Original Research Article

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Graft uptake and post-operative hearing outcome with type-I tympanoplasty in dry versus wet ear: a comparative study

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ABSTRACT

Background: The discharging ear presents the otologist with the dilemma of operating on it or not. This study is being undertaken to study and compare the results of type I tympanoplasty in dry ear (no ear discharge at the time of surgery) and wet ear (culture negative consistent ear discharge at the time of surgery).

Methods: 50 patients of either sex aged between 18 to 50 years undergoing type-I tympanoplasty were included in the study on the basis of pre-determined clinical criteria. Type I tympanoplasty was performed using temporalis fascia graft by underlay technique. Post-operative data regarding graft uptake and hearing improvement was recorded in the follow up period of three months.

Results: The complete graft uptake was there in 88% of the patients in group 1 and 84% patients in group 2. The difference in the two groups was statistically insignificant (p>0.05). The mean pre-operative pure tone average in group 1 was 30.57 ± 7.80 dB while post-operative pure tone average was 20.68 ± 8.22 dB with a mean hearing gain of 9.89 dB. The mean pre-operative pure tone average in group 2 was 35.21 ± 5.98 dB while the post-operative pure tone average was 27.07 ± 9.25 dB with a mean hearing gain of 8.12 dB. There was marked hearing improvement in both the groups post operatively (p<0.001 i.e., highly significant). When hearing improvement was compared between two groups there was no significant statistical difference (p>0.05).

Conclusions: The outcome is equally good for type 1 tympanoplasty in dry and wet ear in safe (mucosal) type of chronic suppurative otitis media with respect to graft uptake and hearing improvement.

Keywords: Wet ear, Type 1 tympanoplasty, Temporalis fascia

INTRODUCTION

WHO definition of chronic otitis media (COM) is stage of ear disease in which there is chronic inflammation of middle ear cleft i.e., eustachian tube (ET), middle ear and mastoid air cells, associated with a non-intact tympanic membrane (e.g., perforation) and discharge which is present for two weeks or longer.¹

Chronic otitis media is classified based on the presence or absence of middle ear inflammation and production of discharge into active and inactive COM respectively.²

The tympanic membrane (TM) plays a significant role in the physiology of hearing as well as in the pathophysiology of chronic inflammatory middle ear diseases. Perforation is a breach in the integrity of TM and is nature's mechanism to achieve ventilation in phase of middle ear inflammations.³

The two hallmark presenting symptoms are otorrhoea and hearing loss. Pain is unusual with COM and indicates either a reactive external otitis or the possibility of a developing intratemporal or intracranial complication.

Profuse, intermittent mucoid discharge is commonly noted in mucosal type of COM. The hearing loss is usually conductive or mixed in nature. The degree of hearing loss varies greatly depending upon the size, location of perforation and presence or absence of middle ear pathology. A simple TM perforation can lead to maximum hearing loss of upto 45 dB as there is the diminished surface area of the TM, resulting in dampened ossicular chain excursion and loss of phase difference due to the sound reaching the round window directly.⁴

The primary goal of surgery for COM is to eradicate the disease and obtain a dry, safe ear along with restoration of function (preservation or improvement of hearing). Restoration of function requires a tympanic membrane, an air containing mucosa lined middle ear and a secure connection between the tympanic membrane and inner ear fluids.⁵

Usually, surgeons perform tympanoplasty on ears with active discharge after the ear becomes dry, but in many cases this is practically impossible because the discharge from the ear continues despite receiving medical treatment. The discharging ear presents the otologists with the dilemma of operating on it or not. In contrast to the common perception that tympanoplasty result in the patients with wet ear is poorer than those with dry ear, the studies show that there was little difference in the results of the operations performed on two groups. This study was conducted to compare the efficacy of type 1 tympanoplasty in active and inactive mucosal type of COM.

METHODS

The study is based on the analysis of 50 patients of either sex undergoing type I tympanoplasty in the department of ENT, Ram Lal Eye and ENT Hospital attached to Government Medical College, Amritsar during the study period of March 2017 to September 2018. The patients were enrolled in the study after obtaining written informed consent and approval of Institutional Ethics Committee, Government Medical College, Amritsar.

Inclusion criteria

Inclusion criteria includes patients having COM with central perforation, with mild to moderate conductive hearing loss and patients in the group with wet earmucoid discharge with no microorganisms on culture and sensitivity.

Exclusion criteria

Exclusion criteria includes patients with age <18 years and >50 years, patients having attic perforation or definite diagnosis of cholesteatoma and ossicular erosion, with sensorineural hearing loss and those having any evidence of active infection in ear, nose, throat and paranasal sinuses.

A complete detailed history was obtained from every patient included in the study. The patients were then subjected to general physical examination.

Examination of ear, nose, throat and paranasal sinuses was done to rule out any source of infection. Hearing assessment was done using Gardiner Brown Tuning Fork of 512 Hz frequency and pure tone audiometry. Routine investigations like Haemoglobin (Hb), bleeding and clotting time test (BT and CT), total leukocyte count (TLC), differential leukocyte count (DLC), urine culture test, blood sugar levels and viral markers (human immunodeficiency virus (HIV), hepatitis C virus (HCV), hepatitis B virus surface antigen (HBsAg)) were done. Requisite pre-anaesthetic checkup and clearance for surgery was taken from the anaesthetist before the surgery.

The patients were categorized into 2 groups of 25 each. Group I included the patients with dry ear (no active discharge for a period of at least 4 weeks) at the time of surgery and group II included the patients with wet ear (culture negative persistent mucoid discharge) at the time of surgery.

All the patients underwent type-I tympanoplasty using temporalis fascia graft by underlay technique. Post operatively, the patients were given oral antibiotics, analgesics, and anti-histaminics for a period of two weeks.

Follow up

Mastoid dressing was changed on 2nd post-operative day and sutures were removed on 7th post-operative day. The patients were followed up in the outpatient department. Intactness of drum and presence of discharge was assessed. Hearing assessment including repeat audiograms was done at 12th week. The collected data was statistically analysed using software IBM SPSS 23.0 (Armonk, NY:IBM Corp.).

RESULTS

In the present study in group I as well as in group II, maximum number of patients belonged to the age group 21-30 years. The mean age of the patients in group I was 31.16 ± 9.66 while in group II it was 26.30 ± 7.21 (Figure 1).

There is slight female preponderance (M:F=0.78:1) in the study. The number of males and females in group I and group II was the same i.e., 44% males and 56% females (Figure 2).

In group I as well as in group II, patients were more in number from the rural background (64% in group I and 56% in group II). 82% of the patients enrolled in the study had unilateral symptoms while rest 18% had the

bilateral disease. In the study, 21 (42%) right ears and 29 (58%) left ears were operated upon.

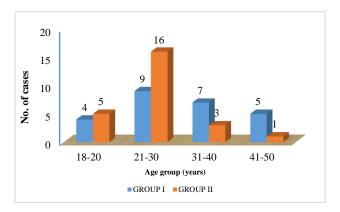


Figure 1: Age distribution.

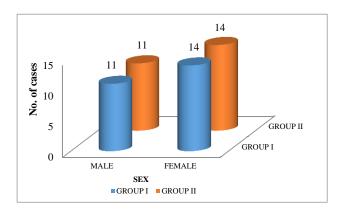


Figure 2: Gender wise distribution.

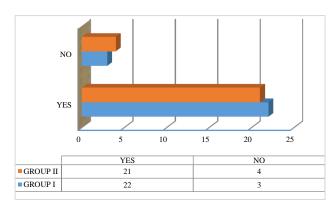


Figure 3: Complete graft uptake comparison.

On day 90, otoscopic examination revealed that complete graft uptake was present in 88% of the patients in group I and 84% of the patients in group II. 12% patients in group I and 16% patients in group II did not had complete graft uptake. The difference in two groups was statistically insignificant (p value 0.684 i.e., >0.05) (Figure 3).

The mean pre-operative PTA in group I was 30.57 ± 7.80 dB while postoperative PTA was 20.67 ± 8.22 dB and the mean pre-operative PTA in group II was 35.21 ± 5.98 dB

while the postoperative PTA was 27.07±9.25 dB. The PTA gain in group I was 9.89±7.40 dB and in group II it was 8.14±7.86 dB. The p-value in both the groups was <0.001 i.e., highly significant (Figure 4).

The mean pre-operative air bone gap was 19.22 ± 7.40 dB in group I and 23.19 ± 7.64 dB in group II. Post-operative air bone gap was 10.26 ± 7.9 dB in group I while mean postoperative air bone gap was 16.39 ± 7.23 dB in group-II. Percentage change (AB gap closure) in group I was 8.96 dB and 6.80 dB in group II. The p-value in both groups came out to be <0.001 i.e., highly significant (Figure 5).

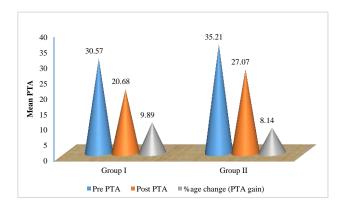


Figure 4: Pre- and post-operative pure tone audiogram comparison.

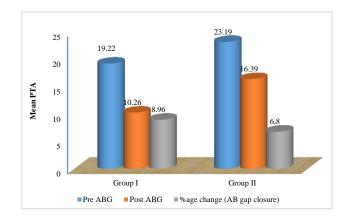


Figure 5: Air bone gap comparison..

DISCUSSION

Type 1 tympanoplasty is one of the most commonly performed procedures in otorhinolaryngology. With advanced microsurgical techniques and equipment, the graft uptake success rates of 90% to 97% have been reported. Various factors influencing the success rate of tympanoplasty have been discussed in literature. In this study we compared two groups of patients with tubotympanic chronic suppurative otitis media (CSOM), group I with dry ears and group II with wet ears. The patients in both the groups underwent type 1 tympanoplasty with temporalis fascia graft by underlay technique.

In the present study, with both the groups put together, the largest group (50%) consisted of patients in 21 to 30 years of age. Patients in the age group 31 to 40 years comprised the second largest group (20%). The mean age of patients in group I was 31.16 ± 9.66 years while in group II it was 26.30 ± 7.21 years.

Nagle et al observed that majority of the cases were in the second decade.⁶

A study named "outcome of type 1 tympanoplasty" conducted at Biratnagar hospital in eastern Nepal showed the highest frequency of patients in the age group 21-30 years, which is similar to the results of present study.⁷

The involvement of young age groups being more common indicates the fact that CSOM tends to occur more in early decades of life and resolves to leave permanent perforations with condutive hearing loss in many cases.⁸

The early presentation may be due to health issues and difficulty in hearing affecting the work efficiency, leading patients to seek early medical intervention.

There is slight female preponderance (M:F=0.78:1) in our study. The number of males and females in group I and group II was the same i.e., 44% males and 56% females. A study by Nagle et al showed female preponderance with male to female ratio of 0.85:1.

In the study "outcome of type 1 tympanoplasty" conducted at Biratnagar hospital in eastern Nepal females were more common than male with a sex ratio of 1.6:1.⁷ There was no statistically significant difference between the two groups in terms of gender.

82% of the patients enrolled in the study had unilateral symptoms while rest 18% had bilateral disease. In the study 21 (42%) right ears and 29 (58%) left ears were operated upon.

In study named "outcome of type 1 tympanoplasty" conducted at Biratnagar hospital in eastern Nepal, 65 (43%) right ears and 86 (57%) left ears were operated upon which is similar to the side preponderance seen in our study.⁷

However Nagle et al observed perforation to be common on right side (42%) with bilateral presentation in 18% of their cases. 40% cases had left sided perforation.

Complete graft uptake was present in 88% of the patients in group I and 84% patients in group II. 12% patients in group I and 16% patients in group II did not had complete graft uptake. The difference in the two groups was statistically insignificant (p>0.05).

The results of present study are comparable to study conducted by Nagle et al who observed that in dry ear

primary closure rate was 88% while in wet ear it was 74% giving statistically insignificant p value (0.07). They concluded that the presence of discharge in the ear at the time of operation does not interfere with the results of type 1 tympanoplasty, but it should be muciod and sterile.⁶

In the study by Mills et al the success rates for the closure of perforation were 83% for inactive ears and 82% for active ears confirming that the difference is not statistically significant (p=-0.9) which is comparable to present study.

The results of present study are comparable to study by Dhar et al who inferred with graft uptake of 90% in dry ears compared to 84% in wet ears after myringoplasty (p=-0.0956) that presence of mucoid discharge which is culture negative at the time of surgery is not a contraindication for surgery. ¹⁰

Study by Hosny et al showed results similar to our study wherein graft uptake rate for myringoplasty was 90.4% in dry ears and 87% in wet ears. The p value was 0.665 which was statistically insignificant.¹¹

Shankar et al observed success rate of 88% in the dry ear group and 80% in the wet ear group (p=-0.324) and concluded that success rate is not influenced by the presence of ear discharge at the time of surgery. ¹²

The mean pre-operative pure tone audiometry (PTA) in group I was 30.57 ± 7.80 dB while post-operative PTA was 20.68 ± 8.22 dB with a mean hearing gain of 9.89 dB. The mean pre-operative PTA in group II was 35.21 ± 5.98 dB while the post-operative PTA was 27.07 ± 9.25 dB with a mean hearing gain of 8.12 dB. There was marked hearing improvement in both the groups post operatively (p<0.001 i.e., highly significant). When hearing improvement was compared between two groups there was no significant statistical difference (p>0.05).

Our study is comparable to the study by Nagle et al in which post-operative hearing improvement was noted in 42 patients in dry ear group and 37 patients in wet ear group with a statistical p value of 0.85 (p>0.05) which is insignificant with respect to hearing improvement.⁶

Hosny et al in their study noted mean post-operative hearing gain of 10.3 ± 6.43 dB in active group while 11.2 ± 7.8 in inactive group with statistical p value of 0.635 (p>0.05) and concluded that discharge has no adverse effect on outcome of myringoplasty with respect to hearing gain which is similar tour study. ¹¹

CONCLUSION

In our study, the overall complete graft uptake following type 1 tympanoplasty was 86% with 88% in group I and 84% in group II. It was observed that there was no statistical significance (p=0.684) between the two groups

in relation to graft uptake. There was hearing improvement post operatively in both the groups which was statistically significant (p<0.05) while on comparing hearing improvement between the two groups, there was no significant statistical difference (p>0.05).

Based on above observations we conclude that the outcome is equally good for type 1 tympanoplasty in dry and wet ear in safe (mucosal) type of chronic suppurative otitis media with respect to graft uptake and hearing improvement.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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