

Original Research Article

Study of outcome of tympanoplasty with and without mastoid antrum exploration in patients with mucosal CSOM

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ABSTRACT

Background: Chronic suppurative otitis media (CSOM) is a major cause of acquired hearing impairment in children. Standard medical treatment of tubotympanic CSOM is aural toilet, topical antibiotics, systemic antibiotics and dry ear precautions. Surgical intervention for safe / tubotympanic CSOM is tympanoplasty. Otologists currently remain divided as to the importance of antrum exploration in the treatment of tubotympanic CSOM. The aim of the study was to evaluate the outcomes of tympanoplasties with and without antrum exploration in cases of tubotympanic CSOM in terms of graft uptake rate and hearing improvement.

Methods: The present study included 60 patients of CSOM with central perforation who underwent surgery at JNU IMSRC from January 2016 to July 2016. Detailed history, clinical examination including tuning fork test, pure tone audiometry was done. All patients were followed up for a period of 3 months.

Results: Out of the 60 cases of tubotympanic CSOM graft uptake was seen in 53 cases (88.33%). Graft uptake rate was 96.6% in patients who underwent tympanoplasty with antrum exploration which was significantly higher than those who underwent tympanoplasty alone (80%). Hearing improvement was seen in 93.10% of patients who underwent tympanoplasty with antrum exploration as compared to 83.33% of patients of tympanoplasty which was not statistically significant ($p=0.263$).

Conclusions: Tympanoplasty with antrum exploration is recommended in all patients of CSOM as it enhances the chances of graft uptake.

Keywords: Chronic suppurative otitis media, Tympanoplasty, Tubotympanic CSOM, Antrum exploration

INTRODUCTION

Ear discharge is a common ear complaint encountered by an otorhinolaryngologist. Most of the cases of long term ear discharge are attributed to chronic suppurative otitis media. Chronic suppurative otitis media (CSOM) is a major cause of acquired hearing impairment in children. It is also an important cause of preventable hearing loss, particularly in the developing world. Incidence of CSOM is higher in developing countries because of poor socioeconomic standards, poor nutrition and lack of

health education. In India overall prevalence rate of CSOM is 46 and 16 persons per thousand in rural and urban population respectively.

According to WHO, CSOM is defined as an 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 (otorrhoea) are present. Clinically CSOM is divided into two types a) tubotympanic/safe CSOM and b) atticoantral/ unsafe CSOM.

Tubotympanic involves anteroinferior part of middle ear cleft i.e. Eustachian tube and mesotympanum and is associated with a central perforation. There is no risk of serious complications.

Standard treatment of tubotympanic CSOM is conservative management with aural toilet, topical antibiotics, systemic antibiotics and dry ear precautions.¹ In those that do not resolve or do not result in spontaneous healing of tympanic membrane with conservative measures, surgical intervention is done. Surgical intervention for safe / tubotympanic CSOM is tympanoplasty.²

Tympanoplasty is a procedure used to eradicate disease in the middle ear and to reconstruct the hearing mechanism with or without tympanic membrane grafting.^{3,4} The goal of otologists performing middle ear surgery is to make the patient free of ear discharge and correct the conductive hearing loss.

The management of tubotympanic chronic otitis media has witnessed a significant change during the past few decades. Otologists currently remain divided as to the importance of antrum exploration in the treatment of tubotympanic CSOM. Some authors have thought that antrum exploration is justified in cases of chronic suppurative otitis media, which have been refractory to antibiotic therapy and is essential for the complete clearance of the disease process.⁵ However, others have argued that antrum exploration is not only unnecessary but also increases patient risks with little or no significant advantage in clinical outcome.

Along with several key factors, infection represents a major cause of graft failure in tympanic membrane reconstruction and can result from a hidden mastoid disease. Tubotympanic CSOM often leads to blockage of aditus ad antrum by oedematous mucosa thus obstructing the ventilation and drainage of mastoid air cells. The resultant negative pressure in the mastoid induces mucosal edema in mastoid air cells with fluid exudation and small hemorrhages. According to proponents of Antrum exploration, it is an effective method of eradicating the mastoid source of infection and checking the patency of aditus ad antrum thus ensuring the pneumatisation of mastoid air cells.

This study was designed to determine which technique is better for successful outcome of surgery.

Aims and objectives

The aim of the study was to evaluate the outcomes of tympanoplasties with and without antrum exploration in cases of tubotympanic CSOM in terms of:-

- Graft uptake rate.
- Hearing improvement.

METHODS

This prospective study was conducted in the Ear, Nose and Throat Out Patient Department of Jaipur National University Institute of Medical Sciences and Research Centre, Jaipur from January 2016 to July 2016. The study was carried out on 60 patients, who were divided into two groups of 30. Group A consisted of patients undergoing only tympanoplasty and Group B consisted of patients undergoing tympanoplasty with antrum exploration.

The segregation of patients into the two groups was randomized.

All the data obtained was tabulated, grouped and analysed using appropriate SPSS statistical methods.

Inclusion criteria

Inclusion criteria were age– 15 to 45 years; central perforation; X ray mastoid Schuller's view showing sclerotic mastoid; minimum of 2 weeks elapsed since last episode of ear discharge; mild to moderate conductive hearing loss.

Exclusion criteria

Exclusion criteria were patients having atticointral disease; age less than 15 years and more than 50 years; patients with mixed hearing loss and moderate to severe degree of hearing loss; X ray mastoid Schuller's view showing pneumatic mastoid; medical contraindications to surgery.

Detailed history, clinical examination including tuning fork test, pure tone audiometry was done to assess degree of hearing loss. Examination under microscope was done to see the margins of the perforation, granulation tissue and polyp and the status of ossicular chain. Routine and radiological investigations including X-ray both mastoids (Schuller's lateral oblique view). Nasal endoscopy was done to look for ET function.

All patients were followed up for a period of 3 months. Informed written consent to undergo surgery was obtained from all patients. Mastoid shaving and local preparation was done in the ward prior to surgery. All cases were done under GA.

Postaural incision was given. Temporalis fascia harvested as graft. External auditory meatus opened. Rim and undersurface of perforation made raw. Posterior tympanomeatal flap raised. Antrum opened in group B cases. Ossicular mobility checked. Graft put by underlay technique. Gelfoam filled in canal. Wound closed in layers. Mastoid dressing done. Patient called for regular follow up.

RESULTS

The present study included 60 patients of CSOM with central perforation who underwent surgery at JNU IMSRC from January 2016 to July 2016. The following observations were made in the study.

Table 1: Age wise distribution.

Age group (in years)	Tympanoplasty N (%)	Tympanoplasty with antrum exploration N (%)
15-25	15 (50)	14 (46.6)
26-35	9 (30)	8 (26.6)
36-45	6 (20)	8 (26.6)

The chi-square statistic is 0.379. Both groups were comparable with $p=0.827364$. Most of the patients in both the studies were in the age group of 15-25 years.

Table 2: Size of perforation.

Size of perforation	Tympanoplasty N (%)	Tympanoplasty with antrum exploration N (%)
Small	19 (63.3)	17 (56.6)
Large	11 (37.7)	13 (43.4)

Perforations involving <50% of total drum area were considered small whereas those with area >50% were taken as large. Most of the patients in both the groups had small perforations. Size of perforation was statistically insignificant in both the groups with $p=0.598161$. The chi-square statistic is 0.2778.

Table 3: Graft uptake.

Graft status	Tympanoplasty N (%)	Tympanoplasty with antrum exploration N (%)
Graft taken	24 (80)	29 (96.66)
Graft not taken	6 (20)	1 (3.33)

Cases of tympanoplasty with antrum exploration had a significantly higher success rate in terms of graft uptake as compared to those without antrum exploration ($p=0.044352$). The chi-square statistic is 4.0431.

Table 4: Hearing improvement.

Hearing status (AB gap closure ≥ 10 db)	Tympanoplasty N (%)	Tympanoplasty with antrum exploration N (%)
Improved	20 (83.33)	27 (93.10)
Not improved	4 (16.66)	2 (6.89)

Hearing improvement was considered if air bone gap closure is ≥ 10 db.

The chi-square statistic is 1.2486. The p-value is 0.263813. Fisher exact test statistic value is 0.3923. The result is not significant at $p<0.05$.

DISCUSSION

All the 60 cases were analysed and results compared with similar studies in literature. In our study patients were selected in the age group of 15-45 years with most of the patients (48.33%) in the age group of 15-25 years.

In a study conducted by Lasisi and Afolabi the majority of patients were aged 21-34 years which was in concurrence with present study.⁶ The chi-square statistic is 0.379. Both groups were comparable with $p=0.827364$.

In our study most of the patients i.e. 36 (60%) had small perforation. Size of perforation was statistically insignificant in both the groups with $p=0.598161$. In most of the studies in literature, small sized and medium sized perforations are most common.

The overall graft take up rate in patients undergoing surgery is 88.33% which is also within the range to the studies available in literature. In a study by Mishiro et al graft uptake rate was 90% whereas in another study by McGrew et al graft uptake rate is 91%.^{7,8}

In our study graft uptake rate in patients undergoing tympanoplasty with antrum exploration is 96.66%. Similarly a study conducted by Holmquist and Bergstrom suggested that mastoidectomy improves the chance of successful tympanoplasty for patients with noncholesteatomatous chronic otitis media.⁹ In a study conducted by Nayak et al of a sample size of 40 patients which were followed up for a period of 20.4 months had a success rate of 100% in tympanoplasty with mastoidectomy and 60% in tympanoplasty revealing that mastoidectomy is required in all cases.¹⁰ Many authors suggest that a cortical mastoidectomy should be carried out at the same time as myringoplasty in active ears. Mishiro et al compared 104 ears treated by tympanoplasty alone with a previous group of 147 ears treated by tympanoplasty with mastoidectomy. There was no significant difference in the tympanic membrane closure rates between groups (94% in tympanoplasty alone and 91% in tympanoplasty with mastoidectomy). Balyan et al reported in 81 ears that were actively discharging at the time of surgery treated with tympanoplasty without mastoidectomy (53 ears) and tympanoplasty with mastoidectomy (28), there was no significant difference in the graft success rates between these groups (91 and 86% respectively).¹¹ Mc Grew et al in their paper on 'Impact of mastoidectomy on simple TM Perforation repair' concluded that mastoidectomy impacts clinical course of disease in patients by reducing

number of patients requiring future surgery and disease progression.⁸

The hearing improvement after the surgery was assessed in terms of closure of the Airbone gap based on the pure tone audiometry done at 3 months. The hearing improvement was considered successful if the airborne gap closure was better than or equal to 10 dB. In Group A, an airborne gap closure ≥ 10 dB was noted in 20 cases (83.33%) out of 24 cases in which graft was taken up with an average airborne gap closure being 12.1 dB. In the remaining 10 cases, the graft was not taken up in 6 cases while the other 4 had an improvement less than 10 dB. In Group B, successful hearing improvement was noted in 27 (93.10%) out of the 29 cases in which graft was taken up with an average airborne gap closure of 15.6 dB. The graft had not taken up in the 1 case that did not show any hearing improvement after tympanoplasty with cortical mastoidectomy and in the remaining 2 cases (6.89%) improvement was less than 10 dB. So hearing improvement was not significantly different in both the groups.

CONCLUSION

Many authors have recommended mastoidectomy in conjunction with tympanic membrane grafting to increase graft success in revision tympanoplasty. The primary argument in favor of mastoidectomy has been an improvement in the middle ear and mastoid environment through clearance of diseased mucosa and through the ventilatory mechanisms of an open mastoid system. It is theorized that when an aerated mastoid communicates well with the middle ear, it acts as a buffering system to reduce the impact of pressure changes experienced by the middle ear. Thus in a well pneumatized mastoid, significant changes in middle ear pressure will likely to have little effect on the middle ear and tympanic membrane owing to the buffering action of the mastoid air cell system. Hence, tympanoplasty with mastoidectomy will improve the outcome of surgery in terms of graft uptake as it will help in achieving the patency of mastoid air cell system in cases where it is blocked. But there is no difference in terms of hearing improvement.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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