

Role of Cortical Mastoidectomy in Mucosal Type of Chronic Otitis Media: An Institutional Study

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INTRODUCTION

Chronic otitis media represents one of the most common diseases of the middle ear cleft. It is classified into mucosal, squamousal and healed otitis media. Based upon whether the ear discharge is present it is further sub-divided into active and inactive type of mucosal or squamousal disease [1]. In mucosal type of COM chances of complications are less, whereas squamousal disease i.e. cholesteatoma is often associated with osteitis, bone erosions, granulation tissue, marginal perforation and risk of complications is high. It affects people of all age groups and both genders.

Chronic otitis media continues to be an important public health problem despite significant advances in medical science in south-east Asian countries. It is the commonest preventable and curable cause of hearing loss. The definitive treatment is tympanomastoid exploration. The aim of surgery is to eliminate the infection, achieve dry ear, and prevent reinfection by closure of tympanic membrane perforation and to restore hearing. Chronic otitis media is multifactorial disease; causes include recurrent and long standing middle ear infection, inflammation, eustachian tube dysfunction, nasal allergy and trauma.

At present otolaryngologists around the globe are not using tympanomastoidectomy as a routine procedure in the treatment of mucosal type of chronic otitis media. There is controversy about the role of mastoidectomy along with tympanic membrane repair in cases of mucosal type of chronic otitis media. There are different studies on this topic with variable opinions regarding role of cortical mastoidectomy in mucosal type of COM [2-5]. There are many factors which affect the successful outcome of surgery, it includes the type of mastoid pneumatization and presence of inflammatory disease in the mastoid air cells. Holmquist and Bergstrom in 1978 observed that well aerated mastoid is a pre-requisite for a ventilated middle ear and long term success [6].

The term “Tympanoplasty” was first used by Wullstein in 1953 [7]. Various grafting materials have been used. Temporalis fascia is the most commonly used graft material. Other grafting materials such as vein graft, fat, perichondrium, placental membrane have been used. Glasscock and Shambaugh used full thickness skin graft, while Wullstein and Zollner used split thickness skin grafts [8]. The most common approaches for Tympanoplasty are end-

aural, post-aural and per-meatal. Endaural approach gives better exposure of posterior part, while post-aural approach give better exposure of anterior part of tympanic membrane. For small perforation with wide canal, per-meatal approach is applied.

We studied 60 patients who were diagnosed with mucosal type of chronic otitis media and they underwent tympanoplasty and cortical mastoidectomy surgery under general anaesthesia for the success rate in terms of graft uptake and disease free ear.

Keywords: Chronic otitis media, mucosal type COM, Mastoidectomy

AIMS AND OBJECTIVES

1. To study demography of the patients presenting to us with COM, their graft uptake rate, improvement in hearing thresholds
2. To evaluate role of mastoidectomy in patients with mucosal type COM & improvement of long term surgical outcomes in these patients.

MATERIAL AND METHODS

A prospective, observational and interventional study conducted at a tertiary care hospital in India. 60 patients operated during the period of one year were included in the study. Patients in the age group 15–55 years diagnosed with mucosal type of chronic otitis media (COM) were taken into account. Patients with squamous type of disease, otogenic complications, pure sensorineural hearing loss, uncontrolled diabetes or hypertension, bleeding disorders, prior ear surgeries, or active infections in the ear, nose or throat were excluded. Informed consent was taken from all the patients included in the study.

Pre-Operative Work Up

A detailed medical history, physical examination, systemic assessment and local examination was done for patients in the study. Pre-operative pure tone audiogram and HRCT temporal bone were taken. Standard laboratory investigations, blood and urine workup were conducted. Pre-anaesthetic assessment before undergoing surgery was done. All the patients received broad spectrum antibiotics a day prior to scheduled surgery, written informed consent obtained and patients were overnight fasting.

Operative Procedure

60 patients included in the study underwent cortical mastoidectomy with tympanoplasty under general anaesthesia. All the cases were operated through post aural approach by the same surgeon to avoid any confounding factors affecting the study results.

Technique - Local infiltration 1 in 100000 lignocaine with adrenaline solution injected post aurally and in the external auditory canal. William wilde's incision given, dissection performed using monopolar cautery. Temporalis fascia graft harvested. Soft tissue and periosteum dissected and reflected anteriorly, mastoid cortex exposed. Meatotomy performed few millimetres medial to spine of Henle. External canal, tympanic membrane perforation and middle ear mucosa findings noted. Margins of perforation dissected and removed out to achieve bleeding edges. External auditory canal infiltrated at this stage again with 0.5 ml to 1 ml 1 in 100000 Lignocaine+ Adrenaline solution. Tympanomeatal

flap raised by giving incision at 12'o clock and 6 o'clock position in the bony canal skin and flap raised till annulus. A second curved incision was given anteriorly parallel and 3 to 4 millimetres lateral to the anterior annulus meeting up to the above mentioned radial incisions. Annulus elevated by sharp incision and middle ear entered status of ossicular chain and middle ear mucosa noted. Mac Ewen's triangle was identified and cortical mastoidectomy performed. Mastoid antrum was inspected for any hypertrophied mucosa if present, it was removed and sent for histopathological examination. Aditus was inspected and widened if required. Antral patency test was done using saline ensuring ventilation between mastoid air cells and middle ear. Tympanoplasty was done depending upon the status of ossicles either by remodelled incus or cartilage which was harvested from the conchal cartilage. Grafting was done using temporalis fascia graft by underlay technique in all the cases. Tympanomeatal flap repositioned, antibiotics soaked gel foams pack in the middle ear and over the edges of temporalis fascia graft stabilising the graft and the skin flap in the external auditory canal. The wound was sutured in 2 layers after ensuring complete hemostasis mastoid dressing was done.

Post-Operative Care

All patients received broad spectrum antibiotics, analgesics and antihistamines. All patients were explained the precautions, instructed to keep the operated area dry and not to blow the nose, to keep mouth open during coughing & sneezing. Suture ends were removed 7th post-operative day and topical antibiotics drops and ointment started. Water precautions and care were explained to the patients. Patients were observed for vertigo, tinnitus, otalgia, facial paresis, fever and headache.

Follow Up

Patients were followed up at 3 weeks, 6 weeks, 3 months, 6 months, 1 year and 2 year after the surgery. Assessment of status of ear, graft uptake and hearing improvement in term of air-bone gap closure was done. Pure tone audiometry was taken at 3 months postoperatively; again at 1 year and at 2 year post-operatively.

OBSERVATION AND RESULTS

It was observed that out of 60 patients in the study 32 (53.33%) were females and 28 (46.66%) were males. Patients included were in age group of 15-55 yrs. It was observed that 22 patients(36.6%) were in age group of 20-30 yrs and 20 patients (33.3%)were in age group of 30-40 yrs. 5 (8.33%) patients presented with complaints of hard of hearing only and 55 (91.66%) had history of Mucopurulent ear discharge on and off. 32 out of which (53.3%) had ear discharge since childhood.

34 patients (56.66%) had moderate size central perforation; 16 (26.66%) had large central perforation and 10 (16.66%) patients had small size central perforation involving single quadrant of tympanic membrane.

Pure tone audiogram of these patients showed average hearing loss of 36.42 db and average air-bone (AB gap) of 28.46 db at the time of admission.

Pre-operatively, HRCT temporal bone was studied in all the patients included in the study and 51 patients (85%) were found to have sclerotic type of mastoid air cells, 7 patients (11.66%) had mixed type of mastoid and 2 patients (3.33%) were observed to have pneumatic type of mastoid air cell system.

Intraoperatively, it was observed that antrum mucosa was hypertrophied in 14 patients, aditus was blocked in 9 patients and middle ear mucosa hypertrophy in 7 patients. Incus was necrosed in four cases, malleus & incus absent in one case and malleus was absent with incus & stapes intact in one case (Table1). Stapes was intact & normal with mobile footplate in all the 60 cases.

Table 1: Preoperative findings

Structure/Site	Involved	Percentage (%)
Antral mucosal hypertrophy	24	40%
Aditus block	13	21.60%
Middle ear mucosal hypertrophy	9	15%
Malleus absent	1	1.66%
Incus necrosed	4	6.66%
Incus absent	1	1.66%
Stapes superstructure absent	0	0

14 patients had mucoid discharge coming out of antral region and 46 ears had dry middle ear cleft (Table 2). Middle ear findings of ears with mucoid discharge and dry ears were compared intraoperatively. It was observed during surgery that all 14 cases with mucoid discharge has antral mucosa hypertrophy, 64.2% had aditus block and 50% of them had middle ear mucosa hypertrophy too. Ossicular chain necrosis too was observed more in ears with mucoid discharge with 5 cases as compared to single case in dry ear.

Table 2: Comparison of dry ears and ears with mucoid discharge

Structure/Site Involved Percentage (%)	Ears with mucoid discharge 14 patients	Dry ears 46 patients
Antral mucosal hypertrophy	14 (100%)	10 (21.7%)
Aditus blocked	9 (64.2%)	4 (8.69%)
Middle ear mucosal hypertrophy	7 (50%)	2 (4.34%)
Long process of incus partially necrosed	2 (14.2%)	1 (2.17%)
Long process of incus fully necrosed	1 (7.14%)	0 (0%)
Malleus and Incus absent	1 (7.14%)	0 (0%)
Malleus absent	1 (7.14%)	0 (0%)

Cortical mastoidectomy with type 1 tympanoplasty was performed in 55 cases. 4 cases with ossicular necrosis cortical mastoidectomy with type 2 tympanoplasty was done where ossicular chain necrosis was present 1 case where both malleus and incus were eroded type 3 tympanoplasty was performed using cartilage graft. Stapes was present in all 60 cases included in the study. Ossicular chain reconstruction was done using remodelled incus i.e. auto-incus graft in the cases where incus body present. In the case where malleus and incus both were absent conchal cartilage was used for reconstruction & cartilage strut was kept between stapes head and temporalis fascia graft.

During follow up period, at 3 months mark, 8 out of 60 (13.33%) patients showed post-operative myringitis which was treated according to the spectrum of antibiotics given by culture and sensitivity report of ear swab. Most common organism cultured in such cases was pseudomonas aeruginosa. Four patients (6.66%) infection completely resolved and graft uptake was normal as observed during follow up period. Four patients (6.66%) showed residual perforation, two (3.33%) out of which responded to trichloroacetic acid application i.e. chemical cauterization under microscope

and graft was healed subsequently. Two patients (3.33%) showed residual perforation due to graft rejection. These cases were addressed by revision surgery after 6 months. All patients were followed up to observe long term results. All 58 of them had tympanic membrane intact at 2 year follow up.

Overall, 58 (96.66%) patients had graft acceptance. Graft acceptance was better in dry ear patients as failed cases were from wet ear with mucoid discharge category.

At the end of 3 months and then at 2 years, PTA was taken, AB gap of each patient was calculated. For 91.66% of patients hearing thresholds were in the range of 20 db. Average air–bone–gap reduced to 11.8 dB as compared to average air–bone–gap preoperatively of 28.46 dB.

DISCUSSION

Chronic otitis media is the most common middle ear cleft disease in developing countries. Overcrowding, poor nutrition, low socio-economic status are considered as risk factors. Definitive treatment for mucosal type of chronic otitis media is tympanoplasty with or without mastoidectomy.

The study by Holmquist and Bergstrom first suggested that mastoidectomy increases the probability of successful tympanoplasty and achievement of dry ear in non-cholesteatomatous chronic otitis media. They observed that creating an aerated mastoid enhances the success rate in patients with poor tubal function or small mastoid air cell system [6]. Several authors support the theory given by Holmquist and Bergstrom although studies so far have proven that addition of mastoidectomy yields better results as compared to tympanoplasty alone as cited by Balyan et al [9] and Jakson et al [10].

In our study, preoperatively it was observed that 14 out of 60 patients i.e. (23.33%) of the cases were having mucoid discharge in the middle ear when mastoid antrum was opened, it was also observed that all 14 patients were having mucoid discharge were having associated antral mucosal hypertrophy (100%) as compared to only 10 patients out of 46 (21.7%) cases of dry ear. This shows a strong association of presence of discharge in the mastoid when discharge is found in middle ear.

In a study done by Kabdwal et al. [11] where 93 % of the patients in the study were observed to have a sclerotic mastoid in ours, 51 patients (85%) were found to have sclerotic type of mastoid air cells, 7 patients (11.66%) had mixed type and 2 patients (3.33%) pneumatic type of mastoid air cell system was present.

Similarly, on examining the aditus (communication between the middle ear and mastoid air cells) intraoperatively, it was found to be blocked in 9 (64.2%) patients with mucoid discharge in the ear as compared to only 4 (%) out of 46 patients with dry ear. Out of 14 patients with mucoid discharge 4 were having ossicular chain disruption whereas 1 out of 46 patients with dry ear were having long process of incus necrosed.

These observations suggest that ossicular chain disruption is an association in patients with mucoid discharge in the diseased ear.

Above findings suggest that the patient is found to have mucoid discharge preoperatively generally also have inflammatory changes and disease in the mastoid and also blockage of the passage between middle ear and mastoid air cell system.

Our results were not calculated statistically, to get the answer to the current question, whether mastoidectomy has role in improving results of tympanoplasty to achieve dry ear and disease free status in the long run. Comparative studies with larger sample size is needed to get a definitive answer.

Robert K. Jackler observed that after tympanoplasty alone any inflammatory disease within the mastoid becomes trapped behind the repaired tympanic membrane. While this disease may resolve spontaneously after closure of the middle ear; recurrent suppuration with graft loss and perforation will occur in some cases [12]. After myringoplasty with cortical mastoidectomy, however ears with inflammatory mastoid did very well as those without the signs of inflammatory changes. Again that implies a beneficial effects from mastoidectomy in the diseased mastoid air cell system [12].

CONCLUSION

We recommend opening of mastoid air cells, for the cases of mucosal type of chronic otitis media especially the ones with mucoid discharge. Cortical mastoidectomy should be done in order to achieve better ventilation and removal of inflammatory disease of middle ear cleft system & better surgical outcomes with good long term results.

Conflicts of interest: None

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