

Original Research Article

Assessment of the outcome of myringoplasty with cortical mastoidectomy in dry and wet mucosal type of chronic otitis media

Sreeshma Balan*, Prakash M. D.

Department of Otorhinolaryngology, Bangalore Medical College and Research centre, Bangalore, Karnataka, India

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*Correspondence:

Dr. Sreeshma Balan,

E-mail: dr.sreeshma2014@gmail.com

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ABSTRACT

Background: Chronic otitis media (COM) is an inflammatory process in the middle ear space that results in long-term changes in the tympanic membrane including atelectasis, dimeric-membrane formation, perforation, tympanosclerosis, retraction pocket or cholesteatoma. COM can be classified into healed, inactive (mucosal or squamosal), active (mucosal or squamosal). Myringoplasty is tympanoplasty without ossicular reconstruction. Cortical mastoidectomy is usually accompanied by tympanoplasty. Aim was to assess and compare the efficacy of myringoplasty with cortical mastoidectomy in dry and wet mucosal type of COM, in terms of graft uptake and hearing improvement.

Methods: A prospective study, where 30 patients each of wet and dry mucosal-type COM were included. Patients underwent myringoplasty with cortical mastoidectomy. All were followed up for 6 months, both the groups were statistically compared.

Results: In our study, mean age of patients in group A (wet COM) was 34.13 years and group B (dry COM) was 33.36 years. Group A had success rate of 90% and group B had success rate of 86.6%. There was no statistical significance (p value- 0.53) on comparing both groups with respect to graft uptake. There was significant hearing improvement post-operatively in both the groups (p<0.05). However, there was no significant difference between the groups (p value- 0.66). This shows that presence of discharge at the time of surgery does not interfere with the results of cortical mastoidectomy with myringoplasty.

Conclusions: We conclude that, there is good outcome in both wet and dry COM following myringoplasty with cortical mastoidectomy with respect to graft uptake and hearing improvement.

Keywords: Cortical mastoidectomy, Chronic otitis media, Myringoplasty

INTRODUCTION

Chronic otitis media (COM) is an inflammatory condition involving the middle ear space which can result in irreversible or permanent changes in the tympanic membrane such as perforation, tympanosclerosis, retraction pocket, atelectasis or cholesteatoma.¹ It accounts for a significant part of health problems in our society and hence cannot be overlooked. Chronic otitis media has been classified into healed COM, inactive (mucosal) COM, inactive (squamosal) COM, active

(mucosal) COM and active (squamosal) COM. Inactive COM is permanent perforation of the pars tensa but the middle ear mucosa is not inflamed. Active COM is permanent defect of the pars tensa with an inflamed middle ear mucosa which produces mucous type of discharge.²

To eradicate the disease and obtain a dry, safe ear along with restoration of hearing mechanism forms the primary goal of surgery in chronic otitis media. This primarily requires a tympanic membrane; an air containing,

mucosal lined middle ear and a secure connection between the tympanic membrane and inner ear fluids.

The most commonly performed surgery for chronic otitis media is the tympanoplasty procedure. It is defined as a surgical procedure to eradicate disease in the middle ear and to reconstruct the hearing mechanism, with or without mastoid surgery and with or without tympanic membrane grafting.³ Myringoplasty is a tympanoplasty involving only tympanic membrane repair without ossicular reconstruction. Cortical mastoidectomy is usually accompanied by tympanoplasty. Simple mastoidectomy or Schwartz procedure involves removing the mastoid cortex and varying amounts of the air cell system, depending on the disease process.⁴

In this study the efficacy of myringoplasty with cortical mastoidectomy in dry and wet mucosal type of COM is compared to assess the success of graft uptake and hearing improvement.

Objectives

To compare the graft uptake following myringoplasty with cortical mastoidectomy in wet and dry mucosal type of COM; and to compare the hearing improvement following myringoplasty with cortical mastoidectomy in wet and dry mucosal type of COM.

METHODS

It was a prospective study conducted at Sri Venkateshwara ENT institute and Bowring and Lady Curzon Hospital, attached to Bangalore Medical College and Research Institute, Bangalore from November 2016 to May 2018. A minimum of 60 cases of mucosal type COM were included in this study with 30 patients each of wet and dry ear.

Inclusion criteria

Any patient between the age group of 18 to 60 years of either sex willing to give informed consent, having mucosal type of chronic otitis media with mild to moderate conductive hearing loss were included in the study.

Exclusion criteria

Anyone aged below 18 years and above 60 years; COM with total and marginal perforation; otitis media with cholesteatoma; otitis media with mixed hearing loss; patients with hearing loss of more than 45 dB; patients with systemic illness; traumatic perforations of tympanic membrane; and COM with mucopurulent discharge.

Data collection was started after obtaining clearance from ethical committee.

In this study 60 patients attending the OPD diagnosed

with mucosal type of COM were included. Informed and written consent was taken from the patients. They were subjected to detailed history taking followed by complete general physical examination and complete otorhinolaryngological examination. They underwent audiological tests like: 1) tuning fork tests, 2) pure tone audiometry, 3) pre-operative investigations like complete blood count, RBS, BT, CT, RFT, HIV, HBsAg, chest x-ray, ECG.

Patients with purulent discharging ear were treated conservatively with appropriate antibiotics, antihistamines and topical ear drops. They were allocated to two groups of 30 cases each. Group A: A minimum of 30 wet ear cases underwent myringoplasty with cortical mastoidectomy. Group B: A minimum of 30 dry ear cases underwent myringoplasty with cortical mastoidectomy.

Temporalis fascia graft will be used in both the groups. They were followed up at first month, third month and sixth month. The success of graft uptake is assessed by otoendoscopic examination at the end of first month. Success of surgery is defined as complete repair of tympanic membrane perforation without lateralization, atelectasis and blunting and post-operative improvement in hearing. PTA was repeated at third month and sixth month post-operatively. Pre-operative and post-operative air-bone gaps of the two groups was compared.

The results obtained during the study were statistically analyzed using Vassar stat SPSS Version 20.0.

Sample size estimation

Based on previous study by Nagle et al on tubotympanic type of COM, primary closure rate in dry ear and wet ear was 88 % and 74% respectively.

Assuming there will be difference of 30% between 2 groups, the required sample size in each group was calculated to be 30 by using the formula:

$$n = \frac{(Z_{\alpha} + Z_{1-\beta})^2 [P_1 (100 - P_1) + P_2 (100 - P_2)]}{d^2}$$

Z_{α} = Standard table value for 95 % CI =1.96

$Z_{1-\beta}$ = Standard table value for 80 % power =0.84

P_1 = Proportion in first group =74

P_2 = Proportion in first group =88

d = effect size =30

$n = (1.96 + 0.84)^2 [74 (100 - 74) + 88 (100 - 88)] / 30^2$

$n =30$.

RESULTS

60 patients diagnosed with mucosal type of COM were included, they were allocated into 2 groups of 30 in each group. Group A: 30 wet mucosal COM ear cases underwent myringoplasty with cortical mastoidectomy. Group B: 30 dry mucosal COM ear cases underwent myringoplasty with cortical mastoidectomy.

Table 1: Gender distribution of patients.

Sex	Group A (n)	%	Group B (n)	%
Male	12	40	14	46.66
Female	18	60	16	53.33

Table 2: Age group.

Age (years)	Group A (n)	Group B (n)
15-30	11	9
31-45	13	18
46-60	6	3

There was slight female preponderance both in group A (60%) and group B (53.3%) (Table 1). In our study mean age of patients in group A (wet COM) was 34.13±12 years and group B (dry COM) was 33.36±14 years with majority of patients in age group of 3rd and 4th decade second decade in both groups (Table 2). In group A (wet COM) right and left ear COM was seen. In 14 (46.66%) and 10 (33.33%) patients respectively. While 6 patients (20%) had bilateral COM. In group B (dry COM) 14 patients (46.66%) had right COM, whereas 12 patients (40%) had left ear COM and 4 (13.3%) patients had bilateral COM (Table 3).

Table 3: Side affected.

Side	Group A (n)	%	Group B (n)	%
Right	14	46.66	14	46.66
Left	10	33.3	12	40
Bilateral	6	20	4	13.33

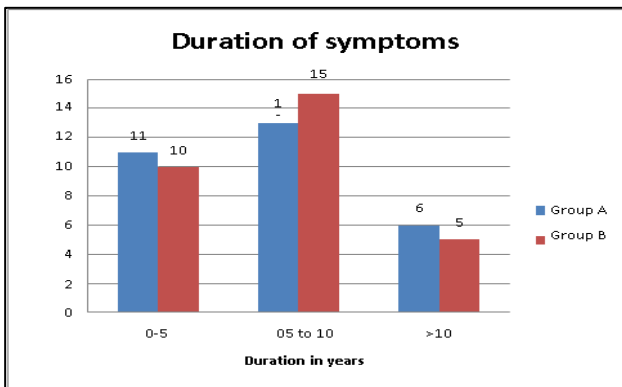


Figure 1: Duration of symptoms.

In group A (wet COM) 11 patients (36.66%) and in group B (dry COM) 10 patients (33.33%) had duration of

symptoms of <5 years. 13 patients (43.33%) of group A (wet COM) and 15 patients (50%) of group B (dry COM) had symptoms for 6-10 years. While 6 patients (20%) of group A (wet COM) and 5 patients (16.6%) of group B (dry COM) had ear discharge of >10 years during presentation (Figure 1).

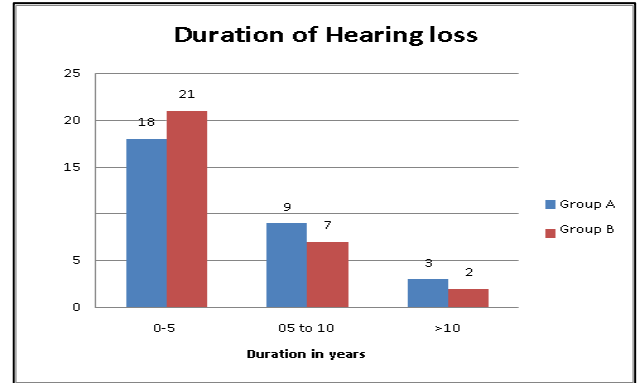


Figure 2: Duration of hearing loss.

In group A (wet COM) 18 patients (60%) and in group B (dry COM) 21 patients (70%) had hearing loss of <5 years. While 9 patients (30%) of group A and 7 patients (23.33%) of group B had hearing loss of 6 to 10 years during presentation whereas 3 patients (10%) group A and 2 patients (6.6%) in group B had hearing loss of >10 years (Figure 2).

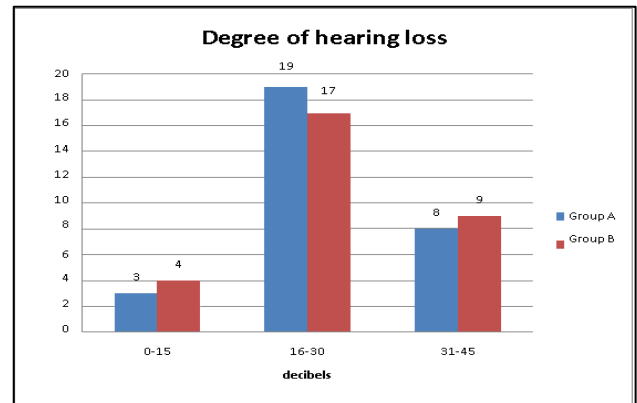


Figure 3: Degree of hearing loss.

In this study 3 (10%) patients in group A (wet COM) and 4 (13.33%) in group B (dry COM) had air bone gap in the range of 0-15 dB. Air bone gap of 16-30 dB was observed in 19 (63.33%) patients in group A and 17 (56.66%) patients in group B and in the range of 31-45 dB, 8 (26.66%) patients of group A and 9 (30%) patients of group B were present on PTA (Figure 3).

After 1 month of follow up, group A (wet COM) had success rate of 90% and group B (dry COM) had success rate of 86.6%. However there was no statistical significance (p value of 0.53, p>0.05) found on comparing both groups with respect to graft uptake. Graft

failure was seen in 3 patients (10%) of wet COM and 4 patients (13.33%) of dry COM after 1 months of follow up (Figure 4).

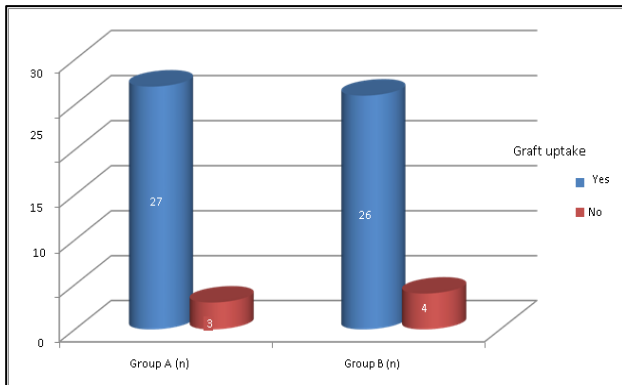


Figure 4: Bar chart showing comparison of graft uptake.

Table 4: Post-operative hearing gain.

AB gap (mean±SD)	Group A	Group B
Pre op	27.083±8.3	24.57±8.23
Post op (3rd month)	24.83±7.4	24.57±7.68
Post op (6th month)	22.70±6.36	22.83±7.38
Hearing gain	4.38±4.68	3.96±2.39

In our study in group A (wet COM) preoperative air bone gap (AB gap) was 27.08 dB, postoperative AB gap in 3rd month and 6th month are 24.83 dB, 22.70 respectively, with a mean hearing gain of 4.38 dB. In group B (dry COM) preoperative air bone gap (AB gap) was 26.87 dB and postoperative AB gap in 3rd month and 6th month were 24.57dB, 22.83 respectively with a mean hearing gain of 3.96 dB. There was significant hearing improvement post-operatively in both the groups which was statistically significant (in group A p=0.0127 group B =0.025 p<0.05). When hearing improvement was compared between two groups, there was no significant statistical difference (independent sample test) (p value 0.66, p>0.05) (Tables 4 and 5).

Table 5: Input data.

	Groups	N	Mean	Std. deviation
Hearing improvement	Group A	30	4.38	4.68
	Group B	30	3.96	2.39

Table 6: Complications of surgery.

Complication	Group A	Group B
Dural tear	2	1
Facial nerve injury	0	0
Sigmoid sinus injury	0	0
Other complication	0	0

2 patients in group A and 1 patient in group B had dural tear, all the patients managed conservatively. All the patients in postoperative period were uneventful (Table 6).

DISCUSSION

Tympanoplasty is a commonly performed procedure in COM. It is defined as a surgical procedure to eradicate disease in the middle ear and to reconstruct the hearing mechanism, with or without mastoid surgery and with or without tympanic membrane grafting.³ Cortical mastoidectomy is usually accompanied by tympanoplasty. Simple mastoidectomy involves removing the mastoid cortex and varying amounts of the air cell system, depending on the disease process.⁴

Various studies done in past have reported good results with myringoplasty alone and cortical mastoidectomy with myringoplasty regard to hearing improvement and graft uptake. Various factors influencing the success rate of this procedure have been discussed in the literature which include the age of the patients, site of the perforation, size of the perforation, duration of ear being dry prior to surgery and the presence of infection at the time of surgery. In this study the efficacy of myringoplasty with cortical mastoidectomy in dry and wet mucosal type of COM (30 in each group) is compared to assess the success of graft uptake and hearing improvement.

Age distribution

In our study mean age of patients in group A (wet COM) was 34.13±12 years (range 19-45) and group B (dry COM) was 33.36±14 years (range 17-50) with majority of patients in age group of 3rd and 4th decade second decade in both groups, which is similar to study by Mills et al who had mean age in 4th decade (range 13-86 years), whereas Nagle et al observed majority of cases were in the second decade.^{5,6}

Sex distribution

In our study there is slight female preponderance ,both in group A (60%) and group B (53.3%), which is comparable to study by Nagle et al. wherein female preponderance was observed with male to female ratio was found to be 0.85:16.

Side affected

In this study on including both groups, perforation was more common on right side (46.66%) in both groups, with 6 and 4 patients had bilateral COM in group A and group B respectively. Similar result was found in a study conducted by Nagle et al, they observed perforation to be common on right side (42%) and with bilateral presentation in 18% of their cases.⁶

Duration of symptoms and hearing loss

In our study, majority of patients in both groups (group A- 43.33%, group B- 50%) had ear symptoms for 6-10 years. Patients with duration of symptoms for >10 years were 6 (20%) in group A (wet COM) and 5 (16.6%) in group B (dry COM). In the present study showed that majority of patients in both groups had duration of hearing loss for 0-5 years.

Graft uptake

In our study, the overall success rate in graft uptake following myringoplasty was 88.33%, with 90% in Group A (wet COM) and 86.6% in group B (dry COM). It was observed that there was no statistical significance (p value of 0.5 >0.05) between the 2 groups in relation to graft uptake. A comparison of graft uptake to this study with other studies is given in the Table 7.

Table 7: Comparison of graft uptake in various studies.

Study by (et al)	No. of cases (n)	Graft uptake (%)		P value
		Active/wet COM	Inactive/dry COM	
Nagle ⁶	100	74	88	0.07
Mills ⁵	268	82	83	0.9
Sharma ⁸	48	75	85.72	
Vijayendra ⁷	70	80	88	0.5
Our study	60	90	86.6	0.5

Our study results are comparable to the study conducted by Vijayendra et al shows that graft failure rate is more in totally dry perforation than in wet central perforation mainly because of avascularity of remnant tympanic membrane in totally dry central perforation.⁷

Study by Sharma et al concluded that performing myringoplasty in dry ear is better (success rate of 85.72%) as compared to myringoplasty performed in wet ears (success rate of 75%) based on its high success rate and better hearing improvement postoperatively.⁸

Our results are comparable to study by McGrew et al concluded that even in the absence of active evidence of infection; mastoidectomy improved the underlying disease process. Combining mastoidectomy with tympanoplasty during repair of simple perforations in patients with no active evidence of infection remains an appropriate option and may be valuable in reducing the need for future surgery.⁹

Hearing improvement

In our study preoperative air bone gap (AB gap) in group A (wet COM) was 27.08 dB postoperative AB gap in 3rd month and 6th month were 24.83 dB, 22.70 respectively, with a mean hearing gain of 4.38 dB. In group B (dry

COM) preoperative air bone gap (AB gap) was 26.87 dB and postoperative AB gap in 3rd month and 6th month were 24.57dB, 22.83 respectively with a mean hearing gain of 3.96 dB. There was significant hearing improvement post-operatively in both the groups which was statistically significant (in group A p=0.0127 group B =0.025, p<0.05). When hearing improvement was compared between two groups, there was no significant statistical difference (independent sample test) (p value 0.66, p>0.05).

This study is comparable to the study done by Hosny et al and they noted, in active COM mean post-operative hearing gain of 10.3±6.43 dB, while 11.2±7.8 dB in inactive COM with p value of 0.635 (p>0.05) concluded that discharge has no adverse effect on outcome of myringoplasty with respect to hearing gain.¹⁰ Another study by Nagle et al in which postoperative hearing improvement was excellent (0-10 dB) in 8 patients with dry ear and 7 patients with wet ear; good (10-20 dB) in 36 patients with dry ear and 30 patients with wet ear with statistical p value of 0.85 (p>0.05) which is insignificant with respect to hearing improvement.

In the present, study 2 patients in group A and 1 patient in group B had dural tear, all the patients managed conservatively. All the patients in postoperative period were uneventful.

Limitations would include shorter sample size and short duration of follow up. Hence, we suggest a larger study with a long term follow up, to generalize our conclusion as well as a pre-operative HRCT of temporal bone to note the evidence of mastoid infection

CONCLUSION

Our study showed that graft uptake following myringoplasty with cortical mastoidectomy in wet COM (group A) had success rate of 90% and group B (dry COM) had success rate of 86.6%. However there was no statistical significance (p value of 0.53, p>0.05) found on comparing both groups with respect to graft uptake. There was significant hearing improvement post-operatively in both the groups which was statistically significant (in group A p=0.0127 group B =0.025, p<0.05). When hearing improvement was compared between two groups, there was no significant statistical difference (independent sample test) (p value 0.66, p>0.05). From this study, it is observed that active disease is not a contraindication for taking up the patient for surgery and we conclude that, there is good outcome in both wet and dry COM following myringoplasty with cortical mastoidectomy with respect to graft uptake and 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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