

COMPARATIVE STUDY BETWEEN ENDOSCOPIC TRANSCANAL MYRINGOPLASTY VERSUS MICROSCOPIC MYRINGOPLASTY IN MIDDLE AGE GROUP (20-40 YEARS)

By

**Hossam Mohammed Esam ,Wael Hassan Abo El-Wafa and Mohammed
Kamel Ibrahim Al-Awady**

Department of Otorhinolaryngology, Faculty of Medicine, Al-Azhar University

ABSTRACT

Background: Myringoplasty (tympanoplasty type I) is usually the treatment of choice for tympanic perforations, whether or not associated with non-suppurative chronic otitis media.

Objective: To determine the advantages and disadvantages of endoscopic as compared to microscopic myringoplasty surgery and to compare the results of both groups.

Patients and methods: This study was carried out at the Otorhinolaryngology Department, Al-Azhar University Hospitals. The study included 40 patients. The age of all patients was between 20 - 40 years old with a diagnosis of chronic suppurative otitis media of tubo-tympanic type, divided into two equal groups.

Results: The difference in age, gender, side of diseased ear and size of perforation between the two groups was not significant. In group (A) the circumference of the perforation was clearly visualized in all patients, while in group (B) the circumference of the perforation could not be visualized in 35% of patients. 25% required external auditory canal curettage and 10% required endoscope assisted microscopic myringoplasty to evaluate the ossicular chain. The difference between the 2 groups was significant. The graft was obtained from the tragal cartilage. In endoscopic group, the graft was uptaken in 85% of patients, while in microscopic group the graft was uptaken in 80% of patients with no statistical significant difference between the two groups.

Conclusion: Comparison of microscopic and endoscopic views revealed superior visualization of the endoscopic approach as opposed to microscopic myringoplasty as endoscopic myringoplasty can be performed, regardless of the perforation size and the narrowness and/or protrusion of external ear canal. So, external auditory canal curettage and canalplasty can be avoided in endoscopic technique.

Key words: Myringoplasty, endoscopic, microscopic.

INTRODUCTION

Myringoplasty (tympanoplasty type I) is usually the treatment of choice for tympanic perforations, whether or not associated with non-suppurative chronic otitis media (*Tawab et al., 2014*). The surgical goal is the total closure of the perforation and secondly, an improvement of auditory thresholds (*Hong et al., 2013*).

In the last decade, there has been an increase in the use of endoscopes in otologic surgery, not just as an adjunct method, but exclusively (*Ayache, 2013*).

Though endoscopes were mainly introduced for sino nasal surgeries, its use is no more restricted to nasal surgeries with surgeons using the scopeto access

other areas like ear, larynx, skull base (*Mohindra and Panda, 2010*).

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 visualise the deep anterior canal wall, anterior recess, anterior marginal perforations, sinus tympani, fascial recess, hypotympanum and the attic (*Patil et al., 2015*).

The view during microscopic surgery is defined and limited by the narrowest segment of the ear canal, whereas transcanal endoscopy bypasses the narrowest ear canal and provides a wider view, even when a 0° endoscope is used (*Tarabichi et al., 2013*).

The present work aimed to compare between edoscopic and microscopic myringoplasty.

PATIENTS AND METHODS

This study was carried out at the Otorhinolaryngology Department, Al-Hussin and Bab-Alsharia University hospitals. The study included 40 patients. The age of all patients was between 20 - 40 years old with a diagnosis of chronic suppurative otitis media of tubo-tympanic type, divided into two equal groups:

Group A were operated using the endoscope-assisted myringoplasty.

Group B were operated using microscopic myringoplasty.

All patients have given informed written consents.

Inclusion Criteria:

1. Patients having small, medium and large (subtotal) dry perforation of tympanic membrane.
2. Patients having chronic suppurative otitis media of tubo-tympanic type.
3. No evidence of infection in nose, paranasal sinuses, nasopharynx and throat.
4. Traumatic perforation.

Exclusion criteria:

1. Patients less than 20 years old or more than 40 years old.
2. Infected ears.
3. Revision Myringoplasty.
4. Patients with chronic suppurative otitis media of attico-antral type (cholesteatoma).
5. Patients with complications of chronic otitis media.
6. Patients with chronic medical diseases as diabetes mellitus, chronic renal or hepatic diseases.

Preoperative assessment:

1. Thorough history taking.
2. Full ENT examination.
3. Hematological investigations (bleeding time, platelet count).
4. Pure tone audiometry.

Patients were discharged on the same day of the surgery. All patients received postoperative antibiotics for at least 7 days

after surgery. Patients were instructed to avoid wetting of the ears, sneezing, constipation and vigorous blowing of the nose.

Postoperative follow-up was performed for at least 2 months. The first postoperative visit was after one week for removal of aural pack and stitches after which antibiotic ear drops were prescribed for one week. Follow up included otoscopic examination of the TM to monitor graft healing. Audio logical assessment (PTA) was done at the end of the second month postoperatively.

In microscopic group, five patients required external auditory canal curettage and 2 patients required using endoscope to assist the microscope in visualization of the edges of the perforation while in endoscopic group no such procedures were needed.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean \pm standard deviation (SD) and

range. Qualitative data were expressed as frequency and percentage. The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Paired sample t-test of significance was used when comparing between related samples.
- Analysis of non-parametric data by Mann-Whitney test displayed as median, interquartile range, minimum and maximum.
- Chi-square (χ^2) test of significance was used in order to compare proportions between qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. P-value was considered significant when it was <0.05 .

RESULTS

The study was done from March 2018 to May 2019. The age of the patients ranged from 20 to 40 years old in all cases, with mean of 31.40 years and standard deviation of 5.95 in group A & mean of 31.85 and standard deviation of 5.76 in group B. There was no significant difference between the two groups regarding the age distribution.

In endoscopic group (group A): males represented 70% (14 cases) and females represented 30% (6 cases) while in

microscopic group (group B): males represented 45% (9 cases) and females represented 55% (11 cases). The difference in gender between the patients was not significant (P value 0.11).

In group (A), the size of perforation was large (subtotal) in 10 patients (50%), medium sized in 6 patients (30%) and small in 4 patients (20%). Meanwhile in group (B), the perforation was large (subtotal) in 12 patients (60%), medium sized in 4 patients (20%) and small in 4

patients (20%). The difference in size of perforation distribution between the two groups was not statistically significant (Table 1).

Table (1): Distribution of patients with respect to age, gender, side and size of perforation in the study groups

Parameters \ Groups	Group A N=20	Group B N=20	P-value
Age in years Mean \pm SD	31.40 \pm 5.95	31.85 \pm 5.76	0.809
Gender: n (%)			0.110
Males	14(70%)	9(45%)	
Females	6(30%)	11(55%)	
Side of diseased ear			0.342
Right	12(60%)	9(45%)	
Left	8(40%)	11(55%)	
Size of perforation			0.525
Large (subtotal)	10 (50%)	12(60%)	
Medium	6 (30%)	4(20%)	
Small	4(20%)	4(20%)	1.000

In group (A) the circumference of the perforation was clearly visualized in all patients (100%) even when the ear canal was narrow or protruding and in patients with subtotal perforation without need for external auditory canal curettage or canaloplasty. While in group (B) the circumference of the perforation could not

be visualized in 7 patients (35%), 5 patients (25%) required external auditory canal curettage and 2 patients (10%) required microscopic myringoplasty assisted by endoscope to evaluate the ossicular chain.

The difference between the 2 groups was significant (Table 2).

Table(2): Visualization of the edges of the perforation

Visualization of the edges of the perforations: n(%) \ Groups	Group A N=20	Group B N=20	P-value
Visualized	20(100%)	13(65%)	0.004
Could not be visualized	0(0%)	7(35%)	
Added procedures			
Curettage	0(0%)	5(25%)	0.017
Microscope assisted by endoscope	0(0%)	2(10%)	0.147

No statistically significant difference between both groups according to air bone

gap (ABG) preoperatively and after 2 months postoperatively (Table 3).

Table(3): ABG of the studied groups:

Groups ABG	Group A N=20	Group B N=20	P-value
Preoperative ABG: mean ±SD	22.85±3.34	23.75±2.90	0.369
Postoperative ABG: median (IQR) min-max	12.5 (10-16.75) 0-27	14 (10-16.5) 0-26	0.714
ABG gain: median (IQR) min-max	8 (6.25-13.75) 1-17	11 (6.75-12) 1-19	0.718
ABG gain percent: median (IQR) min-max	42.7 (27.89-57.38) 3.57-100	46.99 (28.94-54) 4.17-100	0.829

In endoscopic group the graft was up taken in 85% of patients (17 patients) and not taken in 15% of patients (3 patients) while in microscopic group the graft was up taken in 80% of patients (16 patients)

and not taken in 20% of patients (4 patients). There were no significant statistical difference between the two groups (p=0.677) (**Table 4**).

Table (4): Graft taking of the studied groups

Groups Graft taking	Group A N (%)	Group B N (%)	
Taken	17 (85%)	16 (80%)	0.677
Not taken	3 (15%)	4 (20%)	

Regarding complications, there were 3 residual perforations in endoscopic group (15 %) and another 4 residual perforations in microscopic group (20 %). All presented with post-operative infection and irregular follow up. No other

complications reported as SNHL in both groups. So there was no statistically significant difference regarding complications between endoscopic and microscopic groups after 2 months postoperatively (**Table 5**).

Table (5): Complications among the study groups after 2 months postoperatively

Groups Complications	Endoscopic group N. 20	Microscopic group N. 20
Residual perforation	3 (15 %)	4 (20%)
SNHL	0	0

DISCUSSION

Different endoscopes have been used in the performance of ear surgery in general and myringoplasty in particular, and the surgical success of endoscope-

assisted tympanoplasty ranges between 80 and 100% (*Dündar et al., 2014*).

This study was carried out at ENT Department, Al Hussin and Bab Al-Sheria University hospitals on patients with a

diagnosis of chronic otitis media or with traumatic perforations without spontaneous resolution for more than three months prepared for myringoplasty. The aim was to evaluate and compare the advantages, disadvantages and outcomes of endoscopic transcanal myringoplasty as compared to microscopic myringoplasty.

In group (A), the circumference of the perforation was clearly visualized in all patients (100%) without need for external auditory canal curettage or canaloplasty, while in group (B) the circumference of the perforation could not be visualized in 7 patients (35%), 5 patients (25%) required external auditory canal curettage and 2 patients (10%) required microscopic myringoplasty assisted by endoscope to evaluate the ossicular chain. So, there were statistical significant differences between the 2 groups.

In this study, endoscope gave good exposure to the perforation and the middle ear which was similar to observation of *Lade et al. (2014)*. Also, *Migirov and Wolf (2015)* stated that the transcanal microscope-assisted endoscopic myringoplasty had a 100% rate of surgical success. They mentioned that this technique can be especially appropriate for patients with narrow external canals, anterior defects and bone overhang making the perforation margins barely visible under a microscope.

Furukawa et al. (2014) mentioned that the circumference of the perforation could not be confirmed with a microscope before denuding in 12.0% of cases. Furthermore, the entire perforation was not visible in 20.0% of cases after refreshing the edges. In contrast, endoscopy can show the entire tympanic

membrane in one field with clear visualization of the perforation edges, even when the ear canal is narrow or protruding.

In this study, the graft was up taken in 85% of patients and not taken in 15% of patients in group (A), while the graft up taken in 80% of patients and not taken in 20% of patients in group (B). The improvement in the A-B gap showed no significant difference between the two groups.

The present results were in line with those of *Furukawa et al. (2014)* who reported a perforation closure rate of 84.0% and the improvement in ABG was 10.3 dB in transcanal endoscopic myringoplasty. *Ayache (2013)* reported that using cartilage grafts in patients undergoing endoscopic tympanoplasty can achieve a success rate of 96%. With the increasing use of minimally invasive surgery, using an endoscopic approach could fulfill the goal of causing the least amount of trauma to normal tissues (*Özgür et al., 2015*).

According to this study, the disadvantage of the endoscope is a one handed technique. Surgeon has to hold the scope in one hand during all the time while only other hand is free to operate. It was consistent with study of *Patel et al. (2015)* also reported that the major disadvantage of endoscopic approach was the necessity to operate with a single hand. They also stated that any bleeding in the external ear canal made manipulations very difficult and underlined the necessity to achieve total hemostasis in the external ear canal.

In our study, endoscopes allowed us close inspection of the tympanic

membrane perforation, the drum remnant, the eustachian tube orifice, the middle ear mucosa and ossicular chain. The anatomical variations (tortuous or stenotic ear canal, anterior meatal overhang etc.) that hamper the view of entire tympanic membrane during ear surgery were overcome by the use of endoscopes. Endoscope holds the greatest promise in ear surgery in coming days (*Lakpathi and Reddy 2016*).

CONCLUSION

Comparison of microscopic and endoscopic views revealed superior visualization of the endoscopic approach as opposed to microscopic myringoplasty as endoscopic myringoplasty can be performed, regardless of the perforation size and the narrowness and/or protrusion of external ear canal. So, external auditory canal curettage and canalplasty can be avoided in endoscopic technique. Thus, endoscopic transcanal myringoplasty can be a good alternative of microscopic myringoplasty.

REFERENCES

1. **Ayache S (2013):** cartilaginous myringoplasty: the endoscopic transcanal procedure. *Eur Arch Otorhinolaryngol.*, 270: 853 - 60.
2. **Dünder R, Kulduk E, Soy FK, Aslan M, Hanci D and Muluk NB (2014):** Endoscopic versus microscopic approach to type 1 tympanoplasty in children. *Int J Pediatr Otorhinolaryngol.*, 78: 1084–1089.
3. **Furukawa T, Watanabe T, Ito T, Kubota T and Kakehata S (2014):** Feasibility and advantages of transcanal endoscopic myringoplasty. *Otol Neurotol.*, 35: e140-5.
4. **Hong P, Bance M and Gratzer PF (2013):** Repair of tympanic membrane perforation using novel adjuvant therapies: a contemporary review of experimental and tissue engineering studies. *Int J Pediatr Otorhinolaryngol.*, 77:3-12.
5. **Lade H, Choudhary SR and Vashishth A. (2014):** Endoscopic vs. microscopic myringoplasty: a different perspective. *Eur Arch Otorhinolaryngol.*, 271: 1897-1902.
6. **Lakpathi G and Reddy LS (2016):** Comparative study of endoscope assisted myringoplasty and microscopic myringoplasty. *Indian J Otolaryngol Head Neck Surg.*, 68:185-191.
7. **Migirov L and Wolf M (2015):** Transcanal microscope-assisted endoscopic myringoplasty in children. *BMC Pediatrics*, 15:32-35.
8. **Mohindra S and Panda NK (2010):** Ear surgery without microscope; is it possible. *Indian J Otolaryngol Head Neck Surg.*, 62(2):138–141.
9. **Özgür, A., Dursun, E., Erdivanli, Ö. Ç., Coşkun, Z. Ö., Terzi, S., Emiroğlu, G. Ö. K. H. A. N. and Demirci, M. (2015):** Endoscopic cartilage tympanoplasty in chronic otitis media. *The Journal of Laryngology & Otology.*, 129(11): 1073-1077.
10. **Patel J, Aiyer RG, Gajjar Y, Gupta R, Raval J and Suthar PP (2015):** Endoscopic tympanoplasty vs. microscopic tympanoplasty intubotympanic CSOM: a comparative study of 44 cases. *Int J ResMed Sci.*, 3(8):1953–1957.
11. **Tarabichi M, Ayache S, Nogueira JF, Al Qahtani M and Pothier DD (2013):** Endoscopic management of chronic otitis media and tympanoplasty. *Otolaryngol Clin North Am.*, 46:155–163.
12. **Tawab A, Gharib F, ElSharkawy L and Algarf T (2014):** Myringoplasty with and without cortical mastoidectomy in treatment of non-cholesteatomatous chronic otitis media: a comparative study. *Clin Med Insights Ear Nose Throat*, 7:19-23.

دراسة مقارنة بين عملية ترقيع طبلة الأذن باستخدام المنظار وعملية ترقيع طبلة الأذن باستخدام الميكروسكوب فى المرضى متوسطى العمر (20-40 سنة)

حسام محمد عصام ، وائل حسن ابو الوفا، محمد كامل ابراهيم العوضى

قسم الانف والاذن والحنجرة، كلية طب الأزهر

خلفية البحث: استخدام المنظار فى عمليات الأذن هو من التقنيات الحديثة التى بدأت فى الانتشار فى السنوات الأخيرة فى العالم نظرا لأن العملية تتم من خلال قناة الأذن بدون وجود جرح كبير خلف الأذن كما يحدث فى الجراحات التقليدية وهذا يقلل فترة التعافى ويقلل الألم بعد الجراحة. كما أن المنظار الجراحى يعطى تفاصيل دقيقة أثناء الجراحة لا يوفرها الميكروسكوب.

الهدف من البحث: مقارنة معدل النجاح بين ترقيع طبلة الأذن باستخدام المنظار واستخدام الميكروسكوب وذلك من خلال قناة الاذن الخارجية فيما يتعلق بتحسّن السمع والتنام طبلة الأذن.

المرضى وطرق البحث: أجريت هذه الدراسة فى قسم الأنف والأذن والحنجرة بمستشفيات جامعة الأزهر على 40 مريض بالتهاب الأذن الوسطى المزمن الذين لديهم ثقبوب بطبلة الأذن وتتراوح اعمارهم بين 20-40 عام حيث تم تحضيرهم لجراحة ترقيع طبلة الاذن.

وقد تم تقسيم المرضى الي مجموعتين متساويتين:

المجموعة الأولى: تم إجراء عملية ترقيع طبلة الاذن لهم باستخدام المنظار الجراحي.

والمجموعة الثانية: تم إجراء عملية ترقيع طبلة الاذن باستخدام الميكروسكوب.

النتائج: كانت نسبة نجاح العملية في المجموعة (أ) 85 %، وفي المجموعة (ب) 80%. وفيما يتعلق بمعدل السمع كان هناك تحسناً كبيراً في السمع في كلا المجموعتين، ولكن لم يكن هناك فرقاً احصائياً ما بين المجموعتين.

الاستنتاج: نجاح وفعالية جراحة الرأب لطبلة الأذن باستخدام المنظار الجراحي مع معدل نجاح مرتفع بالإضافة إلى فوائد أخرى متعددة مثل تقليل وقت الجراحة، وإجراءات التخدير، وزيارات المتابعة للمرضى وتقليل من إجمالي تكلفة العلاج مقارنة بالميكروسكوب.