

Original Research Article

A comparative study of the outcome of tympanoplasty in dry and wet ear

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ABSTRACT

Background: Many factors which influence the success rate of tympanic membrane closure, including age of the patient, size of the perforation, duration of the ear discharge, the presence or absence of infective discharge at the time of surgery. Aim was to find the effect of this discharge from the ear on the success of tympanoplasty.

Methods: This is prospective study which was conducted on 100 cases with 50 patients each in dry and wet ear group. The study was conducted on patients of age 6 years to 60 years and of either sex presenting with chronic otitis media.

Results: Ear discharge for less than 10 years, 78% in dry ear group and 81% in wet ear group. Around 64% had hearing impairment for <5 years in dry ear group and 60% in wet ear group. The size of perforation in dry ear group, medium size perforation was found predominant 46%, large in 42% and small in 12% patients. In wet ear group 46% patients had medium, 16% patients small and 38% patient's large perforation. Hearing improvement seen in 35 (70%) cases and worsening in 3 (6%) cases in dry ear group and 38 (76%) hearing improvement, 3 (6%) worsening in wet ear group.

Conclusions: Graft failure was 4(8%) in dry ear and 5(10%) in wet ear. Hearing worsened in 6% cases in dry and wet ear group both. No other complications were seen in patients during follow up.

Keywords: Tympanoplasty, Graft, Middle ear, Hearing impairment

INTRODUCTION

Chronic otitis media (COM) is an inflammatory process in the middle ear space. It can cause long term, more often permanent changes in tympanic membrane that includes atelectasis, dimer formation, perforation, tympanosclerosis, retraction pocket development or cholesteatoma.¹ It is a common condition seen in patients attending the Otorhinolaryngology clinic. The patient may present with ear discharge, a permanent perforation or impairment in hearing. A perforation in the tympanic membrane can result from either trauma or infective process; out of which the infective process is the common

cause. Usually most of the perforation heals spontaneously, but this spontaneous healing is affected by chronicity of infection and certain permanent changes in the margin of perforation leading to a non-healing permanent perforation. This leads to a constant exposure of middle ear for re-infection and hearing disability.²

COM is classified as inactive mucosal type, active mucosal type, inactive squamous type, active squamous type & healed type.¹ Tympanoplasty refers to reconstruction of the tympanic membrane defect along with elimination of disease, if any, from the middle ear and reconstruction of ossicular chain if diseased.² Goals

of tympanoplasty are to achieve a dry ear by eradicating middle ear disease & hearing improvement by closure of any tympanic membrane perforation by grafting & or ossicular reconstruction.¹

There are many factors which influence the success rate of tympanic membrane closure, including age of the patient, size of the perforation, duration of the ear discharge, the presence or absence of infective discharge at the time of surgery.² The discharging ear presents to the surgeon whether to operate or not to operate. This is due to the widespread belief that the success rate while doing tympanoplasty on wet ear is decidedly inferior. The main objective of this study is to find the effect of this discharge from the ear on the success of tympanoplasty.³

Objectives

Objectives were this study has been conducted to compare the outcomes of tympanoplasty in dry and wet ears. in terms of Success of graft uptake in dry and wet ears and Postoperative hearing improvement.

METHODS

Study design and setting

This was a prospective study, which was conducted in department of Otorhinolaryngology in Gadag institute of medical sciences, Gadag (Karnataka) during the period of June 2020 to March 2021 after taking duly permission from the institutional ethical committee.

Sample size and study population

This study was conducted on 100 cases with 50 patients each in dry and wet ear group. The study was conducted on patients of age 6 years to 60 years and of either sex presenting with Chronic Otitis Media. Due written informed consent was obtained from the patients before the recruitment. The consent was explained in vernacular language to the patients.

Inclusion criteria

The inclusion criteria were patients of age 6 years to 60 years and of either sex and Patients with chronic otitis media having mucosal type of disease.

Exclusion criteria

The exclusion criteria were patients of age less than 6 years and above 60 years, Patients with chronic otitis media, squamous type of disease, patients with culture positive discharge to pathogen, patients with any active predisposing sinonasal pathology, Patients with complicated COM, patients with eustachian tube dysfunction, totally deaf ear, patients with syndromal deafness, patients who refuse or unfit for surgery, patients

with SNHL and mixed hearing loss and patients with revision surgery.

Study procedure

The patients were subjected to clinical, audiological, radiological and laboratory investigations according to the performa formed. Patients were admitted to the hospital one day before surgery. Pre-operative preparation done like shaving of hair in the post-auricular region done, 3 cm inside the hair line. Injection Tetanus toxoid, 0.5 ml given intramuscularly and injection lignocaine, 2% 0.2 ml test dose, intradermally given to observe any hypersensitivity reactions in all cases. Anxiolytics and injection ceftriaxone (dose according to weight) given in all cases 12 hour before surgery. All cases were done under general anesthesia by single surgeon. 2% lignocaine with adrenaline (1:200000) was used for local infiltration, given to skin of external auditory canal in all four quadrants and also over skin of post-auricular region. The incision was deepened in layers, with care taken not to injure the periosteum. Next, the temporalis muscle and fascia were exposed. Starting at the zygomatic root, the periosteum was incised along the linea temporalis, and a vertical limb is dropped in a "7" or "T" shape and was curved down to the mastoid tip. The periosteum is elevated forward to expose the spine of Henle and the ear canal. Lying in the posteriosuperior ear canal between the tympanosquamous and tympanomastoid sutures, was the vascular strip, vascular strip incisions can then be made from behind to access the ear canal. Vertical incisions placed at the 6 o'clock and 12 o'clock positions are connected by a horizontal incision just lateral to the annulus to create a long vascular strip. The canal skin was elevated from behind with care taken not to tear the skin, particularly at its attachment at the tympanomastoid and tympanosquamous suture lines. The canal skin and annulus was elevated in continuity, entering the middle ear. Status of ossicles and condition of middle ear mucosa was noted. Patency of aditus was established by antrotomy and confirmed by seeing the flow of saline into middle ear from antrum. The temporalis fascia graft was placed by underlay technique in all cases. The graft was placed below the handle of malleus and tucked anteriorly under the rim of the perforation and was supported by a few pieces of dry gel foam. The tympanomeatal flap was repositioned and the gel foam soaked with antibiotic drops is placed in EAC. Periosteum, subcutaneous tissue and skin were sutured in layers and mastoid dressing was done.

Post-operatively patients were given antihistamines for 3 weeks and antibiotics, analgesics, topical nasal decongestants were used for 1 week. The mastoid dressing was removed after 48 hours of surgery and the sutures were removed after 1 week of surgery and regular follow-up took place at 3rd week, 6th week and 12th week postoperatively. Graft uptake and complications were evaluated in each visit. Hearing improvement was evaluated with the help of pure tone audiometry at 3rd

month and compared with preoperative pure tone audiometry. The hearing gain was evaluated in speech frequency of 0.5, 1 and 2 KHz. The results were tabulated and statistical analysis was done.

Statistical analysis

All the data was filled in Microsoft Excel (Office 2010), which was then transferred to SPSS version 21, for statistical analysis. Differences in the values of preoperative and postoperative clinical and laboratory outcome variables in the study groups were evaluated using Chi-square test. For this study the confidence interval percentage was 95 % and result was considered significant if the p value was less than 0.05.

RESULTS

In our study most of the patients were in the age group of 10-25 years, 34 (68%) in dry ear group and 29 (58%) in wet ear group. Regarding sex distribution females are more than males, 26 (52%) in dry ear group and 34(68%) in wet ear group. Most of the patient have bilateral ear discharge, 21(42%) in dry ear group and 22 (44%) in wet ear group. In unilateral ear cases right ear involvement (34%) is more in dry ear group and left ear (30%) in wet ear group.

Most of the patients have ear discharge for less than 10 years, 78% in dry ear group and 81 % in wet ear group. Around 32 (64%) had hearing impairment for less than 5 years in dry ear group and 30 (60%) in wet ear group.

Regarding the size of perforation in dry ear group, medium size perforation was found predominant 23 (46%), large in 21 (42%) and small in 6 (12%) patients. In wet ear group 23 (46%) patients had medium, 8 (16%) patients small and 19 (38%) patient’s large perforation.

In this study graft was taken in 42 (92%) cases and not taken in 4 (8%) cases in dry ear group and in wet ear group taken in 45 (90%) and not taken in 5 (10%) cases. Graft failure was 4 (8%) in dry ear and 5 (10%) in wet ear. Hearing improvement seen in 35 (70%) cases and worsening in 3 (6%) cases in dry ear group and 38 (76%) hearing improvement, 3 (6%) worsening in wet ear group.

From the Table 1, the improvement in hearing seen in 16(72.7%), 11 (64.7%), 4 (80%), 4 (66.7%) in patient with ear discharging from 0-5 years, 6-10 years, 11-15 years and more than 15 years respectively and graft uptake, 21 (95.4%), 15 (88.2%), 5 (100%), 5 (83.3%) in patient with ear discharging from 0-5 years,6-10 years, 11-15 years and more than 15 years respectively in dry ear group.

As seen in the Table 2, wet ear group, improvement in hearing seen in 19 (82.6%), 14 (73.7%), 2 (100%), 3 (50%) in patient with ear discharging from 0-5 years, 6-10 years, 11-15 years and more than 15 years respectively and graft uptake, 19 (82.6%), 19 (100%), 2 (100%), 5 (83.3%) in patient with ear discharging from 0-5 years,6-10 years, 11-15 years and more than 15 years respectively.

Table 1: Surgical outcome in relation to duration of dry ear discharge.

Duration of onset of ear discharge(yrs)	Total no. of dry ears	Improvement in hearing			Graft uptake	
		Improved	Not improved	worsen	Taken	Not taken
0-5	22	16	5	1	21	1
6-10	17	11	5	1	15	2
11-15	5	4	0	1	5	0
>15	6	4	2	0	5	1

Table 2: Surgical outcome in relation to duration of wet ear discharge.

Duration of ear discharge (yrs)	Total no. of wet ears	Improvement in hearing			Graft uptake	
		Improved	Not improved	Worsen	Taken	Not taken
0-5	23	19	1	2	19	4
6-10	19	14	5	1	19	0
11-15	2	2	0	0	2	0
>15	6	3	3	0	5	1

Table 3: Duration of hearing impairment after surgical outcome in dry ear.

Duration of hearing impairment (yrs)	Total no. of dry ear	Improvement in hearing			Graft uptake	
		Improved	Not improved	Worsen	Taken	Not taken
0-5	32	23	8	1	30	2
6-10	12	8	2	2	11	1
11-15	5	3	2	0	5	0
>15	1	1	0	0	0	1

Table 4: Duration of hearing impairment after surgical outcome in wet ear.

Duration of hearing impairment (yrs)	Total no. of wet ear	Improvement in hearing			Graft uptake	
		Improved	Not improved	Worsen	Taken	Not taken
0-5	30	25	3	2	26	4
6-10	14	10	3	1	14	0
11-15	4	2	2	0	3	1
>15	2	1	1	0	2	0

Table 3 describes that the improvement in hearing seen in 23 (71.9%), 8 (66.6%), 3 (60%), 1 (100%) in patient with pre operated hearing impairment was from 0-5 years,6-10 years, 11-15 years and more than 15 years respectively and graft uptake, 30 (93.7%), 11 (91.6%), 5 (100%), 0 in patient with ear discharging from 0-5 years,6-10 years, 11-15 years and more than 15 years respectively in dry ear group.

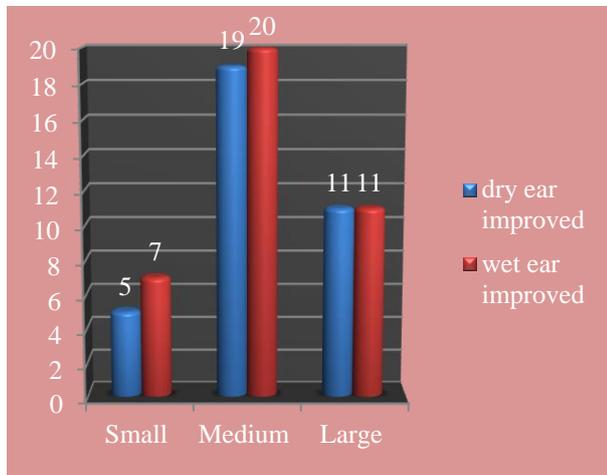


Figure 1: Size of perforation in dry and wet ear

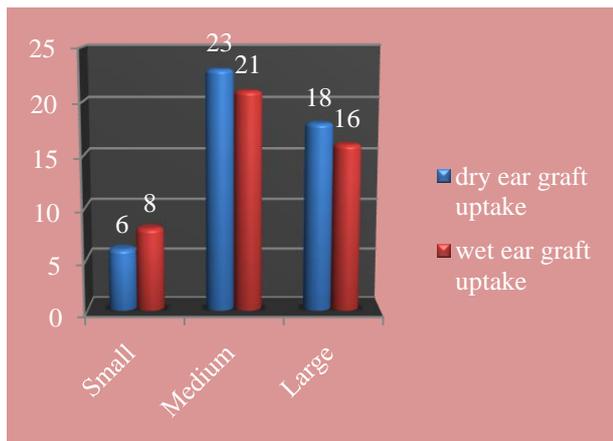


Figure 2: Size of perforation improvement in wet and dry ear.

Table 4 explains that in wet ear group, improvement in hearing seen in 25 (83.3%), 10 (71.4%), 2 (50%), 1 (50%) in patient with pre operated hearing impairment was from 0-5 years,6-10 years, 11-15 years and more

than 15 years respectively and graft uptake, 26 (86.7%), 14 (100%), 3 (75%), 2 (100%) in patient with ear discharging from 0-5 years,6-10 years, 11-15 years and more than 15 years respectively.

From the above Figure, 5 (83.3%), 19 (82.6%), 11 (52.3%), patient shown improvement in hearing and graft was taken in 6 (100%), 23 (100%), 18 (85.7%) having small, medium and large perforation respectively in dry ear group. In wet ear group, hearing improvement seen in 7 (87.5%), 20 (86.9%), 11 (57.9%) and graft uptake in 8 (100%), 21 (91.3%), 16 (84.2%) patient having small, medium and large respectively.

DISCUSSION

In our study, maximum patients attending outpatient department for surgical treatment for chronic otitis media was predominantly in 15-25-year age group. The early presentation may be due to increased awareness in general population for health issues and the disease affecting their work efficiency leading patients to seek early medical intervention. In the study done by Varshney et al he observed similar finding that the number of cases in the 16-25-year age group were 51.3%, and this formed the largest group in their study.⁴ Lasini et al in their study found the majority of the patients were young aged 21-34 years.⁵

In this study females are predominant in dry ear group 52% and 68% in wet ear group. In the study conducted by Kaur et al females are predominant group.⁵ Saurabh Varshney et al also observed female predominance.⁴ Lasini et al found that disease distribution of male to female was 2:3.4.⁵

In our study, incidence of bilateral ear discharge was found in 42% cases in dry ear group compared to 44% cases in wet ear group and in unilateral ear discharge right ear affected more in dry ear group and left ear in wet ear group similarly Kaur et al left sided ear was affected in 29 cases (58%) and right side was affected in 21 cases (42%). This side predominance could not be explained.⁶

Majority of the cases had ear discharge for less than 10 yrs and hearing impairment for less than 5 years. Only 12% of cases were seen with ear discharge lasting for more than 15 years in both groups. Some of the risk factors for leaving the disease at natural course are poor

socioeconomic status of the patient and difficulty in accessing the medical care in their near hood. Lasini et al observed that majority of patients had ear discharge as major complaint and duration was more than 10 years.⁵

In present study, pre-operative duration of hearing impairment had no significant relation to post-operative hearing gain, both in dry ear and wet ear groups, probably because the patients were not about the severity of hearing impairment in ear stages of the disease. Indefinite history regarding the duration of hearing loss may be one of the factor.

In the current study, the successful graft uptake following tympanoplasty was seen in 92% in dry ear and 90% in wet ear with no statistical significance ($p=0.72$) between the two groups in relation to graft uptake. In a study conducted by Hosny et al, graft intake rate for myringoplasty was 90.4% in dry ears and 87% in wet ears, and these differences were not statistically significant.⁷

In this study, hearing improvement was noted in 35(70%) patients in dry ear group, and 38(76%) patients in wet ear and 19(38%) and 18(36%) patients had hearing improvement of more than 10 dB in wet ear groups and dry ear group respectively. There was no statistical significance ($p=0.312$) found on comparing both groups with respect to hearing improvement. In a study conducted by Hosny et al hearing gain rate of 91.3% in wet ears and 92.3% in dry ears was seen, and these differences were not statistically significant.⁷ Hatice Emir et al found that post-operative hearing gain was 47.3% in dry ears and 40.7% in wet ears.⁸

Benjamin et al found post-operative hearing gain for dry and wet ear were not statistically significant. Tos observed more than 10 dB hearing gain in 87% in dry ears and 66% in wet ear group. Raj et al observed improvement in hearings in 68% of the patients undergone myringoplasty in wet ear.⁹

In our study, size of perforation had inverse relation with improvement of hearing and chances of graft uptake. This can be attributed to thin nature of the remnant tympanic membrane and reduced vascularity to the margins of perforation. In both groups, there was 100% graft uptake in small perforation.

Emir et al found bigger perforations had the success rate of 75.8% while the smaller perforations had the success rate of 87.5% and the difference was statistically significant.¹⁰ Benjamin et al found success rates for small and large perforation was 93.0 and 85.1 which was not statistically significant.

Limitations

Limitations were, the findings cannot be generalized as the study has limited number of cases, the study was

conducted in a particular area, there was difficulty in getting long term follow up of patients, failure rate might have increased due to poor hygiene of the patients, as most of them were of low socio-economic status. Confounding factors like atopy, immunological factors etc can also interfere with the results.

CONCLUSION

In dry ear successful graft uptake of 92% was obtained while in wet ear successful graft uptake of 90% was obtained, statistically p -value is 0.72 ($p>0.05$) which is insignificant. Postoperatively hearing gain was (0-5 dB) in 8 patients with dry ear and 3 patients with wet ear; (6-10 dB) in 8 patients with dry ear and 16 patients with wet ear; more than 10 dB in 19 patients with dry ear and 19 patients with wet ear, statistically p value is 0.312 ($p>0.05$) which is insignificant. The very fact that the p value is insignificant in both, the graft uptake rate and hearing improvement, shows that the presence of discharge in the ear at the time of operation does not interfere with the result of tympanoplasty. Graft failure was 4(8%) in dry ear and 5(10%) in wet ear. Hearing worsened in 6% cases in dry and wet ear group both. No other complications were seen in patients during follow up.

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Conflict of interest: None declared

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

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