

Outcomes of Endoscopic Assisted Versus Microscopic Assisted Type1 Tympanoplasty for Inactive Chronic Otitis Media

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Abstract

Background and objectives:The objectives of this study is to assess the outcomes of the endoscope as compared to the microscope in type 1 tympanoplasty surgery for cases with inactive chronic otitis media. **Methods:**Prospective comparative study was conducted from October 2016 to October 2017, forty patients underwent myringoplasty, twenty were endoscope assisted and twenty were microscope assisted. Results of surgery were compared at the end of six months post-operation **Results:** In the endoscope group 85% while in the microscope group 90% of patients had a successful outcome. Average time taken in microscopic myringoplasty was 103.75 minutes range (75 -150 minutes) while time taken in the endoscopic myringoplasty group was 82.25 minutes range (60 -120 minutes). Average hearing gain was 12.25 dB for microscope assisted group and 11 dB for endoscope assisted group. **Conclusions:** The surgical result of endoscope assisted myringoplasty was similar to the microscope assisted myringoplasty although the graft taken and postoperative hearing gain in microscopic group was better than endoscopic group, but the operation dura-tion in endoscope group was shorter.

Keywords:Type 1 tympanoplasty; Temporalis fascia; Endoscope; Microscope.

Introduction

Inactive chronic otitis Media is a constant perforation of the pars tensa, but the middle ear and mastoid mucosa are not inflamed. The mucocutaneous junction is usually found at the edge of the perforation, which can extend up to the fibrous annulus¹. Tympanic membrane perforation may result from of acute otitis media, chronic otitis media, or trauma (injury or iatrogenic). In some occasions, a dry, simple perforation will result from a single episode of acute otitis media². Myringoplasty is an operative procedure used to restore the integrity of a perforated tympanic membrane. This assumes that the middle ear space, its mucosa, and the ossicular chain are free of active disease³. Frequently, tympanoplasty has been done via an operating microscope. In spite of the continual technical developments, the basic optical principles of the microscope and their limitations have remained the an equivalent over the last three decades^{4,5}. Mer and colleagues in 1967 were first introduced endoscopes in otology but till the last decade endoscopes have been

mainly used for diagnostic and photographic purposes⁶. The microscope approach offers an enlarged image in a straightforward line, therefore the surgeon cannot imagine the deep recesses of the middle ear in a single operating field⁷. The endoscope provides an excellent magnified image with a good resolution, just by moving nearer or by drawing the scope. Further, with minimal effort the surgeon can visualize hidden areas; deep anterior canal wall, anterior recess, anterior marginal perforations, sinus tympani, facial recess, hypotympanum^{8,9}. Endoscopic tympanoplasty follows the philosophies of minimally invasive surgery, hence there is minimal trauma to the canal wall, but the surgeon is still able to examine the middle ear and exclude a cholesteatoma¹⁰. There are no known absolute contraindications to endoscopic ear surgery. Any otologic case that may be made via microscopic techniques may be assisted by the use of an endoscope. In addition, possible complications of endoscopic ear surgery are similar to that of traditional microscopic ear surgery, including injury to adjacent structures, such as ossicular

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chain, bony labyrinth, and facial nerve. There is no reason to believe that complications for endoscopic ear surgery are higher than microscope assisted approaches¹¹. The objectives of this study is to assess the outcomes of the endoscope as compared to the microscope in type 1 tympanoplasty surgery and to match the results of each group, regarding the graft taken, needed time for the operation and postoperative hearing gain.

Patients and methods

The present study was conducted at Sulaimani teaching otolaryngology center hospital, between October 2016 and October 2017. After the agreement of the ethics and scientific committee of Kurdistan Board for Medical Specialties and taking patients' consent, the data were collected using direct interview, clinical examination and audiological assessment. Patients with more than 18 years of age with a small size to subtotal dry central perforation of the tympanic membrane and arranged for surgery were included in the study after taking a written and informed consent. Patients with marginal or attic perforations, cholesteatoma, otitis externa, otomycosis, uncontrolled diabetes mellitus, ossicular fixation, ossicular discontinuity, revision cases and those with upper respiratory tract infections at the time of surgery were excluded from the study. The size of the perforation was determined according to the number of quadrants it occupied. Tuning fork tests were done to determine the type and degree of hearing loss. Pure tone audiometry (PTA) was done as per the method outlined by the American speech and hearing association (ASHA). Air-Bone (A-B) gap at frequencies 500 Hz, 1 KHz and 2 KHz was noted and hearing loss was calculated by taking the average of three. Of the total 40 patients, 38 patients underwent surgery under general anaesthesia and the remaining 2 patients were operated under local anaesthesia. All patients in this study underwent underlay myringoplasty with dry temporalis fascia graft. In the endoscope group, zero degree, 17 cm long, 4 mm wide Hopkin's rod endoscope was used. All surgeries were done by visualization using the monitor. The patients were prepared and draped in the usual fashion, with the ipsilateral shoulder being pulled down to allow easier access to the area. Injection of local anesthetic is particularly important

in the endoscopic ear surgery, as properly injecting the ear canal skin with a vasoconstrictive agent will reduce bleeding considerably. The margin of the perforated tympanic membrane was refreshed with a sickle knife through the external auditory canal, this step is very critical because it breaks the adhesion formed between the outer epithelial layer and an inner mucosal layer of tympanic membrane, if these adhesions left unbroken will hamper the take up of the neo tympanic membrane. Dried temporalis fascia graft was put by underlay technique and supported by gelfoam. All patients in both groups were followed up for minimum six months. A final assessment of the tympanic membrane and hearing was done at six months post operation. An intact mobile tympanic membrane with closure of air-bone gap six months postoperative was considered as a successful outcome. The presence of a defect in the tympanic membrane or unchanged air-bone gap or both at six months was considered to fail outcome. The "IBM SPSS Statistics version 20" was used for the data analysis. Moreover, a p-value of (≤ 0.05) was considered statistically significant.

Results

The current study was conducted on 40 patients with a mean \pm SD (Standard Deviation) age of 33.10 ± 10.9 years (ranged from 18 to 62 years) with dry central perforation, small, medium, and large in size, dividing into two groups and each group containing twenty cases were selected for the study. From the forty patients included, 26 (65%) were female and 14 (35%) were male.

It was observed that among the forty cases that were studied, small and medium size perforation seen in 34 cases, i.e., 85% of all the cases taken for the study, Figure(1).

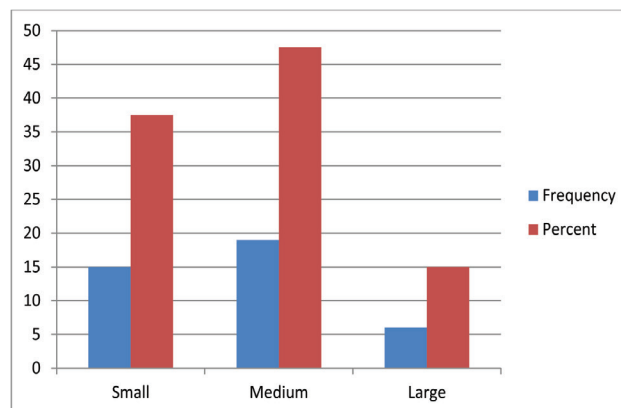


Figure (1): Perforation size of study sample.

Average time taken in microscopic myringoplasty was 103.75-minutes range (75-150 minutes) while time taken in the endoscopic group was 82.25 minutes range (60-120 minutes), Table (1).

Table (1): Time taken in minutes.

Type of operation	Average time taken/ min.	Range of time taken/ min.
Endoscopic	82.25	60-120
Microscopic	103.75	75-150

In endoscopic assisted myringoplasty group 17/20 (85%) had successful graft uptake, while in microscopic assisted myringoplasty group 18/20 (90%) had successful graft uptake six month postoperatively. Graft uptake failure seen in 3 cases (15%) of endoscopic group, while it was 2 cases (10%) in microscopic group, Table(2).

Table (2): Graft uptake status.

Type of operation	Outcome	No.	%
Microscopic	Success	18	90
	Fail	2	10
	Total	20	100
Endoscopic	Success	17	85
	Fail	3	15
	Total	20	100

In current study, average preoperative hearing loss (air-bone gap) in microscopic myringoplasty was 27.75 dB while in endoscopic myringoplasty group was 27 dB. Postoperatively, average air bone gaps in the microscopic group were 15.5 dB while in the endoscopic group were 16 dB. Average hearing gain in the microscopic group is 12.25 dB and in the endoscopic myringoplasty group is 11 dB, Table(3).

Table (3): Audiological evaluation of study sample.

Type of operation	Average pre-operative air-bone gap	Average air-bone gap after 6 months	Average hearing gain after 6 months
Endoscopic	27 dB	16 dB	11 dB
Microscopic	27.75 dB	15.5 dB	12.25 dB

Statistically significant differences in favor of the endoscope were found in terms of shorter operation duration (p-value<0.001 = 0.00). Differences between the 2 groups were not statistically significant in terms of success rate and postoperative hearing gain.

Discussion

As opposed to microscopic methods, the endoscope

assisted tympanoplasty is an adequate and minimally invasive procedure does not require surgical exposure such as wide skin incision, and avoids the substantial risk of unnecessary injury to the chorda tympani¹². In current study, we found the result of endoscopic myringoplasty and microscopic myringoplasty are similar with respect to graft uptake as well as hearing improvement. The endoscopic myringoplasty however, gave us added advantage like reduced surgical time. Jyothi study found that the average time taken during microscopic myringoplasty is (120 minutes) and in the endoscopic group it takes on average (60 minutes)¹³. In current study, the average time taken in microscopic group of myringoplasty was (104 minutes) while the time taken in the endoscopic group of myringoplasty was (82 minutes) which is similar to mentioned literature. Yadav in his study of endoscopic myringoplasty found that 40 out of the 50 patients had an intact tympanic membrane in the 8th postoperative week, accounting for an 80% success rate¹³. Gaur R in his study of comparative study of microscopic assisted and endoscopic-assisted myringoplasty using temporalis fascia and compare the result of both. A graft uptake in conventional group was 90%, while in the endoscopic group were 88%¹⁵. In current study, the percentage of successful graft uptake in microscopic group is 90%, while in endoscopic group is 85% which is constant with above literatures. Guarave Batni in his study of 100 patients with air - bone gap 23.5 dB prior to surgery, but postoperatively the air - bone gap was 11.6 dB with the average of 11.94 hearing gain¹⁵. Lade et al mean air-bone gap pre and postoperative in the endoscopic group was 28.5dB and 18.13 dB respectively, whereas these values were 32.4 dB and 16.9 dB, respectively, in the microscopic group¹⁷. In current study, average preoperative hearing loss (air - bone gap) in the microscopic myringoplasty group was 27 dB while in the endoscopic myringoplasty group was 27.75 dB. Postoperatively, average air - bone gap in the microscopic myringoplasty group was 17.5 dB, while in the endoscopic myringoplasty group was 16.5 dB. Average hearing gain in the microscopic myringoplasty group is 9.7 dB and in endoscopic myringoplasty group is 11.25 dB which is similar to the results of above literatures. The endoscopic technique is the future of myringoplasty and tympanoplasty. With results similar to the microscop-

ic techniques and the added advantages, the endoscope may become more prevalent than the microscope. The endoscope takes the greatest promise in tympanoplasty and cholesteatoma surgery and should increase the utilization of transcanal over post-auricular procedures^{18,19}. Minimally invasive endoscopic and endoscope-assisted surgical techniques are gradually being employed in the surgical management of cholesteatoma as they aid in good visualization of residual cholesteatoma sites, such as the anterior and posterior epitympanic spaces, sinus tympani, facial recess, and hypotympanum. The endoscope is also being used for endoscopic repair of cerebro-spinal fluid otorrhoea, management of meniere's disease, management of perilymphatic fistulae, endoscopic cochlear implantation & transcanal stapedotomy²⁰. Thus endoscope holds the greatest promise in ear surgery in coming days

Conclusions

The surgical result of endoscope assisted myringoplasty was similar to the microscope assisted myringoplasty although the graft taken and postoperative hearing gain in microscopic group was better than the endoscopic group, but the operation duration in endoscope group was shorter. Loss of depth perception and one handed technique are some of the disadvantage of endoscope that can be overcome with practice and use of endo-holder. Thus endoscopic myringoplasty can be a good alternative of microscopic myringoplasty.

Conflict of interest

Nothing to declare

References

- Gleeson M, Scott-Brown W. Scott-Brown's otorhinolaryngology, head and neck surgery. Volume 3. 7th ed. London: Hodder Arnold; 2008.3396-439.
- Cummings C, Flint P, Haughey B et al. Cummings otolaryngology. 6th ed. Philadelphia: Elsevier/Saunders; 2015;2139-55.
- Hirsch B.E. Myringoplasty and Tympanoplasty. In: Myers N.E. operative otolaryngology –head and neck surgery. 2nd ed. Philadelphia; 2008. pp1458-83.
- Sismamnisl A, MD. Tympanoplasty. In: Glasscock and Shambaugh. Surgery of the Ear. 5th ed. Hamilton: Elsevier; 2003.463-86.
- Thomassin J, Korchia D, Duchon Doris J. Endoscopic-Guided Otosurgery in the Prevention of Residual Cholesteatomas. The Laryngoscope. 1993;103(8):939.
- Mer SB, Derbyshire AJ, Brushenko A, Pontarelli DA. Fiberoptic endoscopic for examination the middle ear. Arch Otolaryngol. 1967; 85(4):387-93.
- Dennis SP. Endoscopic assisted middle ear surgery. In: Glasscock and Shambaugh. Surgery of the Ear. 5th ed. Hamilton: Elsevier; 2003. 325-34.
- Thiagarajan B, Ulaganathan V. Endoscope assisted myringoplasty. Online Journal of Otolaryngology. 2012;2(5):18.
- Presutti L, Marchioni D. Endoscopic ear surgery. Stuttgart. New York. Delhi. Rio: Thieme; 2015. 6-15.
- Karhuketo TS, Ilomäki JH, Puhakka HJ. Tympanoscope-Assisted Myringoplasty. Orl. 2001;63(6):353–8.
- Kozin E, Lee D. Basic principles of endoscopic ear surgery. Operative Techniques in Otolaryngology-Head and Neck Surgery. 2017;28(1):2-10.
- Kakehata S, Futai K, Sasaki A, Shinkawa H. Endoscopic Transtympanic Tympanoplasty in the Treatment of Conductive Hearing Loss: Early Results. Otolology & Neurotology. 2006;27(1):14-9.
- Jyothi AC, Shrikrishna BH, Kulkarni NH, Kumar A. Endoscopic Myringoplasty Versus Microscopic Myringoplasty in Tubotympanic CSOM: A Comparative Study of 120 Cases. Indian Journal of Otolaryngology and Head and Neck Surgery. 2017;69(3):357–62.
- Yadav SPS, Aggarwal N, Julaha M, Goel A. Endoscope-assisted myringoplasty. Singapore Medical Journal. 2009;50(5):510–2.
- Gaur RS, Tejavath P, Chandel S. Comparative study of microscopic-assisted and endoscopic-assisted myringoplasty. Indian J Otol 2016; 22:177-82.
- Batni G, Goyal R. Hearing Outcome After Type I Tympanoplasty: A Retrospective Study. Indian Journal of Otolaryngology and Head and Neck Surgery. 2014;67(1):39–42.
- Lade H, Choudhary SR, Vashishth A. Endoscopic vs microscopic myringoplasty: A different perspective. European Archives of Oto-Rhino-Laryngology. 2014;271(7):1897–902.
- Raj A, Meher R. Endoscopic transcanal myringoplasty—a study. Indian J Otolaryngol head neck surg. 2001;53(1):47–9.
- Mc Kennan KX. Endoscopic second look mastoidoscopy to rule out residual epitympanic—mastoid cholesteatoma. Laryngoscope.1993;103:810–14.
- Migirov L, Wolf M. Minimally Invasive Transcanal Endoscopic Ear Surgery. Endoscopy - Innovative Uses and Emerging Technologies [Internet]. 2015; Available from: <https://www.intechopen.com/books/endoscopy-innovative-uses-and-emerging-technologies/minimally-invasive-transcanal-endoscopic-ear-surgery>.