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Research Article

Endoscopic tympanoplasty vs microscopic tympanoplasty in tubotympanic csom: a comparative study of 44 cases

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ABSTRACT

Background: Tympanoplasty is one of the commonest operations performed on the middle ear. Endoscopes are increasingly used for various middle ear surgeries. The objective was to determine merits and demerits of the endoscope as compared to the microscope in myringoplasty surgery and to compare the results of both group.
Methods: Between the time period of January 2014 to September 2014, 44 patients underwent myringoplasty, 22 were endoscope assisted and 22 were microscope assisted. Results of surgery were compared at the end of 3 months post surgery.
Results: In both groups, equal number of patients i.e. 15 (68.18%) had a successful outcome.
Conclusion: Panoramic, wide angle, and magnified view provided by endoscope as well as ability to easily negotiate through EAC and provide uninterrupted image overcomes most of the disadvantage of microscope. In our study success rate was equal between endoscopic and microscopic technique. In terms of morbidity and postoperative recovery endoscope produced better results. Loss of depth perception and one handed technique are some of the disadvantage of endoscope that can be overcome with practice. Thus, Endoscopic tympanoplasty can be a good alternative of microscopic tympanoplasty.

Keywords: ENT, CSOM, Radiology, Tympanoplasty

INTRODUCTION

Myringoplasty and tympanoplasty are descriptive terms defining surgical procedures that are used for repair of the tympanic membrane and middle ear respectively. Tympanoplasty is one of the commonest operations performed on the middle ear. In the surgical repair of tympanic membrane perforations several variables come into play such as size of perforation, overhang, eustachian tube function, state of the mucosa, wound healing, degree of pneumatization etc. Over last few years various continuous efforts have been made by otologists to attain the perfect surgical outcome. Inspite of various technical advancements in operating microscope, basic limitations could not be resolved.[1] With the advent of the rigid endoscopes for sinus surgery other extended applications in other fields have emerged. Mer and colleagues introduced the middle ear endoscopy in 1967. Since than endoscopes are increasingly used for various middle ear surgeries.[2]

METHODS

Our study was conducted at SSG hospital, Vadodara between January 2014 to September 2014. Patients attending ENT outpatient department with chief complain of decreased hearing and ear discharge were screened. Those patients having small to medium sized central

perforation of TM due to CSOM and A-B gap less than 45 db and willing for surgery were included in study after taking written and informed consent. Diagnosis was supplemented by high resolution computed tomography of temporal bone (Figure 1 and 2) or X-ray mastoid view (Figure 3). Patients with cholesteatoma, active ear discharge, ossicular discontinuity or fixation, significantly narrow EAC and revision cases were excluded from study. Tuning fork test 256, 512 and 1024 hz tuning fork and PTA was done to determine type and degree of hearing loss. A-B gap at frequencies 500, 1 and 2 khz was noted and hearing loss was calculated by taking the average of three. Of total 44 patients 22 patients underwent endoscopic tympanoplasty and 22 underwent microscopic tympanoplasty. All tympanoplasty were type 1 tympanoplasty and were performed under GA. Temporalis fascia was used as graft material in all microscopic tympanoplasty procedure while for endoscopic tympanoplasty either TF or Tragal pericondrium was used as graft material. All Microscopic tympanoplasty were operated by postural route.

Figure 1: Axial HRCT temporal bone shows sclerosis of the right mastoid and right middle ear is filled with the hypodense material without any ossicular chain erosion suggestive of right sided CSOM.

Technique

Zero degree & 30 degree 4mm wide 10 cm long Hopkins rod endoscopes were used. [Figure 4] All endoscopic surgeries were performed by direct visualization on the monitor (Figure 5). All patients were given prophylactic state dose of injectable antibiotic and oral decongestant. Dryness of the middle ear was confirmed preoperatively. All surgeries were done under General Anaesthesia. Temporalis fascia was used as graft material in all microscopic tympanoplasty while for endoscopic tympanoplasty either TF or Tragal pericondrium was used as graft material. All endoscope assisted tympanoplasty were done through permeatal route. Temporalis fascia graft was harvested through 3 cm incision in hairline just above helix. Margins of the perforation was freshened using a wide curved pick (Figure 6). The middle ear was inspected and following findings were noted: State of the Ossicles and incudostapedial joints, eustachian tube opening, oval and the round window. The round window reflex was visualized and continuity of the ossicular chain was confirmed. Middle ear was packed with medicated gelfoam (Figure 7). The graft was placed by an underlay technique beneath the remnant of the drum, over a bad of medicated gelfoam and was tucked all around. Medicated gelfoam was placed over the graft to stabilize the graft (Figure 8). Medicated wick was kept in EAC. Mastoid bandage was given. All patients were kept overnight, given injectable antibiotics and on next day operative wound was checked and sterile dressing was given. All patients were discharged on oral antibiotics for one week and called for regular follow up.

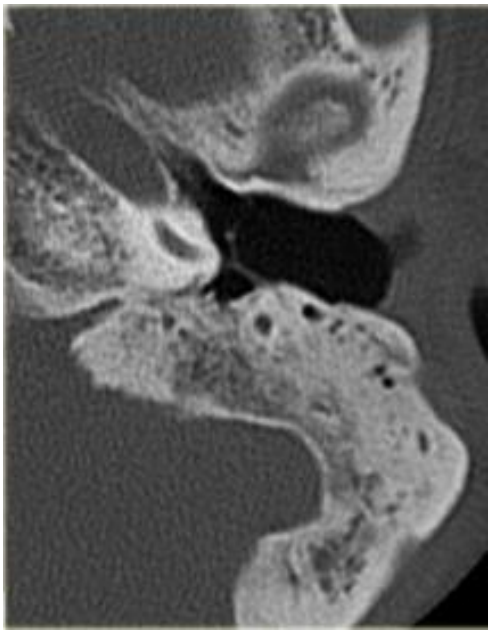

Figure 2: Axial HRCT temporal bone shows sclerosis of the left mastoid without any erosion suggestive of left sided chronic mastoiditis secondary to the CSOM.

All patients were kept under weekly follow up for the first month with oral antibiotics for the first three weeks, followed by twice in a month for the next two months. Tragal or postauricular sutures were removed on the eight or tenth postoperative day. During follow up all patients were examined for pain, wound healing (any dehiscence or infection), hearing improvement, discharge or infection. Final assessment of graft uptake was done at 3 months and hearing was assessed by postoperative PTA, where postop A-B gap was calculated by taking the average of A-B gap at 500 Hz, 1 kHz and 2 kHz. Successful results were considered as patient having complete graft uptake (Figure 9) and post operative air bone gap ≤15 db. Those patients not fulfilling above criteria were considered as failure.

Figure 3: Left mastoid Schuler's view shows sclerosis of the left mastoid air cells in a CSOM.

Figure 4: Zero degree & 30 degree 4 mm wide 10 cm long Hopkins rod endoscopes.

Figure 5: All endoscopic surgeries were performed by direct visualization on the monitor.

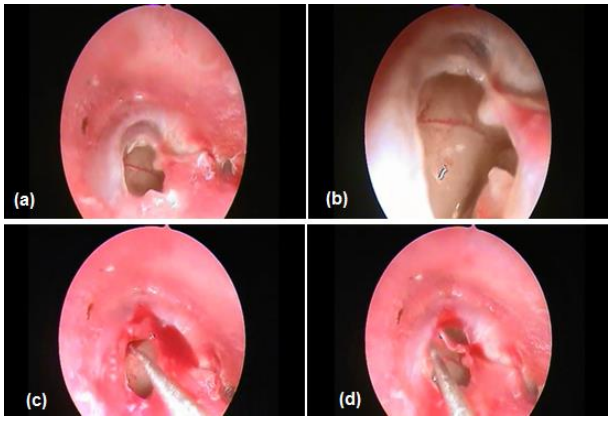

Figure 6: (a, b) Endoscopic images show perforation in the tympanic membrane. (c, d) endoscopic images show, margins of the perforation was freshened using a wide curved pick.

Figure 7: Endoscopic image shows how middle ear is packed with medicated gelfoam.

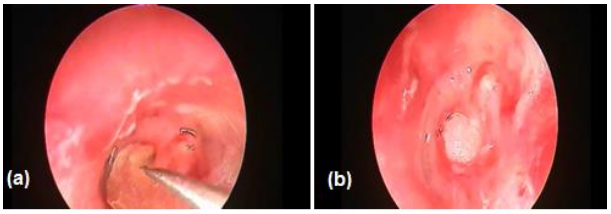

Figure 8: (a) Endoscopic image shows how the graft is placed by an underlay technique beneath the remnant of the drum, over a bad of medicated gelfoam and was tucked all around (b) Medicated gelfoam is placed over the graft to stabilize the graft.

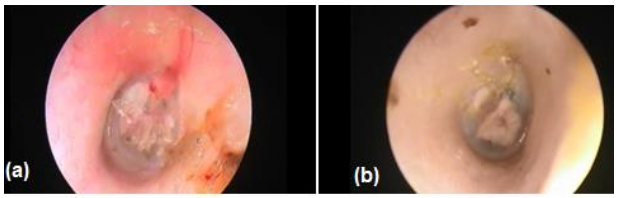

Figure 9: (a, b) Follow up endoscopic image shows successful results with complete graft uptake.

OBSERVATION & RESULTS

The present study was conducted on 44 patients of age group15 to 65 years with dry central perforation, small and medium in size. Most of the patients were in their 2nd or third decade of life and male to female ratio was 1:1.75

and 1:2.14 for endoscopic and microscopic group respectively. In endoscopic group 11 patients had small perforation while another 11 patients had moderate perforation. While in microscopic group 17(77.27%) patients had medium sized perforation, while 5 (22.72%) patients had small perforation. Average preoperative A-B gap was 25.37 db in endoscopic group and 28.03 db in microscopic group. In endoscopic group no patient required meatoplasty while among microscopic group 5 patients required meatoplasty. At three months follow up in endoscopic group 10 (45.45%) patients had postop A-B gap in the range of 0 to 10 db while 11 (50 %) patients had postop A-B gap in the range of 11 to 20 db while in microscopic tympanoplasty 10 (45.45%) patients had postop A-B gap in the range of 0 to10 db, while 8 (36.36 %) patients had postop A-B gap in the range of 11 to 20 db. In endoscopic group 16 (72.72 %) patients while in microscopic group 20 (90%) patients showed complete graft uptake. Complete uptake rate was 69.23% and 77.77% respectively for tragal perichondrium and temporalis fascia respectively. While as per criteria for successful results in both study group equal no. of patients (15 patients (68.18%) showed successful result. In endoscopic group two patient developed complication: one patient developed tragal perichondritis after two weeks of the surgery and another patient developed otitis externa with otomycosis after three weeks of the surgery. While for microscopic group only one patient developed complication : post aural wound gaping after 10 days of the surgery following suture removal . The average time taken for endoscope assisted tympanoplasty was around 75 minutes, while the same time taken for microscopic tympanoplasty was around 90 minutes.

DISCUSSION

The study was undertaken with the objective of determining the merits and demerits of the endoscope compared to microscope assisted myringoplasty surgery. While operating the patient with microscope tortuosity of the EAC and bony overhang hampers the view of the deeper structures. Because of which we need to frequently manipulate head of the patient. Sometimes inspite of manipulations deeper structures could not be visualised. IN such condition canalplasty becomes mandatory. This in turn may increase operative time. In contrast, endoscope can be easily negotiated through curvy EAC. Thus endoscope brings surgeon's eye to the tip of the scope. The wide angle of scope brings the tympanic membrane in one frame, more over the image can be magnified by just getting close to the structures. Thus there is no need of frequently manipulating patients head and moreover canalplasty can be avoided. Similar observations were made in two separate studies by Tarabichi M[3] and Usami S, Iijima N et al.[4] Moreover with angled endoscopes it is possible to visualize other structures like round window niche, sinus tympani, anterior epitympanum, Eustachian tube area, facial recess, which are difficult to visualise with microscope. Authors Raj A, Meher R[5] reported similar observations in their study.

In endoscope group, we used treagal perichondrium as a graft which was harvested through a smaller tragal incision with minimum tissue dissection. Where as in microscopic group temporalis fascia was used as a graft which was taken from a larger postaural incision with obvious more tissue dissection. Thus endoscope group had relatively early wound healing and less morbidity in terms of postoperative pain and hospital stay as compared to microscopic group. Unlike microscope, endoscope is easily transportable and hence ideal for use in ear surgery camps.

Discussing the demerits biggest disadvantage is that, endoscopic ear surgery 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. At time of excessive bleeding it becomes extremely difficult to operate as only one hand is free. Moreover blood soils the tip of microscope which obscures the surgical field. Thus tip of endoscope has to be cleaned frequently. Where as in microscopic technique both hands are free to operate. Thus procedure is easily performed in microscopic technique. Similar observation was made in studies of Tarabichi M[3] and Karhuketo TS, Ilomaki JH, Puhakka HJ.[6]

So, while performing endoscopic tympanoplasty meticulous hemostasis is must for doing smooth surgeries. This problem can be solved by developing a stand for a endoscope, which can fix the scope in desired position so both hands are free to operate. Endoscopes provide monocular vision which leads to loss of depth perception.[1] So one has to be extra careful, while close to vital structures and positioning of the graft. This difficulty may be overcome by experience. Savlon is used as a defogging agent for endoscopes. Studies on effect of savlon on middle ear mucosa and inner ear are not sufficient, thus safety of savlon is yet to be established.

CONCLUSION

Panoramic, wide angle, and magnified view provided by endoscope as well as ability to easily negotiate through EAC and provide uninterrupted picture overcomes most of the disadvantage of microscope. In our study success rate was equal between endoscopic and microscopic technique. In terms of morbidity and postoperative recovery endoscope produced better results. Loss of depth perception and one handed technique are some of the disadvantage of endoscope that can be overcome with practice. Thus Endoscopic tympanoplasty can be a good alternative of microscopic tympanoplasty.

Abbreviations

TM: Tympanic membrane
CSOM: Chronic Otitis Media
A-B gap: Air Bone Gap
ENT: Ear nose and throat
EAC: External Auditory Canal

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