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Otoendoscopic management of small to medium sized tympanic membrane perforation

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ABSTRACT

Background: Chronic suppurative otitis media (CSOM) is a wide spread disease of developing countries like India especially in rural areas. A perforated tympanic membrane results in loss of hearing due to decreased drum area and liability to recurrent infection of the middle ear mucosa.
Methods: A prospective study was conducted over a period of 18 months in the Department of ENT, HNS, Government Medical College, Srinagar with total of 36 patients were enrolled.
Results: This study consists of male 12 and 24 females mean age 32 yrs hearing loss average 26 db. Management methods were grouped in group A, B, C and D fat myringoplasty, chemical cauterization (trichloroacetic acid), fat myringoplasty + chemical cauterization: and transcanal transtympanic myringoplasty using tragal perichondrium respectively with least success seen in group B 55% and 100% seen in group D.
Conclusions: Otoendoscopic management of small to medium sized TM perforations with different methods is a cost effective, less traumatic procedure, cosmetically better and functionally effective in terms of hearing improvement.

Keywords: Otoendoscope, CSOM, Tympanic membrane

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a wide spread disease of developing countries like India especially in rural areas. It is one of the commonest causes for hearing loss that mainly result due to tympanic membrane perforations. Although 88% of tympanic membrane perforations of any size heal without any interventions, the rest become chronic and require surgery. These non-healing perforations typically require tympanoplasty for closure. In developing countries like India, where tertiary medical facility is not available to all people, treatment should be cost effective and easily feasible at even primary health centre. Medical costs associated with tympanoplasty have recently compelled investigators to search for less expensive, simple non-surgical, less traumatic methods. Without closure of perforation morbidity may include chronic ottorhera and cholesteatoma formation, deterioration of hearing.[1]

Traumatic perforations usually heal spontaneously, and it is preferable to wait for at least 3 weeks prior to any intervention. A perforated tympanic membrane results in loss of hearing due to decreased drum area and liability to recurrent infection of the middle ear mucosa. These problems limit the patient's participation in water sports, and for job recruitment in the military service and as a motor vehicle driver.[2] Different methods of tympano-plastic surgery have been used. Transcanal otoendoscopic management for small to medium size tympanic membrane perforation includes TCA, harvesting tempo-ralis fascia graft, tragal perichondrium graft and fat myringoplasty. The transcanal technique using composite tragal perichondrium cartilage graft, which is specially

designed like a butterfly to fit in the perforation without support in the middle ear or the external auditory canal has better outcomes.[1,2] The technique carries practical advantages of decreased surgical time, comfort to patient, cosmesis in terms of minimal scarring, improved hearing and dry ear. Other approaches involve postauricular, endoscopic tympanoplasty.

Advantages of otoendoscopic myringoplasty

- It is less traumatic, requires less operating time, less expensive, less morbid, results in less postoperative pain.
- Visualizes the whole tympanic membrane and the ear canal without having to manipulate the patient's head or the microscope.
- Extends the operative field in the transcanal procedures of the structures usually hidden under the microscope.
- Visualizes structures from multiple angles as opposed to the microscope's single axis along the ear canal. Provides extremely sharp image with high resolution.

The aim of this study was to evaluate the function and success rate of otoendoscopy closure of small to medium sized tympanic membrane perforation using different types of procedures.

METHODS

This prospective study was conducted over a period of 18 months in the Department of ENT, H&NS, Government Medical College, Srinagar. A total of 36 patients were enrolled for the study after fulfilling the inclusion criteria. All the patients were treated on OPD basis and were followed for 18 months. Patients having safe type of tympanic membrane perforation were included in this study. Pure tone audiometry was used to assess the average air-bone gap preoperatively and postoperatively, including the failed cases

Inclusion criteria

Inclusion criteria were dry central perforation for minimum 6 weeks; central perforation measuring 3.5 mm in longest diameter i.e. approximately 30% area of tympanic membrane (parstensa mild conductive hearing loss (<40 db); normal eustachian tube and cochlear function; no significant pathology in tympanic cavity (judged by otoendoscopic examination).

Exclusion criteria

Exclusion criteria were perforation with discharge; moderate hearing loss (>40 db); large central/subtotal /total perforation; atticoantral type of CSOM.

Measurement of size of perforation: size of perforation is measured with the help of otoendoscopy. Thin, non-traumatic and transparent plastic strips of different gauge varying from 1 to 6 mm are used to measure maximum diameter of perforation.

Hearing was assessed by tuning fork test and pure tone audiometry. For those who had bilateral perforations, one ear was treated first and the other ear was treated 6 weeks to 3 months later.

Group A: Fat myringoplasty

Fat plug myringoplasty is an under-used technique to repair a small central tympanic membrane perforation. It is easy, quick and cost effective way with minimal morbidity. It can be done as an OPD procedure. The fat is readily available from ear lobe, abdomen and buttocks. Fat was harvested from ear lobule and kept in normal saline, margins of perforation freshened, middle ear examined and single piece of dumbbell shaped fat was introduced sealing the tympanic membrane perforation.

Group B: Chemical cauterization (trichloroacetic acid)

4% xylocaine was used to anaesthetize the tympanic membrane by adding a few drops into a small cotton ball and placing it into the external canal wall over the surface of the tympanic membrane for about 10 min. Using otoendoscope undersurface of the rim of the perforation was cauterized using a cotton tipped applicator dipped in 50% trichloroacetic acid until a white cauterized margin 0.5 mm in width is created and the excess of the chemical was removed using a dry cotton swab. Care was taken not to scar the promontory. Once the blanching of the rim was complete, a small sterile, thin gel foam patch moistened with antibiotic drops was placed as a patch over the perforation.

Group C: Fat myringoplasty + chemical cauterization

In some patients both the procedures were done i.ecauterization of margins followed by use of fat plug for small to medium size tympanic membrane perforation.

Group D: Transcanal transtympanic myringoplasty using tragal perichondrium

Perichondrium was harvested and kept in normal saline, margins of perforation was freshened, bed for graft was prepared using gel foam in the middle ear, graft was placed over the tympanic membrane remnant covering it all along beyond 2 mm of margin. The graft was then pushed by the circular knife all along the 360 margin so that the perichondrial graft was overlapped by tympanic remnant all over. Gel foam kept canal packed by using ointment.

RESULTS

All the patients were treated on OPD basis and were followed for 18 months. Total of 36 patients 24 were

females rest males with mean age 32 yrs. Most of the patients 80% presented as hearing impairment associate with complain of ear discharge and on and of tinnitus. Patients having safe type of tympanic membrane perforation were included in this study. All the patients were grouped on basis of management type done as group A, B, C, D and results were analyzed. Patients were randomly selected for type of treatment modality. Post-operative results were grouped immediately post op and 6 months after (late post-operative period). Pure tone audiometry was used to assess the average air-bone gap comparing preoperatively and postoperatively, including the failed cases and were tabulated.

The maximum number of patients had an improvement of magnitude ranging from 11 to 20 db.

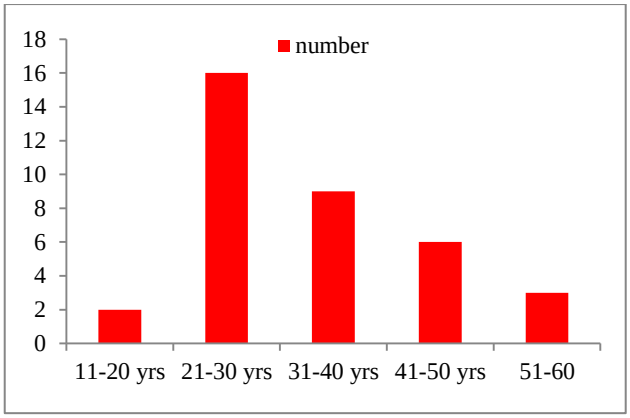

Figure 1: Age distribution of patients.

Table 1: Patient distributions in various management groups.

Procedure	No. of patients	Healed tympanic membrane post operative	Results (%)
Fat myringoplasty (Group A)	9	7	78
Chemical cauterization (trichloroacetic acid): Group B)	9	5	55
Fat myringoplasty + chemical cauterization (Group C)	9	8	88
Transcanal transtympanic myringoplasty using tragal perichondrium (Group D)	9	9	100

Table 3: Immediate postoperative hearing changes.

Average air- bone gap(db)	Preoperative no. of patients	Postoperative no. of patients 4 weeks
<10	2	23
11-20	6	8
21-30	22	5
>30	6	0

Table 1: Late post-operative hearing changes.

Average postoperative air-bone gap (db) after 6 month follow up	Number of healed cases(%)
<10	29
11-20	5
21-30	2
>30	0

DISCUSSION

Otoendscopic management of small to medium size tympanic membrane perforation is one of the most fast growing surgery in otology. It yields very satisfying results for both to the patients and the surgeon. The results are usually expressed in terms of the healed tympanic membrane and hearing improvement, which is assessed subjectively as well as objectively. When we evaluated the preoperative and postoperative air-bone gap, there was an upward shift in all patients in all groups with least in group B 55% and 100% in group D.

Landsberg et al performed fat graft myringoplasty on 38 perforations and found successful closure in 81.6%.[3] They also described significant improvement in speech reception threshold (18.5±7.7 dB vs. 23.5±8 dB). In our study the result was comparable with less difference (78%) could be due to less sample size.

In a study conducted by Uppal et al in 1997, trichloroacetic acid cauterization showed 78% success rate in closing perforations of tympanic membrane with an average of 2.8 applications.[4] Goldman conducted a study on chemical closure of tympanic membrane and 64% success rate was observed.[5] In study a another comparison of chemical cautery versus fat myringoplasty by Debnath, closure results were found to be comparable with an average success rate of 68%.In our study the results were 55% with chemical cautry only and 88% with combination of chemical cautry and fat myringoplasty.[6] The less success rates are explained as

chemical cauterisation nedded repeated cycles and less no of cases in study group. The perichondrium graft success rate in myringoplasty was reported as 71%– 96% in the literature review of el-Guindy et al, Yadav et al.[7,8]

A otoendoscopic tympanoplsty fulfills the criteria of minimally invasive surgery with least trauma to normal tissue and that almost excludes pre and postoperative complications. We used the otoendoscope for the inspection of medial surface of tympanic membrane as well for the ossicular chain. Otoendoscope was helpful in excluding and treating the possible unwanted presence of epithelium in the middle ear, which is almost impossible to do in conventional microscopic tympanoplasty.[5,7] Since we did not encounter any postoperative cholesteatoma in our cases during follow up 18 months, we believe that the otoendoscopic examination of tympanum allows one to repair the small to medium size tympanic membrane perforation without any possibility of iatrogenic choleasteatoma in contrast to conventional microscopic tympanoplasty.

CONCLUSION

Otoendoscopic evaluation, with its visualization of hidden areas, justifies myringoplasty through a tympanic membrane perforation with comparable better results. It also avoids unnecessarily exposure to anaesthetic agents, work loss due to stay in hospital, less traumatic cost effective procedure and better in terms of hearing improvement.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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