

# Comparative study of outcomes of microscopic versus endoscopic myringoplasty

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## Abstract

**Background and objectives:** Chronic suppurative otitis media (CSOM) is a wide spread disease of the developing countries, hence treating CSOM with surgical treatment by tympanoplasty is one of the common procedure in Ear Nose Throat specialty. Very few studies have been conducted till date to correlate the outcomes of microscopic and endoscopic tympanoplasty such as intra operative time, percentage of graft uptake, postoperative hearing improvement. Hence the objective of the study was to compare the outcomes of tympanoplasty by conventional microscopic method and endoscopic method.

**Material and Methods:** This was a longitudinal study conducted for a period of 1 year from November 2012 to December 2013. During 1 year study period, 30 patients underwent endoscopic tympanoplasty and 30 patients underwent microscopic assisted tympanoplasty. Intra operative time taken for the both types of surgery was noted and Post operative follow up was done to look for graft uptake at 12 weeks and post operative hearing improvement at 14 weeks.

**Results:** Graft uptake at 12 weeks was 74% in endoscopic tympanoplasty and 80% in microscopic tympanoplasty. Over all graft uptake was 77%. Both types of surgery had significant hearing improvement. Intra operative time was more in endoscopic tympanoplasty.

**Conclusion:** Both endoscope and microscope are good tools for tympanoplasty surgeries. Post operative outcome such as graft uptake and hearing improvement was equally good in both. Operative time was more in endoscopic surgeries since one hand is occupied with endoscope. Postoperative stay was less in endoscopic method. Endoscopes have wide angle view, visualization of hidden areas is easier. Operating with both hands with good magnification, binocular vision are advantages in microscopic surgery.

**Key Words:** Tympanoplasty, Endoscopic, Microscopic, Graft uptake, hearing improvement.

## Introduction

Chronic suppurative otitis media (CSOM) is a wide spread disease of the developing countries, hence treating CSOM with surgical treatment by tympanoplasty is one of the common procedures in ENT. CSOM is defined by world health organization foundation workshop 1996 as 'a stage of ear disease in which there is chronic infection of the middle ear cleft i.e Eustachian tube, middle ear and mastoid, and in which a non intact tympanic membrane and discharge are present'<sup>[1]</sup>. The introduction of the operating microscope has significantly enhanced the outcome of tympanoplasty by improving the accuracy

of the technique. The operating microscope provides a magnified image in straight line; hence the surgeon can not visualize the deep recesses of the middle ear in single operating field. This is overcome by use of rigid endoscope for tympanoplasty. In rigid endoscopy, view is better but surgeons both hands are not free, so manipulation here is difficult. Very few studies have been conducted till date to correlate the outcomes of microscopic and endoscopic tympanoplasty such as percentage of graft uptake, postoperative hearing improvement. Hence this study is to compare the outcomes of tympanoplasty by conventional microscopic method and endoscopic method.

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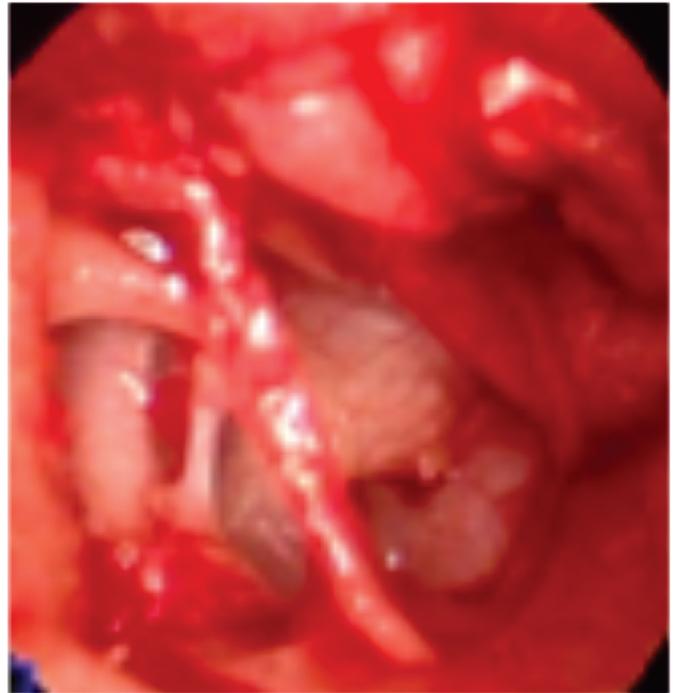
## Materials and Methods

The study was conducted in tertiary care teaching hospital otorhinolaryngology department, north Karnataka. A total of 60 patients between the ages of 16- 60 years suffering from CSOM Tubo Tympanic Disease (TTD) and traumatic tympanic membrane perforation were selected to the study. Inclusion criteria were subjects with tympanic membrane perforation due to CSOM, dry & quiescent or traumatic perforation with conductive hearing loss. Exclusion criteria were patients with active discharge, patients with mastoiditis, patients with sensorineural hearing loss, patients with cholesteatoma. Patients were randomly selected either endoscopic or microscopic tympanoplasty.

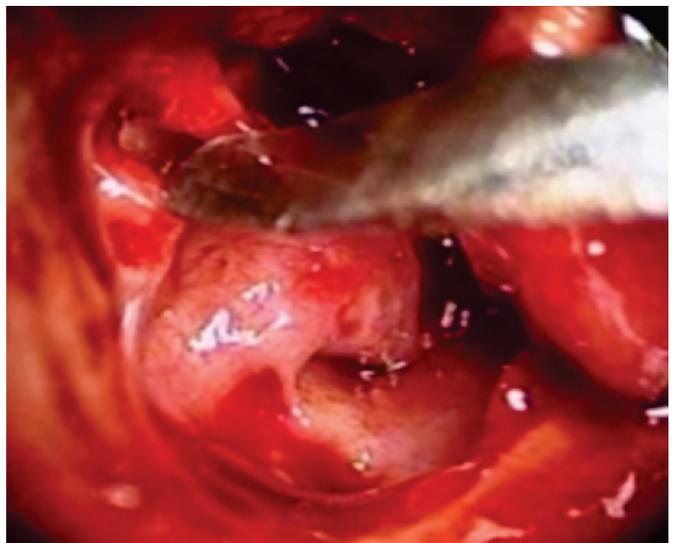
Simple randomization with single blinding was done. Patients were admitted 2 days prior to surgery, detailed history and clinical examination of ear, nose, and throat was done. Written/informed consent was taken. All the cases were done under local anesthesia. Xylocaine sensitivity test was performed in all cases by injecting 0.1 ml of 2% xylocaine subcutaneously over the volar surface of forearm, patients were given pre medication half an hour before surgery in the form of injection hydroxyzine 25 mg IM, injection butrophenol 2 mg IM, injection glycopyrolate 0.2 mg intravenous. Temporalis fascia was used as graft material in both groups.

Endoscopic tympanoplasty (Figure 1) was done by permeal route and microscopic tympanoplasty (Figure 2) was done by post-aural route. Karl Storz rigid endoscope of 4mm in diameter, 100mm in length and with 0° angles of view with camera and monitor was used during surgery. Endoscopy began with 0° endoscope to visualize the middle ear mucosa, Ossicles, incudostapedial joint, eustachian tube opening, oval and the round window.

The round window reflex was visualized and continuity of the ossicular chain was confirmed. Graft placed by underlay technique in both groups. Patients called for follow up after 1 week to look for wound, second follow up at 12 weeks to look for graft uptake, and third follow up at 14 weeks to look for hearing improvement by Pure Tone Audiometry (PTA). Ethical clearance was taken for the above study.



**Figure 1. Endoscopic view of middle ear structures**



**Figure2. Microscopic view of middle ear structures**

## Results

Out of 60 patients, 33 females (55%) and 27 were males (45%), out of 33 females, 15 patients underwent endoscopic, 18 patients underwent microscopic tympanoplasty. Out of 27 males 15 patients underwent endoscopic, 12 patients underwent microscopic tympanoplasty. In our study, females were more than males. In our study age group of 15-30 years were 37 out of 60 patients (61.6%), age group of 31-45 years were 21 out of 60 patients (35%), age group of 40- 60 years were 2 out of 60 patients (3.3%). Age

group of 15-30 were predominating. Time taken for microscopic tympanoplasty was around one hour and for endoscopic tympanoplasty was around one and half hour because one hand occupied with endoscope causing difficulty in graft placement, frequent soiling of tip of endoscope with blood.

Out of 31 large central perforation 18 (59%) patients had graft in situ at 12 weeks. Out of 17 medium central perforations 16 (95%) patients had graft in situ at 12 weeks. Out of 12 small central perforations, all patients had graft in situ at 12 weeks. In our study, large central perforation had least graft uptake compared to moderate and small size perforation. Out of 30 endoscopic tympanoplasty 22(74%) had good graft uptake, 8(26%) patients had residual perforation at 12 weeks. Out of 30 microscopic tympanoplasty 24 (80%) had good graft uptake, 6(20%) patients had residual perforation at 12 weeks. Chi-square test was applied which showed Pearson Chi-Square Value:0.373 df:1 P value: 0.542 which is statistically insignificant. The graft uptake rate was equally good in both study groups. In our study pre operative PTA was done in both groups and post operative PTA was done at 14 weeks for the both groups. Independent T Test value for the surgical outcome is 0.157 with P value of 0.876. So there is no significant statistical, difference on the outcome by type of surgery. Both the groups had equally good hearing improvement.

## Discussion

The study was undertaken with the objective of determining the merits and demerits of the endoscope compared to microscope in tympanoplasty surgery. While operating the patient with microscope tortuous External Auditory Canal and bony overhang hampers the view of the deeper structures. Because of which we need to frequently manipulate head of the patient. Sometimes, in spite of manipulations, deeper structures could not be visualized. In such condition canal plasty 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 plain, more over the image can be magnified by just getting close to the structures. Thus there is no need to frequently manipulate patients head and moreover canal plasty can be avoided. Similar observations were made in two separate studies by Tarabichi M<sup>[2]</sup> and Usami S, Iijima N et al<sup>[3]</sup>. 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 visualize with microscope. Authors Raj A, Meher R<sup>[4]</sup> reported similar observations in their study. Study conducted by Harugop AS, Mudhol RS, Godhi A,<sup>[5]</sup> titled A comparative study of endoscopy assisted myringoplasty and microscopy assisted myringoplasty, Surgical outcome of endoscopy assisted myringoplasty was comparable to the conventional microscopic assisted myringoplasty, but in terms of post-operative recovery the patient in endoscopy group had better result.

Yadav, Agarwal et al<sup>[6]</sup> studied about the endoscopic assisted myringoplasty, they concluded that endoscopic myringoplasty is equally effective, less morbid, very cost effective in small central perforation, however it is not effective in large perforation. Karchuketo TS<sup>[7]</sup> studied that endoscope assisted myringoplasty is reliable and simple procedure with the benefit of minimal trauma to the healthy tissue. Small supra aural incision was taken to harvest temporalis fascia graft in endoscopic group, conventional postaural incision was taken in microscopic group. 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 one 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 endoscope 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 and Karhuketo TS, Ilomaki JH, PuhakkaHJ. So, while performing endoscopic tympanoplasty meticulous hemostasis is must for doing smooth surgeries. This problem can be solved by developing a stand for 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 so one has to be extra careful, while close to vital structures and positioning of the graft. This difficulty may be overcome by experience.

**Conclusion:** Both endoscope and microscope are good tools for tympanoplasty surgeries. Post operative outcomes such as graft uptake and hearing improvement were equally good in both. Operative time was more in endoscopic surgeries since one hand is occupied with endoscope. Endoscopes have wide angle view, visualization of hidden areas is easier. Whereas operating with both hands with good magnification and binocular vision are advantages of microscopic surgeries.

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