Comparative Study of Outcome of Type I Tympanoplasty in Chronic Otitis Media Active Mucosal Disease (Wet Ear) Versus Chronic Otitis Media Inactive Mucosal Disease (Dry Ear)

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Abstract To compare the outcome of type I tympanoplasty with cortical mastoidectomy in chronic otitis media active mucosal disease (wet ear) versus chronic otitis media inactive mucosal disease (dry ear). An observational analytic study was conducted and data collection was done from August 2014 to August 2016. All patients of chronic otitis media with mucosal disease were divided into two groups, one with active disease (group A) and another with inactive disease (group B). The outcome was studied in the form of graft take up rate. Total 103 patients were studied, group A (wet ear) had 67 and group B (dry ear) had 36 patients. Graft take up rate was 94% in wet ear and 100% in dry ear and *p* value was 0.2. There was no statistically significant difference found between the two groups.

Keywords Wet ear · Dry ear · Active versus inactive disease · Mucosal disease · Chronic otitis media · Type I tympanoplasty

Introduction

The diagnosis of chronic otitis media (COM) implies a permanent abnormality of the pars tensa or flaccida, most likely a result of earlier acute otitis media, negative middle

ear pressure or otitis media with effusion [1]. Chronic otitis media is a common condition seen in patients attending the otorhinolaryngology clinic. Surgical intervention is the treatment of choice for closure of perforation.

It is believed that an actively discharging ear is a contraindication for the surgical treatment (tympanoplasty) because there is an active infection which would cause graft rejection. To avoid graft failures it is often preferred to give a course of antibiotics and allow the ear to become dry before operating on them. The interval to make an actively discharging ear dry is highly variable and unpredictable leading to an apparent increase in the number of hospital visits for the patient. In our country patients coming from remote and far flung areas find it difficult to maintain a regular follow up with an additional financial burden of catering multiple antibiotic courses. Extensive counselling and high grade of motivation is required to keep these groups of patients motivated for prolonged treatment duration.

Limited research has been conducted that compares the outcome of surgery to the preoperative status of ear in the form of active (wet) versus inactive (dry) mucosal disease. Hence, we did a study in our institution to form an unbiased opinion regarding the outcome of graft take up in wet ear versus dry ear.

Materials and Methods

It was an observational analytic study of 2 years duration from August 2014 to August 2016.

All patients aged > 8 years of both genders diagnosed with chronic otitis media-mucosal disease both active and inactive disease were included in the study. All patients underwent complete clinical ENT examination with pure

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Fig. 1 Wet ear

tone audiometry and X-ray mastoid. As a part of routine patient care, demographic data and all above information was recorded. They were divided into two groups: group A (wet ear) and group B (dry ear).

Group A comprised of patients in which otoscopy showed a central perforation in pars tensa with congested middle ear mucosa which may be discharging. Group B comprised of patients in which otoscopy showed a central perforation in pars tensa with healthy middle ear mucosa without any congestion or/and any discharge. All of these patients underwent type I tympanoplasty with cortical mastoidectomy with temporalis fascia as the graft material. Post operatively all patients were evaluated on follow up at the 6th week and 3rd month to check status of graft, as a part of routine post-operative care.

The graft taken up is defined as complete closure of perforation by graft at the end of 3 months and this finding will be seen by otoscope. The results were compared (in the form of graft take up rate) in both the group A (wet ear) and group B (dry ear). The details were recorded for the purpose of the study and the outcome was assessed in the form of graft take up rate in the two groups as mentioned above.

Results

Total 103 patients were studied. In group A there were 67 patients and in the group B there were 36 patients. Patients belonged to age group ranging between 8 and 70 years with maximum cases were found in young and middle age group. Equal male to female ratio (48:55) was seen in this research

Fig. 2 Graft taken up at 3 months

study. Amongst 103 subjects, 53 subjects had left ear disease and 50 subjects had right ear disease (Figs. 1 and 2).

The results of both groups have been summarized in Table 1. There was no difference found in graft taken up rate in both the groups (wet and dry ear). Fisher's exact test was applied using WINPEPI software $p=0.216$.

Discussion

Chronic otitis media is a major public health problem in children and adults. It is characterized by recurrent middle ear discharge through a tympanic membrane perforation. Tympanoplasty aims to prevent recurrent otorrhoea and restore middle ear function [2].

Tympanoplasty is an established procedure, yet several aspects regarding its timing, choice of optimal material and factors influencing the short-term and long-term results, have been a subject of controversy. Various factors influence the success of tympanoplasty such as patient's age, site of perforation, condition of the ear (dry or discharging), status of the contralateral ear, grafting material and surgical techniques and associated pathologies like adenoiditis, tonsillitis and rhinosinusitis.

Tympanoplasty can be performed on dry perforation or moist (wet) perforation. As far as literature goes, controversies still surround the subject of performing tympanoplasty in wet ear. While performing dry and wet tympanoplasty, some authors are of the opinion that results of dry tympanoplasty are better while others believe that the results of wet tympanoplasty are better [3–13].

Table 1 Graft taken up rate in both the groups (wet and dry ear)

	Wet group (group A)	Dry group (group B)	Total
Graft taken up	63 (94%)	36 (100%)	99 (96.12%)
Graft not taken up	04 (06%)	00 (00%)	04 (3.88%)
Total	67 (100%)	36 (100%)	103 (100%)

The success rate of graft take up in our study was 100% in dry ears and 94% in wet ears at follow-up of 3 months. By use of Fisher P test, p value is 0.2 which suggests that no statistically significant difference is observed in graft take up rate between two groups.

Our results are comparable with other studies like Nagle et al. [3] which showed the success rate for myringoplasty in dry ear was 88% and for the wet ear was 74% with p value of 0.07 which showed no statistical significance. They considered wet ear if the patient had a mild mucoid discharge which was negative on culture but we have not considered culture negative report of middle ear discharge.

Similarly another study done by Shankar et al. [4], showed that the success rate of tympanoplasty in dry ear was 88% and in wet ear was 80% with p value of 0.5 which showed no significant statistical difference in outcome of tympanoplasty in wet and dry ear.

A meta-analysis done by Vrabec et al. [5], considering the effect of otorrhea on closure rate, indicates that tympanoplasty on a discharging ear is as successful as in a dry ear.

Contrary to our results, many studies have reported that a discharging middle ear, at time of surgery, negatively influences the outcome of tympanoplasty. Uyar et al. found that there was a significantly higher rate of graft take up in patients with dry ear for 3 months preoperatively. He thus recommended to perform tympanoplasty when the ear has been dry for at least 3 months. Although it must be noted here that they had included paediatric population only. In addition, out of the 41 cases included only 28 underwent type I tympanoplasty, the remaining 31.6% underwent other additional ossicular reconstructive methods [6]. However in our study, we have assessed only graft take up rate in type I tympanoplasty cases and no additional ossicular reconstruction was done.

Proponents of tympanoplasty in an inactive ear has said that active infected state tends to cause loss of the free facial graft used for tympanic membrane reconstruction. Survival of graft tends to be affected and there are higher chances of failure and sloughing off in the actively infected ear.

Gersdorff also found a better outcome when operating on a dry ear, and both recommended medical treatment of discharging ears to control the inflammatory changes before myringoplasty. They have included individuals of

all ages. They have also noted to have better results amongst adults in comparison to children. However, we had limited experience in paediatric population. Their overall graft take up rate was 87.7%. They have stressed upon the status of the middle ear in the pre-operative phase to be the most important factor influencing the success of tympanoplasty. But our results are in contrast to this research article [7]. This group has recommended cortical mastoidectomy in every case of chronic otitis media which has been followed as a protocol of the current study.

Onal et al. reported that tympanoplasty is more likely to be successful if the ear has been dry for at least 1 month. This study has also included all types of tympanoplasties which explains the low graft take up rate of 71%. They have also considered other factors affecting outcome of tympanoplasty such as smoking, size and site of perforation, experience of surgeon, patient's socio-economic status etc. which have not been included in this study [8].

Pinar found a significant association between dry ear and success of tympanoplasty. Their graft take up rate was 79% for dry ear versus 64% for wet ear ($p=0.003$). For this author, more than 3 months dry period of the ear and a middle ear risk index (MERI) less than 3 were found to be statistically significant prognostic factors that affect success rate. This author has compared multiple variables, however the Odd's ratio for ear being dry for over 3 months is 2.2 which is the lowest in comparison to other factors such as MERI, size of perforation and myringosclerosis in that order [9]. As such take up rate in both groups was also very low compared to other studies and also with respect to ours, this suggests that there must be some confounding factor causing low graft take-up rate in both the groups.

Takahashi et al. have studied 74 non cholesteatomatous chronic otitis media cases undergoing type I tympanoplasty which is similar to our current research. They found that the presence of granulation tissue or oedematous mucosa in the middle ear impairs the function of transmucosal gas exchange and increases the distance between the middle ear cavity and the capillaries. This may result in surgical failure of tympanoplasty in wet ears. They have evaluated the role of Eustachian tube and middle ear pressure as being a more important factor that affects the success of tympanoplasty [10].

On the other hand, few studies revealed a positive effect of ear discharge on graft take up. Caylan et al. have

reported better healing of the tympanic membrane after myringoplasty in a discharging ear with 100% of success rate, while it was 75% in dry ear. They attributed such better results to the probable increase in the vascularity of the middle ear, which could have favoured better healing in wet ear. They have commented that, contrary to popular articles in the literature, discharging ear in children favours good outcome and they should be operated on, regardless of age and site of perforation [11]. We have seen most converging results with this author. Our results show no variation in graft take up that is statistically significant with the activeness of the middle ear status. We would also opine that good vascularity is definitely a positive factor that impacts graft take up. Though we must add here that dry ears have shown equal graft acceptance rates. Thus, we stand by our results that the activeness of the middle ear does not play a role in the overall graft take up success of the procedure, and so it should not be taken as a contraindication for the surgery.

Vijeyandra et al. did a histopathological study of the remnant tympanic membrane of 20 dry and 20 wet central perforations. They concluded that in wet central perforation, all the layers of epithelium were present and there were a raised number of inflammatory cells and blood vessels. Also, the fibrous layer was present, contrary to dry ears. According to the author, their initial experience was as per popular belief that dry ears give a better outcome in comparison to wet ears, however they have concluded that a draining central perforation was not a contraindication for tympanoplasty as these anatomical conditions promote the graft take up [12]. Here again, we are in complete adjunction with this author.

Since there is no difference in the overall outcome, we would recommend not to wait for the ear to get completely dry before going for a surgical intervention. We could reduce antibiotic abuse by this way and its adverse effects. Additionally, the number of patient visits would be reduced and overall patient compliance would also show an improvement. Thus, contrary to popular belief that the outcome of type I tympanoplasty has a significant relation with the activeness of the ear, changing trends demand that it can be performed in either wet or dry state with equally good results and patient satisfaction.

Conclusion

Based on our data, disease status of middle ear does not interfere with the results of tympanoplasty and has no effect on the surgical outcome.

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