OUTCOMES OF ENDOSCOPIC TRANSCANAL SAME SITTING BILATERAL MYRINGOPLASTY: AN OBSERVATIONAL STUDY IN A TERTIARY CARE CENTER

Bishow Tulachan,[1] Roshan Acharya[1]

ABSTRACT

INTRODUCTION

The trend of same sitting bilateral myringoplasty has been sparkling the Otolaryngologists interest to go either microscopically or endoscopically as per the surgeon's skill and comfort as unilateral myringoplasty would lead to considerable increase in operation cost, time and discomfort to the patient.

MATERIAL AND METHODS

This prospective, observational study was held in the Department of Otorhinolaryngology and Head and Neck Surgery (ORL-HNS), Universal College of Medical Sciences-Teaching Hospital (UCMS-TH). There were 30 patients with age range of 8-50 years. All cases were done under general as well as local anesthesia. Tragal cartilage and the temporalis fascia graft were used as a graft material. Graft uptake results were assessed after 12 weeks and the intraoperative and postoperative complications were observed.

RESULTS

12 (40%) were male and 18 (60%) female. 15 (50%) patients had temporalis fascia graft and other 15 (50%) patients had tragal cartilage graft. 1 patient in each (fascia/cartilage) had a residual peroration in the subsequent operated side. The graft uptake success rate was 96.7% in both the temporalis fascia graft and the tragal cartilage graft myringoplasties with statistically significant association between type of graft and outcome (p=0.976. There were no significant complications observed during the 3 months follow up except the discomfort due to the bilateral mastoid dressing.

CONCLUSION

It is a safe, minimally invasive, and satisfactory procedure with a favourable and similar graft uptake success rate with the advantages of cost reduction, single anesthesia exposure, a low rate of postoperative complications and better cosmesis.

KEYWORDS

Chronic otitis media, Endoscopic, Otomicroscope, Tragal cartilage, Temporalis fascia

1. Department of ENT-Head and Neck Surgery, Universal College of Medical Sciences, Bhairahawa, Nepal

https://doi.org/10.3126/jucms.v12i03.73331

For Correspondence
Dr. Bishow Tulachan
Department of ENT-Head and Neck Surgery
Universal College of Medical Sciences
Bhairahawa, Nepal
Email: tulachanbishow@hotmail.com

INTRODUCTION

Myringoplasty is frequently performed for the repair of tympanic membrane (TM) perforations by the Otolaryngologists all over the world. Operating microscopes are commonly used for the ear surgeries. However, rigid endoscopes utilization in ear surgeries have revolutionized the speciality of Otolaryngology. It provides a magnified vision with good resolution. Magnification is achieved simply by just getting the endoscope closer to the surgical field. Further, the surgeon can get access to every nook and corners of the middle ear cavity by using the angled endoscopes. Even difficult areas to visualize under microscopy like sinus tympani can easily be examined using an angled endoscope. Surgical morbidity like canaloplasty or the postauricular incisions on using microscope is overcome by using the rigid endoscopy.

Traditionally each eardrum perforation was repaired with sequential grafting in two different settings, which leads to considerable increase in operation cost, time and discomfort to the patient. Consequently the trend of same sitting bilateral (b/l) myringoplasty has been rising worldwide either microscopically or endoscopically as per the surgeon's skill and comfort. Though the Otosurgeons were reluctant of doing it as per the literature stating a theoretical risk of postoperative sensorineural hearing loss (SNHL) seen in 1.2 - 4.5% of cases, they are now recommending it due to its several advantages and also realizing that the complications (the risk of SNHL) is encountered primarily in patients with cholesteatoma, congenital malformation, or granulation tissue or in cases where ossiculoplasty has been performed. The advantages of single sitting bilateral transcanal myringoplasty are single hospital stay, less financial burden, less morbidity, less off from work or school, reduces the waiting list for surgery and also the one sided graft material can be used for the both ears with good cosmesis.[1-13]

The prevalence of COM in Nepal is 7.2%.[14,15] Bilateral TM perforations are usual in Otolaryngology practice as it represents about 39.4% of perforated TM, and COM was found responsible for it in more than 90% of patients.[16,17] Acknowledging the advantages of same sitting bilateral procedure with rigid endoscopes, we intended to observe the graft uptake success rate and complications in same sitting bilateral endoscopic transcanal myringoplasty so that it might help on whether to pursue the procedure and graft preference in reconstruction of b/l TM perforation in our clinical setting and could be a platform for the future study.

MATERIAL AND METHODS

It was a hospital based prospective observational study carried out in the Department of ORL-HNS, UCMS-TH, Bhairahawa, Rupandehi from 15th March 2019 to 15th August 2023. It was approved by the Institutional Review Committee of UCMS-TH (UCMS/IRC/026/20). Patients admitted for bilateral same sitting transcanal endoscopy myringoplasty in UCMS ear, nose and throat (ENT) ward were enrolled in the study. The written consent was taken from the patients and caretakers. In this study, 30 cases of bilateral same sitting endoscopic myringoplasty operated by the single surgeon were included. The sample selection was convenience sampling technique.

The sample size was calculated using the following formula:
$n=z^2pq/d^2$
n=required sample size
p=prevalence of disease (7.2%)[14,15]
q=100-p

z=1.96 taken at 95% confidence interval
d=allowable error taken as 5%
$n= \{1.96^2 x\ 7.2\ x\ (100-7.2)\} \div 5^2$
Sample size calculated by above formula was 102.63. However we've taken 30 sample size as convenient sampling method.

Patients admitted for bilateral same sitting endoscopic myringoplast with only conductive hearing loss (CHL) in the range of 25 to 45 decibel, 8 years - 50 years age group and all genders were included in the study. However, patients with complications of chronic otitis media, revision cases, active ear discharge within last one month prior to surgery, cholesteatomatous and reluctant to participation in the study were excluded.

The enrolled cases were done under local anaesthesia (L/A) or general anaesthesia (GA). Either the patients or their care takers were counselled about the nature of operation and the informed consent was taken. A proforma was filled up for the complications faced intra-operative or post-operative and the graft uptake was noted at 12 weeks. All cases had routine pre-operative investigations as per the LA and GA requirements and pure tone audiogram preoperatively.

Surgical procedure
Patient were admitted one day prior to surgery or on the day of surgery in the morning for LA cases. Injection Ceftriaxone 1 gram to adults and 500 milligram to children were given intravenously before surgery and same dosage given in postoperative period twice daily.

The procedure was done under LA as well as GA via transcanal route. For LA, patient was premedicated with injection Pethidine 50 mg (1 ml) plus 25 mg of injection Promethazine intramusculary around 30 minutes prior to surgery. Patients were positioned in a supine position with their head up and turned to one side. After cleaning and draping, the side with a larger perforation was operated first so as to exclude concomitant pathology like granulation tissue, cholesteatoma or ossicular chain defect. Following the local infiltration of injection 2% xylocaine with 1:200000 adrenaline at a dose of 7mg/kg along the incision line of graft harvesting site and four quadrants of external auditory canal (EAC) and also 2 - 3 cotton balls impregnated with 4% xylocaine were kept in EAC. A thorough examination was done endoscopically (zero degree 4 mm, 17 cm rigid endoscope). A generous tragal cartilage graft with perichondrium on both sides approximately 1.5 x 1.5 cm size was then harvested from the donor (ear with larger perforation) site or a generous temporalis fascia graft harvested from 1 cm above the superior attachment of pinna. Around 2 mm of cartilage was left in the dome of tragus so as to maintain the contour. The incision was closed with Prolene 3-0 or Mersilk 3-0 cutting body. The graft was cut into two halves by using surgical blade number 15. Endoscope was held by the left hand and the microintruments by the right hand. The margins of the perforation were freshened with the straight needle and the undersurface with the round knife. Tympanomeatal (TM)

flaps are elevated as per the perforation size. 2 vertical incisions at 5 and 1 o'clock are made in medium (involving two quadrants of pars tensa)[16,17] to large (involving three or four quadrants)[16,17] sized perforations and third incision connecting the both around 7 mm away from the annulus. A thorough ear examination was done by noting the status of ossicles, ossicular mobility, chorda tympani, middle ear mucosa, round and oval windows and the eustachian tube orifice. The graft preparation was done under the top light. A 2 x 2 mm complete cartilage strip was removed vertically from the centre of the graft to accommodate the malleus handle in medium to large sized perforations. Graft was placed either underlay or in under overlay fashion. After TM flap reposition, tucking of graft was ensured in all the directions. The TM flap were not elevated in small sized perforations (involving one quadrant of pars tensa)[16,17] and the grafting technique was simply inlay butterfly myringoplasty technique (figure 2). In this technique, simply the perforation margins were freshened with the straight needle then the size was measured with the opened crocodile forceps and the same sized cartilage was prepared with a groove in the middle. Cotton balls soaked with adrenaline were used for haemostasis in between. In butterfly technique, the graft with the groove was inserted and the TM margins were tucked into the groove. Middle ear was filled with dry gel foam pieces in both the techniques followed by Ciprofloxacin soaked gel foam on top of new grafts and ribbon gauze pack (impregnated with Soframycin ointment) of around little finger's length and a piece of cotton soaked with betadine solution to cover it and box ear dressing was applied. Subsequently the other side was prepared with painting and draping however the instruments were re-used after cleansing with the spirit. Gloves were changed by the operating members. And the same procedure was carried out and followed by bilateral mastoid dressing. Patients were discharged on the first postoperative day (POD) after assessing the wound soakage, facial nerve status and the hearing discomfort. Antibiotics were given for 10 days along with the analgesics and antihistamines. Dressing was opened on the 4th POD and kept open without bandages. Sutures and ear pack were removed on the 7th POD. Patients were kept on Neomycin, Betamethasone and Phenyl Mercuric Nitrate ear drop for 3 weeks. First patient assessment after pack removal was done at 3 weeks then 4 weekly till 3 months post op. Complications if any were noted at every visit and the hearing assessment was done at 3 months post op. Only the subjective and tuning fork tests were done for hearing status. Graft uptake was noted on 12 weeks. Successful closure of the perforation was defined as an intact eardrum at 3 months postoperatively.

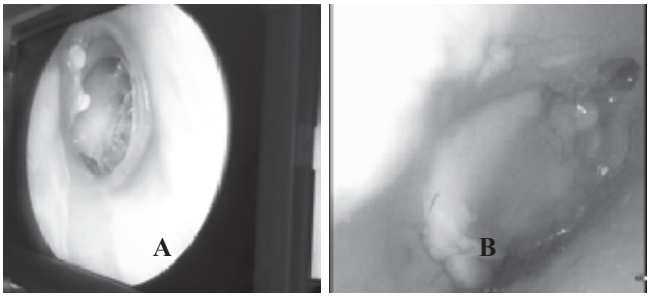

Figure 1. A) Endoscopic image of large TM perforation, B) endoscopic image showing well taken cartilage graft at 3 months follow up

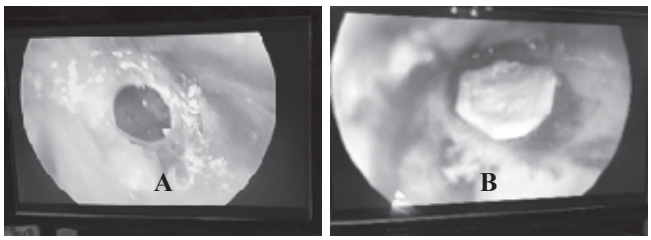

Figure 2. A) Endoscopic image of small central perforation, B) butterfly cartilage graft in small to medium sized TM perforation

RESULTS

30 patients underwent bilateral same sitting transcanal endoscopic myringoplasty from (15th March 2019 to 15th August 2023). 12 (40%) were male and 18 (60%) female. The age of the patients ranged from 9-45 years (mean age 26.53 years). There was 1 patient in 5-15 years old age group, 21 patients in 15-30 years old age group and 8 patients in 30-50 years old age group. In 15 (50%) patients, temporalis fascia graft was used and other 15 (50%) patients had tragal cartilage graft. 1 patient in each (fascia/cartilage) had a residual peroration in the subsequent operated side (table 1 & 3). Complications encountered intraoperatively and postoperatively shown in table 2. The association between the outcome and type of graft used is shown in table 3 and figure 3.

Table 1. Characteristics of patients, perforation size and graft materials

	No. of patients (N=30)
Age (range and mean)	9-45 (26.53)
Gender (male/female)	1:1.1
Size of perforations (small/medium/large)	
small	14
medium	14
large	2
Central perforations	60
Marginal perforations	0
Graft materials (temporalis fascia/tragal cartilage)	
Temporalis fascia	15
Tragal cartilage	15

Table 2. Complications intraoperative and postoperative

Complications	Intraoperative	postoperative
Bleeding	Minimal	none
Discomfort due to mastoid dressing	-	All
Wound gape	-	None
Pinna deformity	-	None
Graft displacement	-	None
Retraction pocket in pars tensa	-	None
Sensorineural hearing loss (SNHL)	-	None

Table 3. Association between outcome and type of graft

Outcome	Temporalis fascia graft	Tragal Cartilage graft	*p* value
Graft Success	29/30 ears (96.7%)	29/30 ears (96.7%)	
Graft Failure	1 (3.3%)	1 (3.3%)	0.976
Total	30	30	

*chi square test was applied.

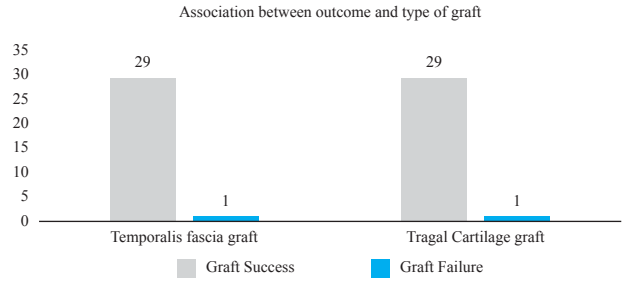

Figure 3. Association between type and outcome of graft

The results showed that graft became success equally in both types of graft. The results showed that there was statistically significant association between type of graft and outcome (p=0.976).

DISCUSSION

Bilateral TM perforations are not unusual in Otolaryngology practice as it represents about 39.4% of perforated TM, and COM was found responsible for TM perforation in more than 90% of patients. However bilateral same sitting transcanal myringoplasty is favoured less because of theoretical risk of postoperative SNHL.[18,19] The studies in the outcome of bilateral single sitting endoscopic transcanal myringoplasty is limited in the literature so far.

In the study done by Daneshi A et al.[2] in 9 patients (18 ears) who underwent bilateral same sitting endoscopic transcanal cartilage myringoplasty, 17 ears (94.44%) had a successful graft uptake rates and failure in 1 ear (5.55%) and the complications like retraction pocket or graft displacement was not observed during follow-up. Similarly, we had 96.7% (29/30 ears) successful graft uptake with 3.33% failure (1/30 ears) and without the postoperative complications like retraction pocket or graft displacement except the bilateral mastoid dressing discomfort as in study by Sharma RC et al.[9] The graft up take failure in our study could be due to the late follow up (2 months postop) in fascia group (large perforation) and repeated ear picking habit in cartilage group (large perforation) that led to fungal infections in the fascia group and the possible traumatic removal of cartilage graft.

In this study, we did not encounter any cases of postoperative SNHL. Our findings are consistent with those of previous studies.[1-4,8,15,18,19] So it is felt that single sitting bilateral myringoplasty when indicated can be performed in most patients without much discomfort or apprehension of SNHL. The case selection should be one of the factors for better outcome in both the groups where both the ears must be dry at least a month before operation and the involvement of single surgeon.

The limitations in this study were relatively small sample size and the follow up period was only 3 months. So, a study with larger sample size and longer follow ups is required to reach a widely accepted results.

CONCLUSION

Bilateral same sitting endoscopic transcanal myringoplasty using tragal cartilage or temporalis fascia from one ear is a safe, minimally invasive, and satisfactory procedure with a similar high graft uptake success rate. Also, it has the advantages of cost reduction, single anaesthesia exposure, graft taken from one side can be used in both sides, a low rate of postoperative complications and better cosmesis.

CONFLICT OF INTEREST

None

REFERENCES

1. Deniz B et al "Simultaneous Bilateral Same-Day Endoscopic Myringoplasty Using Tragal cartilage From One Ear". Ear, Nose and Throat Journal 2020;99(8):522-27.

2. Daneshi A et al "Bilateral same-day endoscopic transcanal cartilage tympanoplasty: initial results". Brazilian Journal of Otorhinolaryngology 2017 :83:411-15.

3. Raghuwanshi SK and Asati DP. "Outcome of single-sitting bilateral type 1 tympanoplasty in Indian patients". Indian Journal of Otolaryngology and Head and Neck Surgery 2013;65:622-26.

4. Ansari MA., et al "Outcome of Bilateral Myringoplasty in Dry Central Perforation- An Appraisal". Journal of the Dow University of Health Sciences 2014;8(1):16-20;

5. Palva T et al "High-tone sensorineural losses following chronic ear surgery". Archives of Otolaryngology 1973;98:176-78.

6. Smyth GD. "Sensorineural hearing loss in chronic ear surgery". Annals of Otology, Rhinology, and Laryngology 1977;86: 3-8.

7. Tos M., et al "Sensorineural hearing loss following chronic ear surgery". Annals of Otology, Rhinology, and Laryngology 1984;93:403-09.

8. Sood AS. "Bilateral Single Sitting Myringoplasty Using Tragal Cartilage from One Ear". Indian Journal of Otolaryngology and Head and Neck Surgery 2013;65: 656-59.

9. Sharma RC, Saroch M. Our experience with single sitting bilateral myringoplasty. Indian Journal of Otology. 2013;19(2): 59-61.

10. Balasubramanian T, Venkatesan U. Endoscope assisted myringoplasty. Online Journal of Otolaryngology 2012;2(1):1-9.

11. Yadav S P S, Aggarwal N, Julaha M, Goel A. Endoscope-assisted myringoplasty. Singapore Med J 2009; 50(5):510-12.

12. Raj A, Meher R. Endoscopic transcanal myringoplasty – A study. Indian Journal of Otolaryngolgy and Head and Neck Surgery 2001;53(1):47-49.

13. Shanmugam V U, Shanmugam R, Mariappan R, Swaminathan B, Srikanth N, Puvvada S. Outcome of

endoscopic tympanoplasty. Int. J. Modn. Res. Revs. 2015;3(10):1017-19

14. Little P, Bridges A, Guragain R, Friedman D, Prasad R, Weir N. Hearing impairment and ear pathology in Nepal. J Laryngol Otol. 1993:07: 395-400.

15. Rayamajhi et al BURDEN OF CHRONIC OTITIS MEDIA- MUCOSAL TYPE AND THE IMPACT OF ITS SURGICAL MANAGEMENT IN THE QUALITY OF LIFE OF PATIENTS IN A TERTIARY HOSPITAL. Nepalese Journal of ENT Head & Neck Surgery 2020;11(2):19-23

16. El-Ahl M, Amer HS, El-Anwar MW. Simultaneous bilateral myringoplasty as a single-stage operation. The Egyptian Journal of Otolaryngology 2013; 29:16–19.

17. Maharjan M, Kafle P, Bista M, Shrestha S, Toran KC. Observation of hearing loss in patients with chronic suppurative otitis media tubotympanic type. Kathmandu Univ Med J 2009; 7:397–401.

18. Olowookere SA, Ibekwe TS, Adeosun AA. Pattern of tympanic membrane perforation in Ibadan: a prospective study. Annals of Ibadan Postgraduate Medicine 2008; 6:843-53.

19. VS Abhishek, Datta Dhrubajyoti, T Jeumon, D Narendranath.. Simultaneous Bilateral Type I Tympanoplasty as a Day Care Procedure. Bengal Journal of Otolaryngology and Head Neck Surgery 2017; 25(2):101-6.