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Comparative Study of Myringoplasty in Dry and Wet Ear with or Without Cortical Mastoidectomy at Tertiary Hospital: Our Experience

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ABSTRACT
Chronic otitis media is defined as chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent discharge or otorrhea through a tympanic perforation. Chronic suppurative otitis media is a common clinical entity in India particularly in rural parts of the country, where the majority of the population lives under poor socioeconomic conditions. Myringoplasty is the surgery limited to repair of tympanic membrane perforation. It is preferable to make active ears inactive before surgery. Activity in the ear has been suggested as a cause of failure of myringoplasty. In some cases myringoplasty in wet ears has better results. A cortical mastoidectomy should be carried out at the same time as myringoplasty in active ears for better results. This is a hospital-based study of 100 patients aged between 16 to 60 years with unilateral chronic suppurative otitis media attending GOVERNMENT GENERAL HOSPITAL, KADAPA from January 2018 to June 2019.The aim and objective of the study is to compare the outcome of myringoplasty in the dry and wet ear with or without mastoidectomy in tubotympanic type of chronic otitis media with respect to graft take up and hearing improvement. Group: A – This group of 25 patients who has a dry ear underwent myringoplasty alone Group-B:- This Group of 25 patients who has a dry ear underwent myringoplasty along with cortical mastoidectomy. Group-C: This Group of 25 patients who has a wet ear underwent myringoplasty alone. Group D: This group of 25 patients who have wet ear underwent myringoplasty along with cortical mastoidectomy. The current study takes into consideration the review of literature and observations made by the study and comes to the conclusion that the differences in audiological outcomes of the patients with DRY CHRONIC OTITIS MEDIA UNDERWENT MYRINGOPLASTY are statistically significant when compared to other groups. With respect to graft uptake WET CHRONIC OTITIS MEDIA patient who underwent myringoplasty along with cortical mastoidectomy shows best results.

INTRODUCTION

Chronic otitis media is defined as chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent discharge or otorrhea through a tympanic membrane perforation. Chronic suppurative otitis media is a common clinical entity in India particularly in rural parts of the country, where the majority of the population lives under poor socioeconomic conditions[1]. Myringoplasty is the surgery limited to repair of tympanic membrane perforation[2]. It is preferable to make active ears inactive before surgery which is not always possible, and surgery should not be postponed because of this. Activity in the ear has been suggested as a cause of failure of myringoplasty[3,4]. But in some studies Myringoplasty in wet ears has better results. They base their arguments on the findings of histological examination of remnant tympanic membrane which showed better vascularity in active COM compared to inactive COM. Similarly in some other studies A cortical mastoidectomy carried out at the same time as myringoplasty in active ears showed better results[5,6]. To avoid this dilemma, a study was conducted to compare the outcome of myringoplasty in dry and wet ears with or without mastoidectomy in the tubotympanic type of Chronic otitis media[7,8].

Aims and Objectives: The aims of the study is to compare the outcome of myringoplasty in the dry and wet ear with or without mastoidectomy in tubotympanic type of chronic otitis media with respect to graft take up and hearing improvement.

The objectives of the study are: 1. Assessment of postoperative health and hearing status of the neotympanum in all the study groups. 2. Comparing the status of neotympanum in all the study groups applying statistical tests of significance.

MATERIALS AND METHODS

This is a hospital-based study of 100 patients aged between 16 to 60 years with unilateral chronic suppurative otitis media attending GOVERNMENT GENERAL HOSPITAL, KADAPA from January 2018 to June 2019.

Inclusion Criteria : 1. Age between 16 -60 years in both sexes 2. Patients with small, moderate, subtotal central perforation of tubotympanic disease 3. Patients with a dry ear for a minimum period of 3 weeks prior to surgery included in the dry group. 4. Patients with mucopurulent discharge at the time of surgery were included in the wet group. 5. Patients having a good general condition.

Exclusion criteria: 1. Age less than 16 years and above 60 years. 2. Patients with attic perforation or cholesteatoma. 3. Cases requiring ossicular reconstruction. 4. Previous history of mastoid surgery.

After obtaining informed consent, all patients were subjected to detailed clinical assessment which includes detailed history taking, routine ENT examination otoendoscopy, and tuning fork tests. Later the patients were subjected to Pure Tone Audiometry. Average air conduction thresholds at 500HZ, 1000HZ, 2000HZ, and 4000HZ and average bone conduction thresholds at the same frequencies were measured. Preoperative Air bone gap was calculated from the measured thresholds. The audiological assessment was done with Elkon EDA3N3 Multi-audiometer. Later the patients satisfying the inclusion criteria included in groups. One hundred patients were taken as the sample population and were allocated the four study groups, 25 each. All patients underwent myringoplasty. Twenty five patients with dry ear underwent type 1 myringoplasty along with cortical mastoidectomy. Twenty five patients with wet ear underwent myringoplasty along with cortical mastoidectomy. Temporalis facia[9] was the graft material used in all the cases and all patients underwent Myringoplasty by underlay technique.

Suture removal on 8th postoperative day and ear drops started after 2 weeks. At 3 weeks – residual gel foam removed from the ear canal. At 3 months and 6 months – assessment of graft uptake done by otoendoscopic examination and post-operative audiogram done.

RESULTS AND DISCUSSIONS

This study comprising 100 patients divided into 4 groups of 25 were conducted in the department of ENT at Government Medical College and General Hospital, Kadapa, Andhra Pradesh.

Sex: Among 100 patients 41 are Male and 59 Are Female . A slight preponderance to females (Ref.Table 1/Figure 1).

Age : Among 100 patients 32 patients are between 16 -25 years ; 33 patients are between 26 -35 years ; 27 patients are between 36 – 45 years ; 4 patients are between 46 -55 yrs ; 4 patients are between 56 -65 years (Ref . Table 2/Figure 2).

Type of perforation: Fourty patients had large central perforation ; 45 patients had sub – total perforation and 15 patients had total perforation (Ref.Table 3).

Side of TM Perforation: Among 100 patients 49 patients had Right side perforation and 51 patients had Left side perforation (Ref.Table 3).

Graft Uptake: In Group A 92 % had graft uptake ; Group B 92 % had graft uptake ;Group C 88 % had graft uptake and Group D 94 % had graft uptake (Ref. Table 3).

Table 1 : Gender distribution of 25 patients in each group

Sex of patient	Group A	Group B	Group C	Group D	Total
MALE	10	10	12	9	41
FEMALE	15	15	13	16	59
TOTAL	25	25	25	25	100

Table 2 : Age wise distribution in each group

Age of patient	Group A	Group B	Group C	Group D	Total
16 -25	7	9	7	9	32
26 -35	6	10	7	10	33
36 -45	11	5	5	6	27
46 -55	0	0	4	0	4
56 -65	1	1	2	0	4
TOTAL	25	25	25	25	100

Table 3 : Distribution of different parameters in each group

Parameters	Group A	Group B	Group C	Group D	Total
Large central perforation	11	9	8	12	40
Sub – total perforation	12	12	14	7	45
Total perforation	2	4	3	6	15
Right side	18	10	9	12	49
Left side	7	15	16	13	51
Graft uptake %	92	92	88	94	
Mean AB Closure	18.400	13.040	14.500	15.500	

AB Closure Achieved: The mean AB closure achieved in each group are Group A - 18.400, Group B – 13.040, Group C – 14.500 and Group D– 15.500.(Ref.Table 3).

Comparison Between the Four Groups: From the above (Table 4) the t value , degree of freedom and p value were calculated and compared among various groups.

Group A Versus B: The mean air-bone gap closure achieved in group A was 18.4 with a standard deviation of 6.5192.The mean air-bone gap closure achieved in group B was 13.04 with a standard deviation of 4.7212 Two-tailed unpaired t-test was applied to know the statistical difference in the mean. The t score was -3.33, degrees of freedom were 48 and the p-value obtained was 0.002 which means the difference was statistically significant.

Group A Versus C: The mean air-bone gap closure achieved in group A was 18.45 with a standard deviation of 6.5192. The mean air-bone gap closure achieved in group C was 14.5 with a standard deviation of 6.5192. Two-tailed unpaired t-test was applied to know the statistical difference in the mean. The t score was 2.419, degrees of freedom were 48 and the p-value obtained was 0.019 which means the difference was statistically significant.

Group C Versus D: The mean air-bone gap closure achieved in group C was 14.5 with a standard deviation of 4.7434. The mean air-bone gap closure achieved in group D was 15.5 with a standard deviation of 6.8404. Two-tailed unpaired t-test was applied to know the statistical difference in the mean. The t score was -0.601, degrees of freedom were 48 and the p-value obtained was 0.551 which means the difference was statistically insignificant.

Group B Versus C: The mean air-bone gap closure achieved in group B was 13.04 with a standard deviation of4.7212. The mean air-bone gap closure achieved in group C was 14.5 with a standard deviation of 4.7434. Two-tailed unpaired t-test was applied to know the statistical difference in the mean. The t score was –1.091, degrees of freedom were 48 and the p-value obtained was 0.281 which means the difference was statistically insignificant.

Group B Versus D: The mean air-bone gap closure achieved in group B was 13.04 with a standard deviation of 4.7212. The mean air-bone gap closure achieved in group D was 15.5 with a standard deviation of 6.8404. Two-tailed unpaired t-test was applied to know the statistical difference in the mean. The t score was -1.48, degrees of freedom were 48 and the p-value obtained was 0.146 which means the difference was statistically insignificant.

Group A Versus B: The mean air-bone gap closure achieved in group A was 18.4 with a standard deviation of 6.5192. The mean air-bone gap closure achieved in group D was 15.5 with a standard deviation of 6.8404. Two-tailed unpaired t-test was applied to know the statistical difference in the mean. The t score was 1.534, degrees of freedom were 48, and the p-value obtained was 0.131 which means the difference was statistically insignificant.

After comparing all these data Group-A (Dry COM with myringoplasty) shows better AB gap closure achieved.

This is a hospital-based single-blind randomized trial comparing the outcomes of myringoplasty in the dry and wet ear with or without cortical mastoidectomy. Though myringoplasty is preferable in dry ears this is not always possible and surgery should not be postponed because of this. Activity in the ear has been suggested as a cause of failure of myringoplasty. However, some studies found no influence of the condition of the ear at the time of surgery on the subsequent graft uptake rate. Some authors conclude that myringoplasty in wet ears has better results. They base their arguments on the findings of histological examination of remnant tympanic membrane which showed better vascularity in, active COM compared to inactive type. Some authors suggest that cortical mastoidectomy should be carried out at the same time as myringoplasty in active ears shows better results.

Chronic Otitis Media (COM): COM is defined as the chronic inflammation of the mucoperiosteal lining of the middle ear cleft. i.e. Eustachian tube, middle ear, aditus and mastoid air cells which presents with recurrent ear discharge through tympanic membrane perforation[10]. It is divided into tubotympamnic and atticoantral disease.

Table 4 : Audiological data of each group

	Group A		Group B		Group C		Group D	
Parameter	Value	Standard deviation	Value	Standard deviation	Value	Standard deviation	Value	Standard deviation
Mean Peroperative air conduction threshold	40.280	6.4905	41.300	4.9624	40.080	6.1503	40.460	6.7975
Mean Preoperative bone conduction threshold	11.460	1.5133	10.160	2.1199	11.300	1.9579	12.260	1.5885
Mean preoperative air bone gap	28.700	6.7423	31.120	5.1746	28.780	6.4130	28.200	6.2367
Mean postoperative air conduction threshold	20.180	2.9576	28.240	3.5152	25.580	2.7677	24.160	3.5435
Mean post operative bone conduction threshold	10.660	1.3207	10.160	2.1199	11.300	1.9579	11.060	1.2189
Mean postoperative air-bone gap	10.320	2.5244	18.060	3.4530	14.280	3.1194	3.100	3.7611
Mean air-bone gap closure achieved	18.400	6.5192	13.040	4.7212	14.500	4.7434	15.500	6.8404

Classification of Chronic Otitis Media:

HEALED COM-TYMPANOSCLEROSIS

INACTIVE MUCOSAL COM- DRY PERFORATION

INACTIVE SQUAMOUS COM-RETRACTION

ACTIVE MUCOSAL COM-PERFORATION WITH OTORRHOEA.

ACTIVE SQUAMOUS COM-CHOLESTEATOMA

COM is classified into active(wet) and inactive(dry) based on the presence or absence of middle ear inflammation and the production of discharge respectively.

Inactive Mucosal Com (Dry Ear): There is permanent perforation of the pars tensa but the middle ear and mastoid mucosa are not inflamed. The lamina propria around a perforation is thickened due to fibrous tissue proliferation. The mucocutaneous junction (the junction of the squamous epithelial layer of TM and the mucosa of the medial TM) is usually located at the perforation edge, but in some cases, epithelial cells migrate medially through the perforation. It is important to excise in-grown squamous epithelium at the time of myringoplasty to avoid iatrogenic cholesteatoma formation.

Criteria for Dry Ear:

- No discharge for at least 3 months
- Tympanic membrane remnant should be of normal color
- Middle ear mucosa should be normal

Active Mucosal Com (Wet Ear): There is a permanent defect of the pars tensa with an inflamed middle ear mucosa which produces mucopurulent discharge. There is chronic inflammation of the middle ear mucosa with edema, submucosal fibrosis, hypervascularity and infiltration with lymphocytes, plasma cells, histiocytes. The proliferation of blood vessels, fibroblasts, and inflammatory cells leading to the formation of granulation tissue with mucopurulent discharge.

Criteria for Wet Ear:

- Congestion of middle ear mucosa
- Congestion of drum remnant
- Presence of discharge in the middle ear

Treatment: Preoperative clinical treatment is based on the removal of secretions from the ear, use of topical antibiotic drops, ear protection, control of allergic rhinitis, and URI and Control of other factors that prevent the functioning of the Eustachian tube.

Surgery in the form of Myringoplasty or Cortical Mastoidectomy is done if conservative management fails. Tympanoplasty is the procedure of removal of disease from the middle ear and reconstruction of the hearing mechanism along with TM grafting. Myringoplasty is one of the most common surgical procedures performed in any otological clinic for the reconstruction of the TM defect[11,12]. Though it is preferable to make active ears inactive, this is not always possible. Activity in the ear has been suggested as a cause of failure of tympanoplasty. However, some studies found no influence of the condition of the ear at the time of surgery on subsequent graft uptake and the success rate of surgery is not influenced by prophylactic antibiotic therapy.

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 along with Mastoidectomy[13]. There was no significant difference in tympanic membrane closure rates between groups (94 percent in tympanoplasty alone and 91 percent in tympanoplasty with mastoidectomy). Balyan et al reported 81 ears that were actively discharging at the time of surgery treated with tympanoplasty without mastoidectomy (53 ears) and tympanoplasty with mastoidectomy (28 ears)[14]. There was no significant difference in graft success rates between these groups (91 and 86 percent respectively). There is no evidence that mastoidectomy increases the success rate in these ears.

Our study revealed that graft success is 92% in group A, 92% in group B, 88% in group C and 92% in group D. there was no statistically significant difference in graft uptake between these groups.

Along with our results, Sheehy[15] in 1985 recommended performing simple cortical mastoidectomy routinely for all tympanoplasties because it is "good practice" and because "it's better to be safe than sorry.

The development of persistent ipsilateral otological disease requiring a subsequent ipsilateral procedure was approximately twice as common in the tympanoplasty group. They concluded that mastoidectomy was not necessary for the successful repair of simple tympanic membrane perforations. However, mastoidectomy impacted the clinical course in patients by reducing the number of patients requiring future procedures and by decreasing disease progression. This suggests that combining mastoidectomy with tympanoplasty during repair of simple perforations in patients with no active evidence of infection remains an appropriate option, and maybe valuable in reducing the need for future surgery.

Coming to the audiological outcome,In the present study, the results obtained after comparing all the groups was Group-A (Dry COM with myringoplasty showed better AB gap closure achievement.

Jackler and Schindler in 1984 studied 48 patients with chronic otitis media with tympanic perforations who underwent myringoplasty with mastoidectomy[16]. In their study, it was found that simple mastoidectomy was found to be an effective means of re-pneumatizing the sclerotic mastoid and restoring the hearing .

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