patients, the A-B gap closure was < 5 dB in 1 case and 5-10 dB In 15 cases and > 10 dB in 2 cases and no improvement in 3 patients with small perforation. In cases of medium sized perforation < 5 dB closure in 5 cases and 5-10 dB in 37 cases and > 10 dB in 11 patients and no improvement in 6 cases. In subtotal perforation cases there was no improvement in A-B gap closure in 6 cases and < 5 dB closure in 1 case, 8 cases with 5-10 dB closure and > 10 dB closure occurs in 5 patients. So overall there was a < 5 dB A-B Gap closure in 7 cases (7%) and 5-10 dB closure in 60 cases (60%) and > 10 dB A-B Gap closure in 18 cases. So there was an overall improvement of hearing in 85 cases (85 %) with failure in 15 cases (15%). Also there was no significant difference in the hearing status in between 1st and 6th post-operative month.



Figure 1: Diagram showing status of the graft uptake

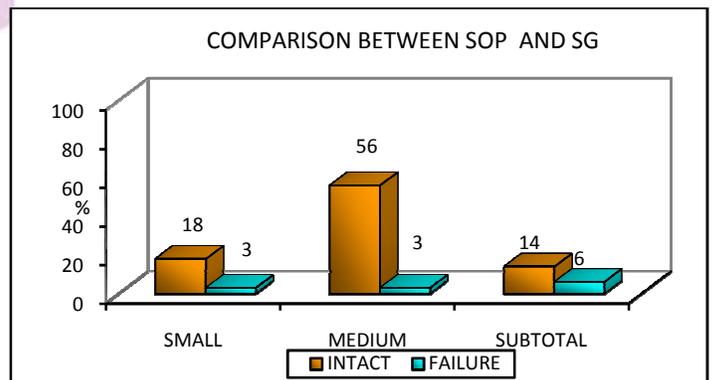


Figure 2: Diagram showing the comparison between size of the perforation and status of the graft uptake

Table 1: Showing comparison of site of perforation and the status of the graft uptake percentage after 6 months of post-op period

Site of perforation	Status of the graft	POST-OP 6	Total
	Intact	Failure	
Anterior	24 (89 %)	3 (11 %)	27
Posterior	53 (95%)	3 (5%)	56
All	11 (65 %)	6 (35%)	17

The mean PTA in the pre-operative period (PRE-OP) was 33.88 with a standard deviation of 2.50. The mean PTA in the post-operative period (POST-OP 1) was 24.52 with a standard deviation of 4.79 during the 1st month and 24.46 with a standard deviation of 4.80 in the 6th month.

Table 2:

PTA	Mean	Std. Deviation	P Value
PRE-OP	33.88	2.50	
POST-OP 1	24.52	4.79	0.000
POST-OP 6	24.46	4.80	0.000

Table 3:

SOP	PTA	mean	Std. deviation	P VALUE
SMALL (21 cases)	Pre-op	31.38	2.22	0.000
	Post-op 1	23.10	4.54	
	Post-op 6	23.10	4.54	
MEDIUM (59 cases)	Pre-op	33.80	1.47	0.000
	Post-op 1	23.81	3.49	
	Post-op 6	23.73	3.50	
SUBTOTAL (20 cases)	Pre-op	36.75	2.29	0.000
	Post-op 1	28.10	6.58	
	Post-op 6	28.05	6.60	

The mean pre-operative PTA in small perforation is 31.38 with a standard deviation of 2.22 and for medium perforation is 33.80 +/- 1.47 and for subtotal perforation its 36.75, +/- 2.29. The mean post-op PTA is 23.10 +/- 4.54 for small perforation and 23.81 for medium sized perforation and 28.10 for subtotal perforation.

Table 4:

SOP	ABG closure (no. of cases)	ABG closure (no of cases)	ABG closure (no. of cases)	ABG closure (no. of cases)	Total
	0 dB	< 5 dB	5 -10 dB	>10 dB	
SMALL	3	1	15	2	21
MEDIUM	6	5	37	11	59
SUBTOTAL	6	1	8	5	20

Overall there was a < 5 dB A-B Gap closure in 7 cases (7%) and 5-10 dB closure in 60 cases (60%) and > 10 db A-B Gap closure in 18 cases. So there was an overall improvement of hearing in 85 cases (85 %) with failure in 15 cases (15%). Also there was no significant difference in the hearing status in between 1st and 6th post-operative month.

DISCUSSION

Endoscopic transcanalmyringoplasty using 0* nasal endoscope with video camera and tv monitor is carried out in our study in 100 patients and the results and observations are discussed here. Our study is compared with the studies done previously by others. In this study the rigid endoscope permit us to have a close inspection of the ear drum perforation and its edges, the status of the middle ear mucosa. Age or sex of the patients does not have a significant influence in the success rate of the graft uptake in our study. In our study the overall graft take up rate was found to be 88 % and for small perforations it was 85 % and for medium sized perforations it was 94 % and for subtotal perforations it was 70%. So in myringoplasty using 0* nasal endoscope there was a significant success rate in cases of medium sized perforations when compared to the small and subtotal types. In cases of anterior and posterior perforation the graft uptake was 89% in anterior type while it was 95% in posterior perforations. So there was not a very significant difference although there was a slight increase in success rate in posterior perforation cases. The middle ear mucosal status also does have a significant influence in the success rate of the graft uptake in our study. There was a 94% success rate in patients with normal middle ear mucosa when compared to a 30% success in cases with abnormal middle ear mucosa. There was also no significant difference in the uptake of the graft in between 1st and 6th post-operative month in all types of variables discussed here. Since in our study we didn't come across any post-operative occurrence of cholesteatoma during the follow-up, this technique permits one to have a good look into the tympanic cavity and the possibility of creating iatrogenic cholesteatoma is completely excluded. There was an average 5-10 dB of hearing improvement in 60% of cases in our study and 18% cases have a hearing improvement more than 10 dB and less than 5 dB improvement in 7 % cases. So there was an overall 85% hearing improvement in the study of 100 patients. There was a 15% of cases who did not have hearing improvement at all. Among all the types of perforation there was a significant improvement in hearing in medium sized perforation. The time taken for the endoscopic technique is an average of 120 minutes with a range 80-160 minutes. Post-operatively patients returned to normal activity in an average of 2.2 days. Patients don't have obvious cosmetic problems since the incision made for harvesting of graft is very small. The above mentioned results are comparable to the studies that were conducted earlier. Ahmed El-Guindy who is from Egypt conducted a study in 36 patients who had CSOM with central dry perforation. In his study the graft take up rate were found to be 91.7 % which was comparable to ours

of 88%. The ABG closure was found to be < 10 dB in 83.3 % cases which was comparable to ours. Before the operation along with endoscope he used tubal manometry to evaluate the Eustachian tube function. Anoop Raj, Ravi Meher *et al* studied 20 cases of CSOM with central perforation and the patients were followed up for 10 weeks. They had a graft take up rate of 90%. There was residual perforation noted in 3 patients. They had graft failure in 5 cases. The mean A-B Gap closure in this study was 8 dB which is comparable to our study. Karhuketo *et al* conducted a study in 2001 in 29 patients and achieved graft take up rate of above 90% and a hearing improvement in more than 90% cases. He concluded that endoscopic transcanalmyringoplasty is a simple and reliable day care procedure with the advantage of less trauma to the healthy tissue and has a very good success rate of tympanic membrane closure and post-operative hearing outcome. In 2001, Usami *et al* carried out the same technique in 22 cases and concluded that the hearing outcome and the graft uptake rate was satisfactory in his study with a success rate of nearly 90%. Harugop *et al* conducted a study in between 2003 to 2006 in 100 patients of which 50 patients underwent endoscopic myringoplasty. They had a success rate of 82% in terms of closure of the perforation and hearing outcome which was comparable with our study. Yadav *et al* conducted endoscopic transcanalmyringoplasty in 50 patients during the year 2009. In their study in terms of closure of perforation the success rate was 80% and hearing improvement was also 80%. This study was done with the aim of evaluating the outcomes of the myringoplasty using 0* nasal endoscope with video camera and tv monitor and highlighting its advantages and its limitations. So the role of nasal endoscope has a definite place in myringoplasty.

CONCLUSION

The wide angled, magnified and having a telescopic view of the 0* rigid nasal endoscopes certainly has a role in transcanal approach in myringoplasty. The graft uptake rate were 88% and hearing improvement was 85%. The endoscopic transcanal technique provides good results in terms of post-operative recovery and cosmesis. Since it's a portable device the endoscope can be carried to remote places for surgical procedure. One handed technique and limited depth perception are some of the limitations of this procedure and with practice it can be easily overcome. Sex or age does not have a significant role in the outcome of the procedure. The overall graft uptake and hearing improvement were better in medium sized perforations indicating that perforation size does have some role in the results of the procedure. The conclusion

we draw from the conducted study is that for myringoplasty through transcanal route the 0* nasal endoscope can be used successfully with a reasonable success rate both in terms of hearing improvement and closure of the perforation with very minimal exposure.

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