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A Comparative Study of Endoscopic And Microscopic Approach Tympanoplasty for Simple Chronic Otitis Media

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Abstract
Objective: *To determine the advantages and disadvantages of the endoscope as compared to the microscope inmyringoplasty surgery and to compare the results of both groups.*
Methods: *Between March 2014 and March 2015, 60 patients underwent myringoplasty, 30 were endoscope assisted and 30 were microscope assisted. Results of surgery were compared at the end of six months post operation. The difference between the perforation condition was not significant ineither group.*
Results*: In both groups, the postoperative air–bone gap (ABG) was significantly lower than the preoperative ABG. There were no significant differences between the preoperative and postoperative ABG values (in dB) in either group. The mean operative duration in Group 1 was significantly lower than that in Group 2 .. The difference between the perforation conditions (larger vs. smaller) was not significant in either group.*
Conclusion: *The endoscopic approach for tympanoplasty offer superior visualization and shorter operative time than conventional surgery ,in addition to equal hearing outcome and perforation rate.Furthermore observation of fewer tissue injuries better outcome, and lesser perioperative nausea and vomiting suggest that the endoscopic is abetter choice for surgery*

I. Introduction

Tympanoplasty is surgical procedure used to eradicated the disease of midlle ear and reconstruction the ear drum. The advent of operating microscope result of myringoplasty started showing dramatic improvement .This is attributed to the accuracy of surgical technique Myringoplasty is a surgical procedure performed to close tympanic membrane perforations.. Major disadvantage of operating microscope is that it provides a magnified image along a straight line which limit the visual field in deep recess of middle ear .Endoscopic ear surgeryis an emerging technique with recent literature highlighting advantage over traditional microscopic approach. It provide an excellent magnified image with good resolution.

With minimal effort it an be visualised corners of middle ear cavity. Magnification can be achieved by just getting the endoscope closer to surgical field. Middle ear cavity can be visualised easily using an endoscope. Even difficult area to visualised undermicroscope like sinus tympani can be easily be examined using an endoscope. Therefore, middle ear surgery is increasingly being performed endoscopically.
In this study we compared the result of hearing improvement ,operation duration ,perforated case after 6month follow up period for patients who recived endoscopic and microscopic type 1 tympanoplasty . we then evaluated whether the endoscopic approach over conventional surgery.

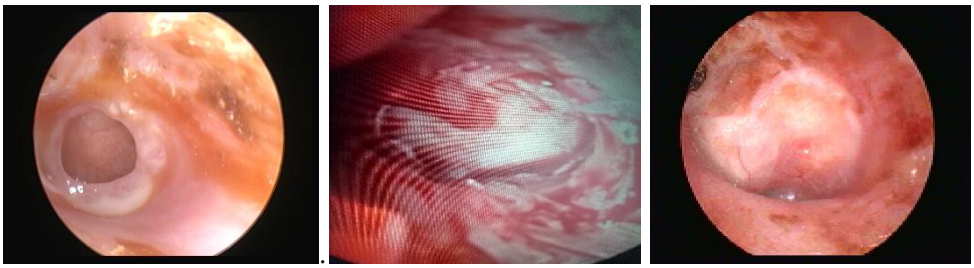
II. Material & method

Inclusion criteria
1 Patients in the age group of 15 -60 were included in the study .
2. All these patients had dry central perforation of ear drum .
3. Patients with demonstrable degree of conductive deafness was chosen (at least 30 dB pure tone average) .
4. Results of this procedure was compared to that of published results of microscopic myringoplasty .

Exclusion Criteria
1 . Csom With Cholestatoma
2 SNHL Type hearing loss

The patients were divided into two groups according to the surgical procedure they received. Group 1 underwent conventional microscopic tympanoplasty and Group 2 underwent endoscopic tympanoplasty. We analysed the demographic data, preoperative and postoperative pure tone audiometry and tympanogram results, surgical approach (endoscopic or microscopic), and operative duration. Postoperative follow-up evaluations were performed after 1, 3, and 6 months; they included pure tone audiometry, tympanometry, and endoscopic or

microscopic evaluation of the status of the graft. Hearing thresholds, including air conduction threshold and bone conduction threshold, were evaluated by the averages at 0.5, 1.0, and 2.0 kHz. The air-bone gap (ABG) was also calculated in each examination. The tympanoplasty procedure performed under general Anaesthesia. In group 1 microscope. was used and a post-auricular approach was employed. The temporal muscle fascia was harvested at the beginning of the operation, and the "underlay" graft was placed medial to the maleus. In Group 2, an endoscopic system and rigid endoscopes (2.7 mm and 4.0 mm)were used for this approach. After freshening the margin of the tympanic membrane perforation, an incision was made laterally in the posterior and inferior parts of the external auditory canal (about 5 to 10 mm from the tympanic membrane). A tympanomeatal flap was elevated, and the middle ear cavity was visualized. A piece of perichondrium graft was taken from the tragus and was stretched and pressedAfter preparation, the underlay graft was placed as in Group1



1. 2. 3.

1. preoperative endoscopic view of Tympanic membrane 2. During operative 3.Postoperative View

III. Result

The demographic characteristics and clinical findings of Groups 1 and 2 are shown in Table 1. In total, 30 ears (16 men and 14women) were subjected to the microscopic approach, and 30ears (13 men and 17 women) were subjected to the endoscopic approach. The mean age of the patients was 49.9±15.0 years in Group 1 and 54.2±15.6 years in Group 2. According to an independent samples t-test, there were no significant differences in the ages of the patients between Groups 1 and 2 (p=0.1687).

Preoperatively, the air conduction levels of the pathological ears in Group 1 and Group 2 were 44.0±21.9 dB and 44.4±20.6 dB, respectively. There were no significant differences between the two groups (p=0.9253). The bone conduction levels of the pathological ears in Group 1 and Group 2 were 22.6±17.0 dB and 22.8±15.2 dB, respectively. There were no significant differences between the two groups (p=0.9507). The ABGs were 21.4±10.6 and 21.6±11.2, respectively. There were no significant differences between the two groups (p=0.9270).

Postoperatively, the improvements in the air conduction level of the pathological ears in Group 1 and Group 2 were 9.5±8.6 dB and 9.5±8.6 dB. There were no significant differences between the two groups (p=1.0000). The improvements in the bone conduction level of the pathological ears in Group 1 and Group 2 were 1.2±7.8 dB and 0.6±7.0 dB. There were no significant differences between the two groups (p=0.6865). The improvements in ABG were 8.3±10.0 dB and 8.9±10.0 dB, respectively. There were no significant differences be-tween the two groups (p=0.7641).

We analyzed the tympanograms and separated the ears into two groups: Type A/C and Type B. Preoperatively, there were 2 Type A/C ears and 28 (94%) Type B ears in Group 1, and 6 (12%) Type A/C and 44 (88%) Type B ears in Group 2. There were no significant differences between the two groups by chi-square test (p=0.2945). Postoperatively, there were 42 (84%) Type A/C ears and 8 (16%) Type B ears in Group 1, and 36 (72%) Type A/C and 14 (28%) Type B ears in Group 2. There were no significant differences between the two groups by Chi-square test (p=0.1475).

The average operation time in Group 1 was 75.5±20.4 minutes, com-pared to 50.4±13.4 minutes in Group 2. The operation time in Group 2 was significantly shorter than that in Group 1 based on an independent samples t-test (p<0.0001).

In Group 1, 34 (68%) and 22 (44%) patients experienced perioperative nausea and vomiting, respectively, compared to 18 (36%) and 6 (12%) patients in Group 2. The chi-square test showed significantly lower rates of nausea and vomiting in Group 2; the p values were 0.0025 and 0.0006, respectively. During the follow-up period (>6 months), there was one (2%) perforation in Group 1 and one (2%) in Group 2. Both patients received a second operation with the same primary technique; however, the data were not included in this study.

Table 1. Demographic characteristics and outcomes of Groups 1 and 2

	Microscopic (Group 1) (30 ears)		Endoscopic (Group 2) (30 ears)		P VALUE

Number of patients	30 (16 men, 14 women)		30 (13 men, 17 women)		
Left /Right	2OLEFT/10 RIGHT		25LEFT/5RIGHT		0.4177
Age (mean±SD)	49.9±15.0		54.2±15.6		0.1687
Preoperative (pathological ear)					
Air conduction (mean±SD)	44.0±21.9		44.4±20.6		0.9253
Bone conduction	22.6±17.0		22.8±15.2		0.9507
Air-bone gap [n (SD)]	21.4±10.6		21.6±11.2		0.927
Tympanogram [n (%)]	A/C	B	A/C	B	0.2945
	2	28	3	27	
Postoperative (>6 months) (pathological ear)					
Air conduction improvement (mean±SD)	9.5±8.6		9.5±8.6		1
Bone conduction improvement	1.2±7.8		0.6±7.0		0.6865
Air-bone gap improvement (mean±SD)	8.3±10.0		8.9±10.0		0.7641
Tympanogram (mean±SD)	A/C	B	A/C	B	0.1475
	26	4	25	5	
Operation duration (minutes) (mean±SD)	75.5±20.4		50.4±13.4		<.0001
Perioperative nausea [n (%)]	Yes	No	Yes	No	0.0025
	34 (68)	16 (32)	18 (38)	30 (62)	
Perioperative vomiting [n (%)]	Yes	No	Yes	No	0.0006
	22 (44)	28 (56)	6 (13)	42 (87)	
Graft condition					
Perforated case [n (%)]	1 (2)		1 (2)		1

IV. Discussion

The main objective of csom is to achieve symptomatic relief , relieve drainage ,rehabiliting hearing and minimize complication .Many ENT surgeon perform tympanoplasty under an operating microscope .. The main advantages of the microscopic approach are stereo vision and bimanual handling. However, despite providing direct exposure, microscopes require frequent adjustment and may still not be suf-ficient when encountering protruding structures, particularly the anterior wall.microscope. Hidden area that cannot be seen under microscope can be better observed via thin rigid endoscope with different angles. In the endoscope allow for functional reconstructionduring surgery and the performance of minimally invasive procedure and conservative surgeries with protection of the anatomy.

The advantages of the endoscopic approach also include a decrease in the operative time, which results in a decrease of the duration of anesthesia and related side effects, and a lower effect on the sur-geon's concentration. In a study by Ghaffar et al. [6], the mean oper-ative time was 62.85 minutes among 34 patients who underwent endoscopic tympanoplasty. In our study, the mean operative time among the 30 ears that received the endoscopic approach was 50.4 minutes, compared to 75.5 minutes for the microscopic approach; this shows a significant differenceThe endoscopic approach gives results equal to those of the microscopic approach in terms of the cosmetic appearance, pain level, and dressing requirement. However, this procedure has several disadvantages, including a lack of sufficient microscopic magnification and focus, the need to perform one-handed operations because the surgeon must use one hand to hold the endoscope, frequent contamination of the surgical site secondary to bleeding, and instrument crowding within the surgical area..

Karhuketo et al. emphasized that the use of endoscopic methods in ear surgery fulfills the requirements of minimally invasive surgery, and the least trauma to the normal tissues can be achieved in this way. Lade et al. compared 60 patients undergoing myringoplasty (type 1 tympanoplasty) using either a microscopic or endoscopic procedure. Among the 30 patients who underwent the microscopic method, canaloplasty was performed to evaluate the ossicular system in 5 and external auditory canal curettage was performed in 4 patients. However, none of the 30 patients who underwent the endoscopic procedure required such interventions, and the ossicular system could be assessed easily. They concluded that the results of endoscopic tympanoplasty are similar to those of microscopic tympanoplasty and that endoscopic tympanoplasty is more tolerable in terms of the cosmetic appearance. Thus, this technique was considered a potentialalternative to microscopic tympanoplasty. In the present study, we obtained results similar to those of Lade et al.

In our microscopic procedure, curettage of the chordal crest was performed to assess the ossicular system, and in one patient, canaloplasty was performed due to the prominence of the anterior wall. However, patients who underwent the endoscopic transcanal procedure required no extra interventions involving the external auditory canal.

Ayache reported a graft success rate of 96% in patients undergoing transcanal endoscopic cartilage tympanoplasty, and this procedure was reportedly a minimally invasive, safe, and effective treatment method. The graft success rate in the endoscopic tympanoplasty procedure of the present study was 87.5%.

Gasline et al. performed the classical microscopic approach for cartilage grafting in 42 patients 3–16 years of age and reported a graft success rate of 83.3%. In a study by Albirmawy, the cartilage graft success rate was 95% in 82 children. Nevoux et al. reportedthat their cartilage tympanoplasty success rate was87.3% in 268 patients. In our study, the graft success rate was 87.5% in 32 patients who underwent the endoscopic procedure and 94.3% in those who underwent the microscopic procedure.

Postoperative hearing gain is an important indicator of treatment success in patients who have undergone tympanoplasty. Especially hearing gain is important in terms of the future quality of life. Many studies have reported successful results regarding postoperative hearing gain in such patients. Friedman et al. performed type 1 tympanoplasty in 119 pediatric patients. Using cartilage grafts, the preoperative and postoperative ABGs were calculated to be 20.7 and 8.5, dB respectively. In a study by Yılmaz et al., the ABGs were 30.6 dB preoperatively and 17.8 dB postoperatively in 45 pediatric patients who underwent type 1 cartilage tympanoplasty. In our study, the preoperative and postoperative ABGs were 20.40 and 8.12 dB, respectively, in the endoscopic tympanoplasty group and 21.34 and 8.13 dB, respectively, in the microscopic tympanoplasty group.

The duration of the operation is an important parameter in terms of the duration of anesthesia, the surgeon's concentration, and the increased risk of iatrogenic complications. In a study by Ghaffar et althe mean operation duration was 62.85 min among 34 patients who underwent endoscopic tympanoplasty. In 24 of these patients, the operation duration was less than 60 min.

In our study, the operation duration among the 30 patients who underwent endoscopic transcanaltympanoplasty was less than 60 min, and the mean duration among the 32 who underwent endoscopic tympanoplasty was 51.37 min. The mean operation duration was 69.03 min for the preferred approach using micro-scopes. The reason for these differences may be related to the fact that neither suturing nor extra time to view hidden areas is needed during endoscopic procedures.

V. Conclusion

The endoscopic approach for tympanoplasty offers superior visualization and shorter operative times than conventional surgery, in addition to equal hearing outcomes and perforation rates. Other advantages of this surgical technique include a lower rate of tissue injury, better cosmetic outcomes, and lower rates of perioperative nausea and vomiting

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