

Original Article



Cortical Mastoidectomy with Tympanoplasty in the Management of Chronic Mucosal Otitis Media

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Abstract

Background: Cortical mastoidectomy with tympanoplasty is considered the standard of treatment in case of active mucosal chronic otitis media, refractory to medical treatment. **Objective:** Aim for this study was to find out the efficacy of cortical mastoidectomy with tympanoplasty in the management of chronic mucosal otitis media. **Materials and Methods:** This is an observational study conducted from January 2016 to July 2016. Total 50 patients were included in this study. Inclusion criteria was diagnosed cases of mucosal chronic otitis media with persistent ear discharge, adequate medical treatment, age between 15-60 years of both sexes. All the patients underwent cortical mastoidectomy with tympanoplasty, and patients were followed up to 12 weeks to evaluate graft take rate and compare pre-operative and post-operative hearing status. **Results:** In this study male to female ratio was 1.17:1. Mean age of study group was 30.66 (9.62) years. Graft uptake was successful in 43 (87%) and in 07 (14%) graft didn't take. Graft take rate was highest in 15-30 years age group. Mean pre-operative and post-operative air bone gap were 28.45 (7.69) dB and 25.30 (8.5) dB respectively. **Conclusion:** Cortical mastoidectomy with tympanoplasty shows good outcome in aspects of disease clearance and graft uptake success in chronic mucosal otitis media. Although hearing gain occurs in most cases, it is rather modest.

Key words: Chronic otitis media, Hearing loss, Myringoplasty, Tympanoplasty, Cortical Mastoidectomy.

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Introduction

Chronic otitis media (COM) is a major ear disorder in our country, with prevalence rate of 5.2%.¹ WHO defines COM as -Chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharge through a tympanic membrane perforation.² Mucosal COM is a common variety of COM, which remains localized to mucosa and involves eustachian tube and middle part of middle ear cavity. It can be active or inactive depending on the presence or absence of discharge in the ear.³ Hearing impairment is usually not severe, depends on the size of tympanic membrane perforation, intactness of ossicular chain and presence of granulation tissue in the middle ear.⁴ The initial management of active mucosal COM is geared towards achieving discharge free ear. Topical antibiotics with steroid and regular aural toileting are the mainstay of pre-surgical interventions.⁵ Although medical treatment is effective in reducing otorrhea

in most cases, it may recur after discontinuation. Persistence of discharge indicates a mastoid reservoir.⁶ There has been a clinical impression that lack of an aerating mastoidectomy at the time of tympanoplasty may be a significant cause of graft failure in patients with mucosal COM, so a cortical mastoidectomy with tympanoplasty has long been considered the surgical procedure of choice.⁷ Several studies have shown additional beneficial effect of mastoidectomy, while on the other hand multiple studies have shown no additional benefit.⁸⁻¹⁴ Whether a tympanoplasty only or a combination of cortical mastoidectomy with tympanoplasty is a suitable procedure to surgically address a case of active mucosal COM-has been an issue of debate.

Aim for this study was to find out the outcome of cortical mastoidectomy with tympanoplasty in the management of chronic mucosal otitis media.

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Materials and Methods

This was an observational study to evaluate the outcome of cortical mastoidectomy with tympanoplasty in the management of chronic mucosal otitis media cases refractory to medical treatment. The study was conducted at the department of otolaryngology and Head-Neck surgery, Shaheed Suhrawardy Medical College Hospital (ShSMCH), Dhaka from January 2016 to July 2016. Calculated sample size was 50 and Inclusion criteria was diagnosed cases of mucosal COM with persistent ear discharge, adequate medical treatment, age between 15-60 years of both sexes. This study involved interviewing all patients (and/or his/her attendant) who underwent cortical mastoidectomy with tympanoplasty, in the department of Otorhinolaryngology and Head-Neck surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka. After admission history was taken & aural examination was done using otoscope and microscope. Relevant investigations including mastoid radiographs and pure tone audiometry (PTA) was done. Pre-operative informed written consent was taken. Per-operative microscopic examination was done. All the patients underwent cortical mastoidectomy with tympanoplasty. After operation first follow up was on 7th Post-operative day, during which skin stitches were removed. The second follow up visit was done on 2nd week, during which aural packs were removed. Next follow up visit was done 3-4 weeks later. After 12 weeks PTA was done to evaluate the post-operative hearing status. Assessment of graft uptake was done by using otoscope in all visits of the patient. Good graft uptake was considered if there was no residual perforation seen after the end of follow up period at 12 weeks. All the information was recorded in prescribed data sheet, and analysed using SPSS (Statistical Package for Social Sciences) version 20. The Chi-Square test was used to analyse the significance level of $p < 0.05$. Continuous data was presented as mean standard deviation and categorical data was presented in number percentage. The summarized data was presented in the tables and charts.

Ethical approval was taken from ShSMCH Ethical review board (ERB) on 24th February, 2016. All the patient volunteered and informed written consent was taken from all patients.

Results

Table I: Sex distribution of the study group (n=50)

	Number of Patients	Percentage (%)
Male	27	54
Female	23	46

In this study 27(54%) of the study population were male and 23(46%) were female. Male: Female ration was 1.17:1 (Table I)

Table II: Age distribution of the study group (n=50)

Sex	Number of Patients	Percentage (%)
15-30	30	60
31-45	16	32
46-65	04	08
Total	50	100
Mean±SD	30.66 (±9.62)	15-52 years

30(60%) of the study population were in the age group of 15-30 years, followed by 16(32%) in 31-45 years and 04(08%) between 46-65 years. Majority of the study population were in the age group of 15-30 years. Mean age was 30.66 (9.62) years (Table II).

Table III: Distribution of symptoms among the study group (n=50)

Symptoms	Number of Patients	Percentage (%)
Ear discharge	50	100
Hearing Impairment	36	72
Tinnitus	02	04
Itching in ear	06	12
Earache	02	04

All patients presented with history of otorrhea, 36 (72%) had hearing impairment, and 02 (04%) had earache. Tinnitus was present in 02 (04%) and itching in ear in 06 (12%) of patients. Most patients presented with more than one symptom (Table:III).

Table IV: Size of Tympanic membrane perforation in the study group (n=50)

Size of Perforation	Number of Patients	Percentage (%)
Small	14	28
Medium	21	42
Large	09	18
Subtotal	06	12

Majority of the perforation were medium in size 21 (42%). 14 (28%) had small, 09 (18%) had large and 06 (12%) had subtotal perforation. In patients with bilateral perforation, ear with larger perforation was considered for operation. (Table: IV).

Table V: Hearing status before operation in the study group (n=50)

A-B Gap	Number of Patients	Percentage (%)
<10 dB	Nil	Nil
11-20 dB	06	12
21-30 dB	27	54
31-40 dB	12	24
>41 dB	05	10

Pre-operative air-bone gap was between 11-20 dB in 06 (12%), between 21-30 dB in 27 (54%), between 31-40 dB in 12 (24%) and > 41 dB in 05 (10%) of the patients participating in this study (Table-V).

Table VI: Hearing status after operation in the study group (n=50)

A-B Gap	Number of Patients	Percentage (%)
<10 dB	Nil	Nil
11-20 dB	16	32
21-30 dB	22	44
31-40 dB	08	16
>41 dB	04	08

Postoperative air bone gap in majority were between 21-30 dB which occurred in 22 (44%) (Table-VI)

Table VII: Comparison between pre and post-operative A-B gap (n=50)

A-B Gap	Number of Patients	Percentage (%)	P value
<10 dB	Nil	Nil	
11-20 dB	6(12)	16 (32)	
21-30 dB	27 (54)	22 (44)	
31-40 dB	12 (24)	08 (16)	0.007614
>41 dB	05 (10)	04 (08)	
Total	50 (100)	50 (100)	
Mean±SD	28.45 (±7.69)dB	25.30(±8.5) dB	

Mean pre-operative and post-operative air bone gap were 28.45 (7.69) dB and 25.30 (8.5) dB respectively. P-value was found to be 0.007614, which indicates post-operative hearing gain was statistically significant (Table-VII).

Table VIII: Graft take rate in relation to age group in study population (n=50)

A-B Gap	Graft take	Percentage (%)	P value
15-30	29	1	
31-45	11	5	
46-65	03	1	0.027443
Total	43	7	

Graft uptake was successful in 43 (87%) and in 07 (14%) graft didn't take. Graft take rate was highest in 15-30 years age group. P-value was calculated to be 0.027443, which indicates graft take rate was statistically significant (Table-VIII).

Table IX: Complications of operation (n=50)

A-B Gap	Number of Patients	Percentage (%)
Graft failure	07	14
Persistent otorrhea	03	06
Deterioration of hearing	03	06
Post-operative wound infection	01	02
Wound infection	00	00
Nerve	00	00

Graft failure occurred in 07 (14%) and persistent otorrhea was found in 03 (06%) patients. Postoperative wound infection occurred in 01 (02%) case. Deterioration of hearing occurred in 03 (06%) patients. There was no facial palsy or damage to chorda tympani nerve (Table-IX).

Discussion

In the surgical management of COM, it is well accepted that the main purpose of operation is to achieve a permanently dry ear and closure of the perforation. Management of mastoid in cases of active mucosal COM with refractory otorrhea remains controversial. Whether to perform tympanoplasty only or to perform cortical mastoidectomy in conjunction with tympanoplasty continues to be debated. The purpose of our study was to evaluate the outcome of cortical mastoidectomy with tympanoplasty in the management of active mucosal COM.

In our study mean age was 30.66 (9.62) years. Majority 30 (60%) of the study population were between 15-30 years. 27 (54%) were male and 23(46%) were female. Kakkar V et al. showed that 55% of the patients were in the age group of 15-25 years. Average age was 27.20 years. In a study of Tawab et al. most patients were in the age group of 20-29 years. The youngest patient was found to be 12 years old and oldest patient 60 years.

Present study showed that all patients presented with otorrhea (100%) and hearing impairment was present in 36 patients (72%). Kakkar et al. found 33 patients (82%) presented with hearing loss. An article showed that otorrhea and reduced hearing was common in all age groups, 92% and 70% respectively.¹⁵ One observer showed that ear discharge was present in all the patients (100%), loss of hearing in (80%).¹⁶ In a retrospective study, the most common presenting symptoms were hearing loss (85%) and otorrhea (73%).¹⁷ Another one demonstrated 52 patients (55 ears), commonest presenting symptom were otorrhea plus hearing loss (54%), otorrhea only (29%), hearing loss only (7.6%).¹⁸

In our current study, all patients had otorrhea because active disease was taken as inclusion criteria. Most patients had either purulent or mucopurulent non-offensive discharge, which persisted after 6 months of trial of medical therapy. The volume of discharge was variable. But majority of patients had profuse otorrhea, some had moderate. In general, amount of discharge depends on the amount of mucosa inflamed or infected. Thus, in patients with profuse otorrhea, it's likely that mastoid antrum and air cells are affected.

Hearing impairment was found in 72% patients. The hearing loss can be attributed to perforation of the tympanic membrane and the status of the ossicular chain. Larger the perforation on the tympanic membrane, higher the hearing loss. Sometimes a small or medium sized perforation can be associated with significant hearing loss due to co-existent ossicular damage. Although ossicular damage is more common in squamous disease, it can occur in long standing mucosal disease and contribute to further hearing loss.

In our study population, 2 patients complained of tinnitus and 1 patient had earache. Subjective tinnitus is rare and difficult to explain by involvement of conductive apparatus. Tinnitus in these patients are due to simultaneous sensorineural involvement. Earache in 1 patient was due to concurrent otitis externa.

In current study, majority of perforations were medium in size, 27 patients (54%). 28% patients had small sized and 18% patients had large perforations. In a study done by Kakkar et al⁹ majority of the patients also had medium size perforation, 21 patients (52%). The size of the perforation of tympanic membrane depends on the duration and severity of middle ear inflammation. Longer the duration of COM, larger the perforation, in general sense. But chronic aural discharge from a pinhole perforation is not uncommon.

In our study, mean pre-operative and post-operative air-bone gap were 28.45 (7.69) dB and 25.30 (8.5) dB respectively. Whereas another one showed that 20.80 7.08 dB mean air-bone gap was found pre-operatively and 19.93 7.27 dB post-operatively. Toros et al. revealed that pre-operative mean A-B gap was 26.44 (10.03) dB and post-operative mean A-B gap were 16.77 (11.1) dB.

Our mean hearing gain was 3.15 dB. This result is similar to the findings of Tawab et al, who depicted as 2.5 dB mean gain post-operatively and someone described a 5.48 dB 2 months post-operative hearing gain.²⁰ These finding suggest that, although cortical mastoidectomy with tympanoplasty results in hearing gain, it's not much. Cortical mastoidectomy's contribution in hearing is negligible, as it doesn't address any component of the conductive hearing apparatus. The hearing gain usually results from closure of tympanic membrane defect which leads to more effective sound transmission through the ossicles and re-establishment of the phase differential of the oval and round window.

We found that, graft uptake was successful in 43 patients (87%). Other showed that among 48 patients with COM who underwent surgery, graft uptake occurred in 85.7%, graft failure occurred in 14.3%.²¹ Tores et al revealed that tympanic membrane perforation closure was successful in 78.3%, graft failure rate was 21.7%. Rate of graft uptake was found to be similar-80% by Tawab et al¹³, and 82.85% by Bhat et al. In a study, myringoplasty was performed with cortical mastoidectomy on randomly selected 67 patients, out of which successful graft uptake was observed in 60 patients after 1-year period of observation (94%). Reperforation due to infection noticed only in 2 patients (6%), within 4 months of observational period.²²

In our study, graft failure occurred in 07 patients (14%). I was most predominant in the age group of 31-45 years; 05 of 16 patients (31.25%). Much lower failure rate was observed in 15-30 years age group, only 01 of 30 patients (3.33%). This is probably due to higher immunity and regenerative cellular function at relatively younger age. With increasing age, body's healing mechanism deteriorates, which accounts for higher graft failure rate in the older age group. Failure of graft uptake even after doing an aerating mastoidectomy can be due to a number of causes like - eustachian tube dysfunction, less than optimum surgical technique, reinfection and others.

Kawatra et al showed overall graft rejection rate was 17.5% in cases undergoing myringoplasty with cortical mastoidectomy. As far as graft take up rate is concerned, our results are comparable to Bhat et al¹⁴ who observed success rate of 82.85% for myringoplasty with cortical mastoidectomy group.

In our study hearing gain was found in 34 patients (68%). No hearing improvement was found in 16 patients (32%). Similarly, Krishnan et al¹¹ found that hearing gain occurred in 75% patients after cortical mastoidectomy with tympanoplasty. Hearing gain mostly occurs due to repair and reconstruction of the tympanic membrane. But there is a discrepancy, as graft take up occurred in 87% and hearing gain occurred in only 68% patients in our study. This may be due to peroperative damage to the ossicles or undetected ossicular damage in a percentage of patients. Also, inflammatory process may continue behind an intact tympanic membrane, which will impair sound conduction to inner ear.

Conclusion

After considering all the variables related to this study and comparing them to other contemporary studies, we can conclude that - Chronic mucosal otitis media, not responding to medical therapy, is a disease entity that needs to be corrected surgically. Currently it is difficult to distinguish between cases which will require cortical mastoidectomy with tympanoplasty and cases which will require tympanoplasty alone. Nevertheless, cortical mastoidectomy with tympanoplasty shows good outcome in aspects of disease clearance and graft uptake success in chronic mucosal otitis media. Although hearing gain occurs in most cases, it is rather modest.

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