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A study of surgical outcomes of myringoplasty in active and inactive ears

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ABSTRACT

Background: Chronic otitis media (COM) can present with inactive (dry) and active (wet) ear. It's an accepted fact that an actively draining central perforation is not a contraindication for ear surgery. The discharging ear presents the otologists with the dilemma of operating on it or not, this is due to widespread belief that the success rate while doing ear surgeries on active ears is decidedly inferior. Hence the present study is intended to find the outcome of ear surgeries in inactive and active ear with objective to find the incidence of graft uptake and hearing improvement in both the groups.
Methods: A total of 50 active ear (with mucoid discharge) and 52 inactive ears (not discharging at least 3 month before surgery) with mucosal chronic otitis media underwent myringoplasty with cortical mastoidectomy. Graft take and hearing gain rates 3 and 6 months after surgery were calculated for both groups and compared.
Results: The graft take rate was 90% for the active ear group and 94% for the inactive ear group. The hearing gain rate was 90% for the active ear group and 94% for the inactive ear group. Differences were found to be statistically insignificant for both graft intake (p=0.461) and hearing gain (p=0.543).
Conclusions: The success of myringoplasty is not adversely affected by the presence of mucoid ear discharge at time of surgery, and outcomes are comparable to those of the opration done for inactive ears.

Keywords: Myringoplasty, Chronic otitis media, Active ear, Inactive ear

INTRODUCTION

Myringoplasty is a common surgical procedure indicated in mucosal chronic otitis media.[1] It aims to close the tympanic membrane perforation to prevent recurrent otorrhea, and create a sound conducting mechanism in a well aerated mucosa lined middle ear cleft, and maintain these achievements overtime.

Several factors may affect the outcome of myringoplasty, such as site and size of perforation, technique (underlay versus overlay), approach (endaural versus postaural), experience of surgeon, condition of operated ear (active versus inactive).[2-7]

Controversy exists about the condition of middle ear as a nessasry for surgery. The aim of this study is to compare surgical outcome of myringoplasty in active and inactive ears.

METHODS

This prospective study includes all the patients with chronic otitis media mucosal type both active and inactive stage who comply with inclusion and exclusion criteria undergoing myringoplasty with cortical mastoidectomy surgery between November 2015 to June 2017.

Definition of inactive/dry ear

Patient with dry central perforation tubotympanic type chronic suppurative otitis media with no active discharge for a period of atleast three months.

Definition of active/wet ear

Patient with tubotympanic type of chronic suppurative otitis media with discharge mucoid or mucopurulent irrespective of amount of discharge.

Inclusion criteria

Inclusion criteria were patients aged between 15-60 years of both sexes; chronic otitis media mucosal type with small, moderate or subtotal central perforation of tympanic membrane having conductive or mixed hearing loss with good air bone gap; patients having good general physical condition.

Exclusion criteria

Exclusion criteria were patient less than 15 or more than 60 years of age; patients with attic perforation or cholesteatoma; patient with sensorineural hearing loss; patient undergoing revision tympanoplasty; chronic suppurative otitis media with intra cranial complications; HbsAg and HIV positive patients and other chronic inflammatory diseases that would interfere with wound healing; hypertension, Diabetes mellitus, chronic cardiac illness, chronic renal failure patients, malignancies, and medically certified as unfit for the anaesthesia.

A total of 100 patients were operated with 50 in each group during the study period.

Patients who satisfied the above mentioned criteria for selection were taken as subjects for the study, after taking an informed and written consent.

The selected patients were subjected to clinical, audiological and laboratory investigation.

- Detailed history of patient, general and systemic examination of patient.
- Socioeconomic status of patients was assessed.
- Examination of tympanic membrane under microscope was done and hearing evaluation using tuning fork tests.
- PTA and Relevant Laboratory investigation including Hb, Rbs, S. creat, S. urea X-ray mastoids, HRCT temporal bone. Chest X-ray and ECG for patients above 40 years.
- All patients underwent cortical mastoidectomy with myringoplasty using temporalis fascia graft placed by underlay technique in local anesthesia.
- Intactness of drum and graft uptake was accessed after 1 month.
- At the end of 3rd and 6th months an audiogram was done on all the patients with intact drum.

The collected data was entered into an excel sheet. After appropriate data cleaning, the data sheet was transferred and analysed using SPSS software version – 20.

Descriptive statistics were used to describe the study variables of the subjects. To compare the categorical qualitative data variables among the two study groups, Chi-square test and Fisher exact test was used and to compare the continuous quantitative data variables ‘t’ test was used.

The p values were corrected by the Bonferroni method and a p value <0.05 was regarded as statistically significant.

RESULTS

In our study, out of 100 patients, 56 were male and 44 were females. Wet group included 29 male and 21 female patients. In dry group, there were 27 males and 23 females. Statistically insignificant (Table 1).

Table 1: Sex wise distribution of patient.

Sex	Dry ear		Wet ear		P value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
Female	23	46.0	21	42.0	
Male	27	54.0	29	58.0	0.687
Total	50	100.0	50	100.0	

Table 2: Distribution of patients based on status of graft among the two groups.

Status of graft	Dry ear		Wet ear		P value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
Graft failure	3	6.0	5	10.0	
Graft intact	47	94.0	45	90.0	0.461
Total	50	100.0	50	100.0	

Graft uptake was noticed in 45 (90%) ears of the active ear group and in 47 (94%) ears of the inactive ear group, and the difference was not found to be statistically significant (p value, 0.461) (Table 2). Failures in the wet ear group were noticed in 5 ears. Three of these ears had subtotal perforation, while the remaining two had large central perforation before the operation. Persistent reperforation was the cause of failure seen in the ears of this group and was associated with upper respiratory infection. Failed myringoplasty was noticed in 3 ears of the dry ear group and was found in ears with preoperative subtotal perforations. All of them were associated with anterior medialization of the graft. There were two graft failure above 40 yr, one graft failures in the age group of 21-30 yrs. Maximum number of graft failures were between 31-40 yr age group, 3 patients (Figure 1). All the patients with graft failure belonged to lower socio economic group (Figure 2).

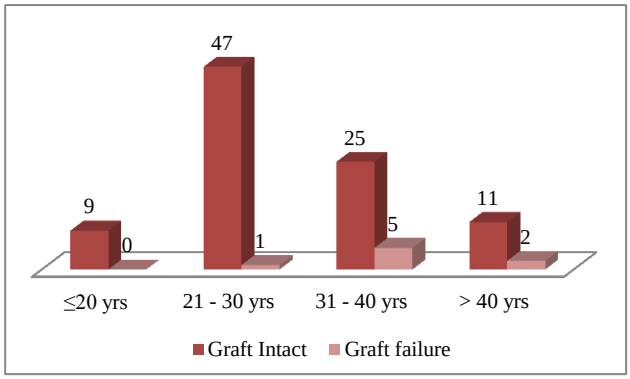

Figure 1: Age factor in success of myringoplasty.

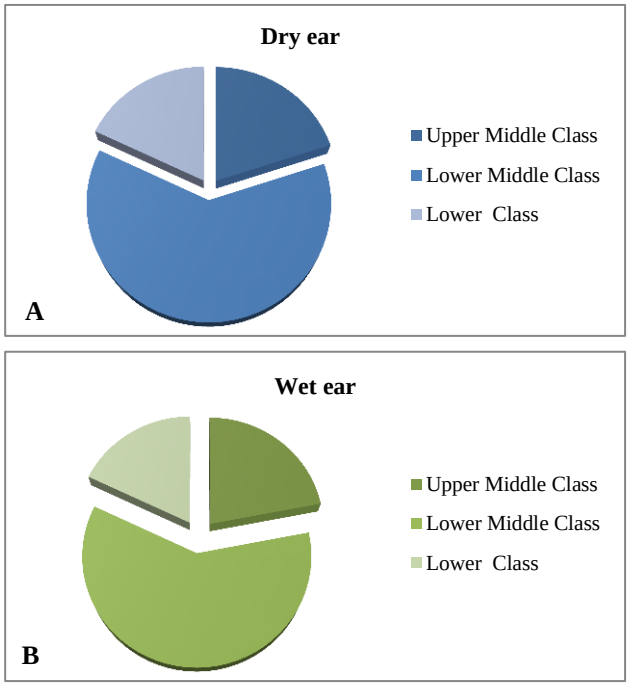

Figure 2: Socioeconomic status distribution of patients. A= Dry ear, B= Wet ear.

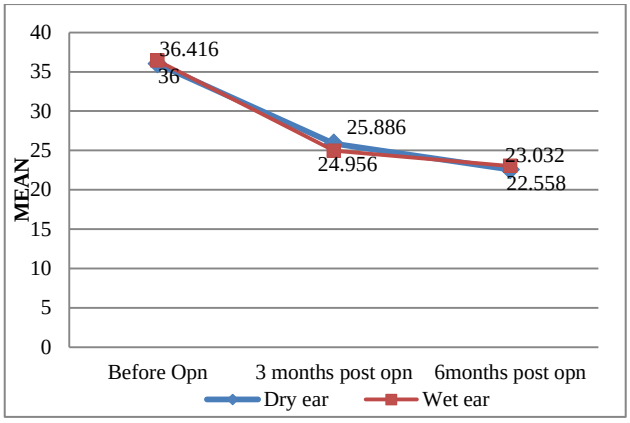

Figure 3: Mean PTA at different intervals of intervention.

Patients with graft failure were excluded from follow up PTA test.

Mean PTA pre-operatively in dry ear was 36.0db and 36.4db in wet ear. Mean PTA at 3rd month was 25.8db in dry ear and 24.6db in wet ear, at 6th month it was 22.4 db in dry ear and 23.0db in wet ear (Figure 3).

No patients had sensorineural hearing loss or worsening of their air conduction threshold.

DISCUSSION

Myringoplasty is one of the most commonly performed procedures in Otolaryngology. With advanced micro-surgical techniques and equipments, the state of the art facility has now developed to the extent that graft success rates have increased exponentially.[8] Several studies done in past have reported good results with myringoplasty with regard to hearing improvement, graft uptake and achieving dry ear. Various factors influencing the success rate of this procedure have been discussed in the literature. The presence of active ear discharge at the time of surgery presents the surgeon with the dilemma of whether to operate or not.

In our study, we have compared two groups of patients with dry and wet ear, including 50 cases in each group. Both the groups were matched by the distribution of age, socioeconomic status and duration of ear discharge.

Age factors in the success of myringoplasty

Age is an important non mastoid factor influencing the outcome of myringoplasty. Failure of myringoplasty in children is attributed to adenoid and eustachian tube dysfunction.

In our study, patients below age of 15 years were excluded. Mean age in wet ears group was 30.8 yrs whereas, in dry ears group it was 32.2 yrs. Maximum number of patients were seen in the age group of 21-40 years (72%).

In a study of 87 cases by ortergren, maximum numbers of patients were in the age group of more than 40 years, also they divided the patients into two groups based on their age.[9]

The first group was below 40 years and second group above 40 years and the success rates in terms of grafts take up were found to be 90% and 75.7%.

Similarly in our study success rate for graft uptake were 93% for patients below 40 years of age and 85% for patients above 40 years respectively.

Socioeconomic status and graft take up

It has been proven that socioeconomic factors such as poor living conditions, overcrowding, poor hygiene and poor nutrition are predisposing factors for COM. The influence of socioeconomic factors in graft up take has not been studied in detail.

In our study maximum number of patients, 79 patients belonged to lower socioeconomic status and 21 patients belonged to upper middle class group. There was a 100% graft Uptake rates in the higher socioeconomic group, compared to 89.8% take-up rates in lower socio economic group. The same factors may have been responsible for higher failure rates in lower socio economic group.

Size of perforation and graft up take rates

Out of 100 patients 62 patients had large central perforation, 20 patients had had small central perforation and 18 cases had subtotal perforation.

The results of myringoplasty with regard to size of perforation were found to vary in different studies.

Jackler and Schindler the graft take up rates were found to be 86.7% for subtotal perforations and 76.5% for small perforation.[10]

In contrast to above, a study by Adkin et al showed only 61% take up rates with subtotal perforations compared to 98% in small sized perforations.[11]

Our study also showed similar results, graft uptake rates in small central perforation was 95%, 94.6%for large central perforation and 78% for subtotal perforation. The higher failure rates in subtotal perforations have been attributes to a larger area, which has to be vascularised and epithelialized and also due to technical difficulty in surgery.

Comparison of graft uptake in dry and wet ear

In our study, postoperative follow up by otoscopic examination after 1 month showed intact graft in 47 patients in dry group (94%) and 45 patients in Wet group (90%). 3 patients in dry group and 5 patients in Wet group showed residual perforation.

Graft uptake rate was slightly better in dry group compared to wet, but was not statistically significant**.** Despite the high success rate and routine nature of the procedure, the effect of many influencing factors still remains unresolved. It is often advocated by few authors to render the ear absolutely dry before attempting tympanic membrane repair to obtain more favorable results.[12]

Raj, Vidit in their study on wet myringoplasty, concluded that myringoplasty in wet ears was as successful as in dry ears and had no increased incidence of complications.[13] The study also showed poorer results in patients with bilateral disease.

Adkins et al in their study, reported an overall success rate of 89%.[11] They concluded that age of the patient, duration of dry ear had no bearing on the success, although bilateral tympanic membrane perforation indicated poor prognosis.

Vartiainen and his colleagues, in their study on 404 primary myringoplasty procedures found an overall success rate of 88% with a mean period of follow up of 5.5 yrs.[14] In another study, Vartiainen analysed failure cases in 417 myringoplasties. He concluded that necrosis of the graft and anterior blunting were the main causes in early failures, whereas infection was the most common cause of reperforation in later failures. Reperforation was more frequent in larger perforations than small ones. Other preoperative factors like dry or wet ear, site of perforation or the grafting technique did not affect the graft take rate.[15]

In our series, postoperative follow up showed complete control of otorrhea in 49 patients in dry group and 48 patients in wet group. 2 in wet and 1 dry ears showed persistent ear discharge. Out of 8 patients of residual perforation only 3 patients had persistent ear discharge.

It's still a point of controversy whether tympanic membrane perforation should be repaired by myringoplasty or in association with cortical mastoidectomy. Infections represent the single most important cause of graft failure and result from a hidden mastoid disease. Even a well pneumatized mastoid may be rendered ineffective by inflammatory disease which blocks the aditus and antrum, there by disconnecting the middle ear and mastoid cavities.

A simple mastoidectomy is an effective means of repneumatizing the mastoid air cell systems, as well as eradicating the mastoid source of infections. Thus cortical mastoidectomy with myringoplasty gives better results in both active and inactive ears, even among failed cases post operatively only 3cases complained of persistent ear discharge out of 8 cases.

48 patients with chronic otitis media with tympanic membrane perforations who underwent myringoplasty with cortical mastoidectomy was studied by Jackler and Schindler.[10] Cortical mastoidectomy was found to be an effective means of repneumatizing the sclerotic mastoid and eradicating mastoid sources of infection. They found that severe Eustachian tube dysfunction to a degree not remediable by enlargement of the mastoid air reservoir is the most common cause of failure. The study concluded that cortical mastoidectomy is a safe and useful adjunct to myringoplasty in selected cases of chronic otitis media with perforation.

Krishnan and colleagues studied a sample consisting of one hundred and twenty ears with chronic suppurative otitis media without cholesteatoma subjected to surgical treatment.[16] They concluded that it is good practice to open the mastoid antrum and aircells if the middle ear mucosa is unhealthy. If the middle ear mucosa is healthy, myringoplasty alone seems sufficient for a successful surgical outcome, irrespective of the fact whether the ear was dry or quiescent prior to surgery. Meticulous and complete removal of disease from the middle ear cleft, with a stable assembly with ossicular chain, will surely give a dry ear with good hearing. Mastoidectomy did not seem to play a significant beneficial role as regards the post-operative hearing gain.

Audiological assesment

Hearing improvement was assessed by repeat pure tone audiometry at 3rd and 6th months. Preoperatively, mean pure tone threshold in wet group was 36.4 db and 36.0 db in dry group. At 3rd month, mean PTA was 26.6db in Wet group and 25.8 db in dry group. PTA after 6 months of follow up showed mean PTA of 23 dB in wet group and 22.4 db in dry group. There was no significant difference between the hearing improvements in two groups.

In our study of 100 patients there was an average hearing improvement of 11 db in speech frequencies in 87.3% patients. 8 patients were not taken in to account as there was failure of graft take up. There was no worsening of hearing in graft taken up patients during follow up post operatively. Hearing improvement was seen in 94% cases in dry ear and 90% in wet ear.

Ceylan et al study on influencing factors in myringoplasty reported the graft success rate to be 88% in dry ears and 88.6% in discharging ears, which was not statistically significant.[17] Postoperative air-bone gap of less than 25 dB and hearing gain of >10 dB was taken as physiological success. Hearing improvement was seen in 77.7% cases in dry ears and 78.4% in discharging ears.

In our study, we found no statistically significant differences between the success rates of active and inactive group, either in terms of graft uptake or the hearing improvement.

Thus, from our study, we conclude that the presence of ear discharge at the time of surgery does not influence the success rate of Myringoplasty.

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

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