

Original Article

# Outcome of Endoscopic Transcanal Cartilage Myringoplasty performed in Janaki Medical College Teaching Hospital

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## ABSTRACT

**Background and Objectives:** Myringoplasty is a commonly performed surgical procedure usually with a microscope. Transcanal endoscopic myringoplasty is being widely used procedures nowadays and has the advantages of demanding lower operative time and minimal external incisions. The main objective of our study was to see the graft uptake rate and hearing results after endoscopic cartilage myringoplasty.

**Material and Methods:** This prospective study was carried out on 50 patients from March 01, 2020 till April 30, 2021. All patients presented with central perforation of tympanic membrane which was dry for at least 3 months were subjected to preoperative clinical, endoscopic, audiological assessment. These patients were followed through a period of 6 months and assessed using pure tone audiometry and graft uptake was seen.

**Results:** Out of 50 patients, male: female ratio was 1.9:1 with mean age group of 34 years. In our study the graft uptake rates is 85% (42) and 6 patient has pin hole perforation and 2 has small central re-perforation on 6 month followup. Mean preoperative air bone gap was 28.95 dB whereas mean postoperative air bone gap was 10.63 dB. The maximum number of patient i.e 20 had pre-operative air bone gap in the range of 31 – 40 and 20 has post operative air bone gap in the range of 0-10 which is normal.

**Conclusions:** The endoscopic approach for myringoplasty offers excellent visualization; avoids postaural approach, enables a faster recovery, requires less hospital stay, with excellent graft closure rate and improved functional outcomes.

**Key word:** Endoscopic, Myringoplasty, Transcanal

## INTRODUCTION

Chronic otitis media (COM) is defined as the chronic infection of middle ear and mastoid mucosa and/or bone with or without perforation with duration of 3 months and

above. COM affects 2-3% of the global population [1]. Chronic tympanic membrane (TM) perforation is a common complication of chronic otitis media (COM) and trauma in adult; persistent perforation requires surgical closure by myringoplasty. Myringoplasty is a

surgical procedure performed to close tympanic membrane perforation. Several graft materials and graft placement methods are used in myringoplasty. Fascia, perichondrium, cartilage and fat grafts are often used, but fascia is still the preferred graft material for most patients. However, cartilage grafts are favored in difficult cases, such as those with poor Eustachian tube function, retraction pockets, infection, or anterior perforations, as well as in revision surgery [2].

The operating microscope made significant advances in middle ear surgery possible for a period of almost 5 decades, but the drawback was unobservable blind angles in the middle ear cavity and a magnified image along a straight line only [3]. The introduction of endoscope in other area of medical field also finds its role in ear surgery. Endoscopes have better optics and magnification with wide angle of view due to angled lenses and provide the excellent resolution of image [4]. Endoscopic inlay butterfly cartilage tympanoplasty, without the need for canaloplasty or elevation of the tympanomeatal flap, has an excellent graft success rate, although it is technically more challenging in terms of achieving precise measurement of the perforation size and shape, and accurate sizing of the cartilage graft [5,6]. The objectives of the present study were to evaluate the graft uptake rate, to evaluate the hearing results, and to compare the preoperative and postoperative hearing results.

## **MATERIALS AND METHODS**

This study was conducted in the Department of ENT- Head and Neck surgery in Janaki Medical College Teaching Hospital from March 01, 2020 to April 30, 2021. Patients attending ENT OPD with central dry

perforation of tympanic membrane were selected for endoscopic transcanal myringoplasty. Written and informed consent were taken from the entire patient. Tympanic membrane status was assessed. Tuning fork test was done with 256 Hz, 512 Hz and 1024 Hz tuning forks. Pre-operative pure tone audiometry was done and recorded. Patient was admitted a day before surgery and a detail history was recorded and the clinical evaluation of ear, nose and throat was done. These patients were followed through a period of 6 months and assessed for graft uptake and hearing level using pure tone audiometry. Final follow-up was completed on April 30, 2020.

**Exclusion criteria:** Exclusion criteria were patients with marginal and attic perforation, cholesteatoma, granulation or flakes, wet central perforation, revision myringoplasty, ossicular chain discontinuity, patients not willing for the surgery.

**Procedure:** All these patients underwent surgery under local anaesthesia. A rigid endoscopes (Karl Storz) is used in our surgical techniques (4.0-mm, 0°, 18-cm-long). Patient ears were prepared and draped under sterile conditions without hair shaving. The patient is premedicated with intramuscular pethidine and promethazine intramuscularly as per body weight. The periaural area and external ear canal were infiltrated with 2% lidocaine hydrochloride and 1:2,00,000 epinephrine. Transcanal injections were administered in all 4 quadrants using a 26-gauge needle under direct endoscopic visualization.

**Step I** Freshening the margins of perforation – Margins of the perforation is freshened using sickle knife or angled pick so as to break the adhesions formed between the squamous margins of the ear drum with that

of the middle ear mucosa. This is followed by scraping of under surface of the tympanic membrane round the perforation using round knife.

**Step II** For harvesting of the tragal perichondrial graft, a 1-cm incision was made 2 to 3 mm medial to the free border of the tragal cartilage by cutting through the skin and cartilage. The perichondrium was freed of the cartilage and prepared as a graft. The incision was sutured with non- absorbable material. The graft was then shaped according to the perforation. The lateral perichondrium was peeled circumferentially and rolled up from the cartilage graft, forming a double layer graft with an interconnecting pedicle. The lateral graft is the perichondrium and the medial graft is the intact cartilage.

**Step III** Placement of graft (Underlay/overlay technique). The medial cartilage graft was placed trans-perforation medial to the TM remnant and the annulus; a notch of cartilage was accommodated the malleus to occlude the perforation. The lateral perichondrium was placed lateral to the malleus, annulus, TM remnant and EAC.

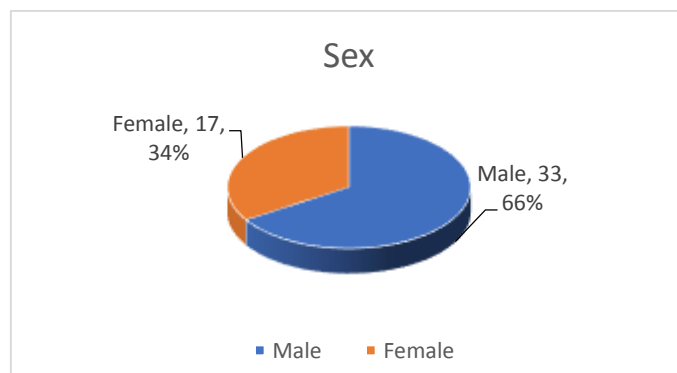
**Step IV** The canal was then packed with wet gelatin sponge soaked in ciprofloxacin ear drops and followed by the ribbon pack medicated with soframycin was kept in the canal and mastoid bandage was applied.

**Post-operative follow-up:** Postoperatively, all the patients received oral amoxicillin/ clavulanate potassium for 1 week to prevent infection. Post- operative follow-up visits took place at the hospital at weeks 1, 3 and 4 and at months 3 and 6. The packing gauze was removed from the EAC at 7 days post-surgery and antibiotics ear drop was started and continued for 6 weeks. The endoscopic evaluation was done on every follow up for

graft uptake and PTA was done on 6 month follow up.

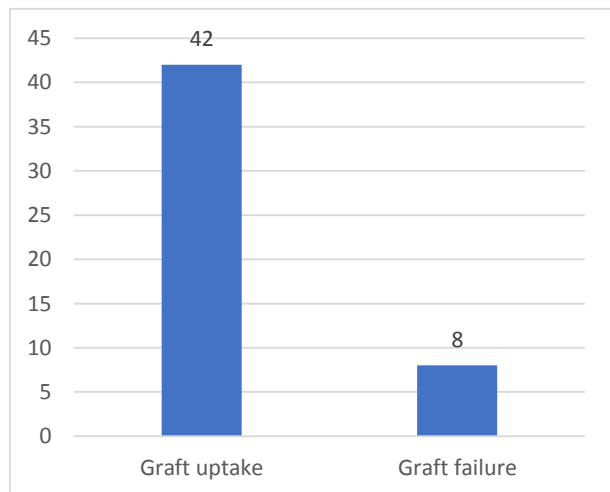
## RESULTS

During the study period, 59 patients were included, out of which 9 were lost to follow-up; therefore, only 50 patients were assessed. Among them only 42 patients were included for hearing outcome. 8 patients were excluded because of graft failure. Among these 8 patients 6 had pin point perforation and 2 had small re - perforation. So, the graft uptake rate was 85%. The mean age of the patients is 34 years old. Their age ranged from 18 to 64 years old. There were 33 (66%) males and 17 females (34%). As for the laterality, in 21 (42%) patients the operation was performed on the right side, and in 29 (58%) patients the operation was performed on the left side. All of the cases were performed under total endoscopic approach.



**Figure 1: Frequency and percentage of patients according to sex**

The mean preoperative air conduction threshold (ACT) and the airborne gap (ABG) were 46.34 and 28.95 respectively. Postoperatively, the ACT and the ABG closure were 27.77 and 10.63 respectively. The maximum of 20 cases had a preoperative ABG level between 31 and 40 dB, and the postoperative ABG had a maximum of 20 patients, which fell between 0 and 10 dB.



**Figure 2: Frequency of graft uptake and failure (n = 50)**

**Table 1: Pre- and Postoperative hearing outcomes (n = 42)**

Outcomes	Mean
Pre Operative ACT	46.34
Post Operative ACT	27.77
Pre Operative BCT	17.39
Post Operative BCT	17.14
Pre Operative ABG	28.95
Post Operative ABG	10.63

Abbreviations: ABG, airborne gap; ACT, air conduction threshold; BCT, bone conduction threshold.

**Table 2: Frequency of Airbone gap range (ABG) (n = 42)**

Frequency	Pre-Operative ABG	Post-Operative ABG
0-10	3	20
11-20	3	18
21-30	14	4
31-40	20	0
>40	2	0
Total	42	42

## DISCUSSION

Myringoplasty is one of the most common forms of surgery in otology. It yields very satisfying results for both to the patient and

the surgeon. The results are usually expressed in terms of the take-up rate of the graft and hearing improvement, which is assessed subjectively as well as objectively. The 1st reported case of endoscopic myringoplasty was by el-Guindy in 1992 [7]. There are now numerous studies published on endoscopic ear surgery with graft uptake rate comparable to microscopic ear surgery. Out of 50 patients included in our study, 33 were male patients and 17 were females. The graft success rate is 85% with mean post OP ABG of 10.63 and 20 patients with post OP ABG of 0 – 10.

Various factors influence the success rate of myringoplasty, such as age, the perforation portion, the perforation size, postoperative otorrhea, revision surgery, and poor visualization of the perforation margin [8] [9].

The study conducted by Leandro De Borborema Garcia et al, study in 2015, included 22 patients found that after 3 months of surgery, closure of TM perforation reported in 86.4% of cases [10]. In the study of Dawood MR in 2017, of 26 cases of successful myringoplasty, the mean ABG reduction was 20.73db [11].

Usami et al. reported on 22 myringoplasty patients treated with endoscopic assistance with a follow-up time of 24.5 months. The rate of perforation closure was 81.8% and improvement in ABG after surgery was 14.8 dB [12]. Karhketto et al. reviewed the records of 29 myringoplasty patients treated with the aid of rigid otoendoscopes with a follow-up time of one year. The rate of perforation closure was 80%, and improvement in ABG after surgery was 7 dB [13]. Yadav SPS et al. in his study of endoscopic myringoplasty 40 out of the 50 patients had an intact tympanic membrane in the 8th postoperative week,

accounting for an 80 % success rate [14]. Lade H. et al. in his study to ascertain the feasibility of transcanal endoscopic underlay myringoplasty using cartilage and compare the results with microscopic myringoplasty. A graft uptake rate of 83.3 % was observed in both groups postoperatively after 24 weeks [15]. Sekaattin Gulsen and others stated that transcanal endoscopic tympanoplasty is reliable alternate to microscopy tympanoplasty in management of COM, with comparable success rate of graft uptake and outcomes of hearing [16].

There was also an evaluation of the percentage of ears with ABG of below 10 dB. The percentages of respective ABGs before and after surgery for <20 dB and <10 dB were reported by Yu and Yoon as 76.5%, 88.2% and 29.4%, 70.6% [17]. Sakagami et al reported an anatomic success rate of 72% (18patients) and a postoperative ABG of <20dB in 15 (60%) of 25 patients [18]. Katsura et al reported an 85% success rate for graft take with hearing improvement in 15 (88%) patients [19]. Yu et al recorded a 100% success rate, with an improvement in ABG from 15.8 to 8.4 dB [20]. Rai et al reported a 93% graft take rate and an ABG of <20 dB postoperatively in 27 (90%) patients who had undergone bilateral myringoplasty using temporalis fascia [21].

## CONCLUSION

This study concludes that endoscopic approach is less invasive and has best cosmetic results, minimal damage to healthy structures so minimize post-operative complications. It has good access to visualize middle ear spaces or structures, safe and feasible procedure, with good success rate for tympanic membrane perforation closure and recovery of hearing threshold.

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