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Original Research Article

Post-operative surgical site infection after type 1 tympanoplasty: an institutional experience

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ABSTRACT

Background: Tympanoplasty is a routinely performed surgery for treating the COM mucosal type of disease. Complications after surgery is not uncommon and can compromise the surgical outcomes. However, the incidence of surgical site infections after ear surgery is declining day by day because of the use of pre-op antibiotics, highly sterilized instruments and clean surgical fields. This paper presents a study on post-operative infections after tympanoplasty and investigates the potential cause responsible for it.
Methods: This prospective study was done over a period of 9 months. The data of 100 patients who were operated for COM mucosal (inactive) type of disease under general anaesthesia, under the care of both the senior and junior surgeons were recorded. There surgical outcomes were evaluated and all cases of locally infected ears were assessed and followed up.
Results: Concerning the SSI postoperatively, 4 cases were diagnosed (4%) within the period of 1 month of follow-up, and a significant association was found with the patients operated by juniors, poor hygienic practices by patients, and the comorbidities associated with the patients.
Conclusions: The occurrence of complications after ear surgery is less rare than previously thought. Inappropriate surgery by junior surgeons is found to be one of the causes of complications resulting in graft failure. Maintaining personal hygiene post-operatively also plays an important role in keeping the surgical site clean, so patient counselling regarding personal hygiene and head hygiene is very important. And co-morbidities like diabetes mellitus should be taken into consideration in view of avoiding SSI.

Keywords: Tympanoplasty, Postoperative SSI, Prospective study

INTRODUCTION

Chronic supportive Otitis media (COM) is the most prevalent infectious illness among children worldwide.[1] CSOM is defined by recurrent bouts of acute otitis media that continue for more than 12 weeks, resulting in tympanic membrane (TM) damage and a non-healing perforation.[2] Tympanoplasty is the surgical repair of a perforated TM, with or without vesicular restoration (ossiculoplasty), with the goal of preventing infection and restoring hearing.[1] Wullstein and Zollner popularised the use of overlay graft to repair the perforated TM and restore the middle ear's sound conduction mechanism, marking the beginning of tympanoplasty history in the 1950s.[3] Tympanoplasty is considered to be a clean ear surgery. Local infection after tympanoplasty is uncommon; it may result in local wound infection, ear discharge, hearing impairment and graft failure.[4] And might require antibiotic treatment, hospitalisation and even re-intervention. Common symptoms of surgical site infections are: persistent pain, discharge from the wound, redness, swelling, fever, hearing loss, etc. These issues

could lead to a rise in morbidity, medical expenses, and patient discomfort. Inadequate pre-op workup, unsterile OT practices, untrained surgeons, improper post-op care, malnutrition, ignorance, and unhygienic practices followed by patients after being discharged from hospitals are certain factors found to be associated with the SSI. The objective of this work is to identify the potential predictive factors responsible for the local infection after COM surgery and to take an initiative to decrease its incidence.

METHODS

This is a prospective observational study, including 100 patients who underwent tympanoplasty over a period of 9 months from January 2024 to September 2024. The study was carried out in the Department of Otorhinolaryngology at the Integral Institute of Medical Science and Research, Lucknow, UP. Ethical clearance was taken from the ethical committee of the institute, and written informed consent was taken from all the patients.

100 patients of all age groups with COM inactive mucosal disease who underwent tympanoplasty with or without post-operative complications after 1 month of follow-up were included in this audit. Patients with mastoid cavity exploration, acute infections, and active ear discharge were excluded. These patients were then followed up weekly for a period of one month. Endoscopic examination, EUM was done every week. Pure tone audiometry was performed 1 month after surgery by the first author.

All the patients were admitted one day before the surgery in ambulatory hospitalisation and received pre-op medications like oral antibiotics on the morning of surgery. The patients took a shower before surgery; part preparation was done adequately by shaving 2 finger widths of hair on the surgical site. All the tympanoplasties were performed under general anaesthesia, and most of the patients were operated on by one of the two experienced senior surgeons and a few of the total by junior trainee surgeons. Intravenous antibiotics were given intraoperatively. A clean and sterile environment was maintained during the surgery. In the post-operative period, IV antibiotics were continued, i.e. up to 7 days after operation. The mastoid dressing was changed on the second postoperative day. Non-absorbable sutures, applied, were removed on the sixth postoperative day. Patients were then discharged on oral antibiotics until the first follow-up, which is up to 7 days. Antibiotic ear drops were prescribed for 4 weeks after suture removal. Follow-up evaluation of the patients with postoperative infection was done up to 4 weeks minimum and extended as needed. Postoperative infection was defined as an infection occurring within four weeks of the postoperative period. Wound assessment was done by assessing the pinna, post-aural incision site and graft donor site for any signs of infection. Postoperative infection was said to be present if the patient had discharge from the incision site or wound gaping or purulent discharge from the external auditory canal (EAC) along with generalised symptoms of fever and localized raised temperature, for 1 month. If discharge was present, then swabs were taken and sent for culture and sensitivity of microorganisms. If microorganisms were grown, patients were given an appropriate antibiotic that was sensitive to the microorganism.

RESULTS

105 cases were included in this audit between January 2024 and September 2024. Following the removal of the mastoid dressing and getting discharged, five patients were lost to follow-up. The remaining 100 patients underwent analyses. The majority of cases (69%) were from low socioeconomic groups in rural areas, and the majority of cases (35 males and 65 women) were in the mid-age group with a mean age of 26.7 years. Of these, 35 cases (35%) had bilateral ear illness, and 65 cases (65%) had unilateral ear disease. Of these, 32 cases involved the right ear, and 33 cases included the left, indicating no relationship between the site and ear disease. Table 1 displays the demographic data.

Table 1: Distribution of cases according to demography.

Variables	No. of cases	Percentage (%)
Age (years)		
<30	52	52
>30	48	48
Gender		
Male	35	35
Female	65	65
Ear involved		
Right	32	32
Left	33	33
B/L	35	35
Residence		
Rural	69	69
Urban	31	31

All the patients underwent type 1 tympanoplasty and were followed up weekly up to 4 weeks. 4 patients developed complications after operation within the duration of 1 month of the follow-up, giving an overall prevalence of 4 per cent. 2 patients developed the complication on the 2nd week, one on the 3rd week and the other one on the 4th week. No significant intraoperative complications were noticed. Symptoms associated with post-operative complications were persistent ear discharge, pain, itching and surgical site infection in the form of wound gaping after suture removal and granulations in EAC due to improper TM flap repositioning, followed by infection. As described in Table 2, 1 patient (1%) presented with ear discharge in the 3rd week of the mastoid dressing removal. 1 patient (1%) had itching in the ear in the operated ear, seen on

the 3rd week of surgery. 1 patient (1%) had post op pain and swelling on the suture line, followed by infection seen on the 4th week of surgery, and 2 patients (2%) had wound gaping due to inappropriate suturing seen on the 1st week of surgery, immediately after the suture removal.

Table 2: Distribution of cases according to post op symptoms.

Symptoms	Case 1	Case 2	Case 3	Case 4	Percentage (%)
Otorrhea	+	-	-	-	1
Itching	+	-	-	-	1
Post op scar pain	-	+	+	+	3
Surgical scar wound infection	-	+	+	+	3

Table 3: Factors resulting in the early postsurgical infections and their week of presentation.

Patients	1	2	3	4
Age (years)	17	40	38	8
Sex	Female	Male	Male	Female
Pre-op ear examination	Dry	Dry	Dry	Dry
Post-op ear examination	Wet	Wet	Wet	Wet
Intra-op antibiotics	IV	IV	IV	IV
Post-op antibiotics	Oral	Oral	Oral	Oral
Time to SSI diagnosis after surgery (weeks)	4th	4th	3rd	4th
SSI (causes)	Inappropriate surgery	Inappropriate surgery	Fungal infection	Head lice infection
Associated with comorbidity	No	No	Yes (diabetic)	No
Operating surgeon	Junior	Junior	Senior	Senior
Personal hygiene	Maintained	Maintained	Maintained	Not-maintained

In a univariate analysis, the following factors were significantly found to be associated with the complications: operation by junior surgeons, patients' poor personal hygiene, patients with co-morbidities, and oral post-operative antibiotic use. The individual records of all four patients with a post-operative complication were scrutinised. The most salient features of all four cases are shown in Table 3. In 2 of the 4 post-operative complicated cases, surgery was carried out by the junior trainee surgeon, giving a prevalence of 2 per cent. One of the cases (1 per cent) among 100 had a post-operative complication due to the underlying comorbidity. And the last one developed complication due to the unhygienic practices followed after surgery, contributing to 1 per cent of the total.

DISCUSSION

Tympanoplasty is a surgical technique used to repair tympanic membrane perforations and restore middle ear function. Even though the procedure is usually successful, a number of factors are associated with the post-operative complications, such as early and late surgical site infections. To maximise patient care and surgical success, understanding these factors is crucial. The aim of this audit is to identify the factors responsible for the early post-operative complications. In our study, the following factors: Inappropriate surgery done by the junior surgeons, co-morbidity (DM) and head-lice infection were found to be associated with the early post op complications. This audit assessed 100 cases that underwent type 1 tympanoplasty under GA All the patients stayed in the hospital and were observed for up to 7 days after surgery and then discharged after suture removal on the 8th day. Similar length of hospital stays (median: 8 days) was seen in the study of Suzuki S et al.[5] All patients were called for follow-up weekly, for a minimum of 4 weeks, to identify any early complications occurring locally after surgery and the factors associated with it. To our knowledge, this is the first audit to investigate the factors responsible for early post-surgical local complications for COM. Starting with the patient-related factors, tympanoplasty done in younger populations results in better healing as compared to the older groups due to age-related tissue changes, which result in longer healing durations and a higher risk of complications.[5] Majority of the patients in this audit belonged to the age group of 10-40 years with the mean age of 26.7 years and the patient developing complications presented in the same age group, thus showing no relation of age with the complications, similar findings were seen by other authors also, who concluded that patient age did not influence the surgical result of tympanoplasty and is not a prognostic factor.[3,6] However, in a study of Emir et al, a significant decrease in the success of the graft was seen in young age group when compared with adults (82% compared with 89.5%, p=0.049).[7] Comorbidities like malnutrition, diabetes mellitus, high blood pressure and immunocompromised states, also affect the graft uptake, making it harder to heal and making them more vulnerable to infections.[8] In our study, we have found only 1 patient (1%) with type 2 diabetes mellitus developing complications in the 3rd

week of surgery due to increased susceptibility to secondary fungal infection. In one study, no significant associations were found for DM and short-term outcomes after TP, but in another regional study, no graft failure was seen during the 1st month of surgery, but failure of 28.6% and retraction of 14.3% were seen after an evaluation at the 6th month.[5,9] In our study, females were predominant over males (65% vs 35%). However, the rate of complications was equal in both groups (1:1), thus showing no relation of tympanoplasty success rate with sex; similar results were found in other studies.[3,10] The majority of people belonged to the rural class, where factors including overcrowding, poverty, illiteracy, ignorance, poor hygiene, malnutrition, and a lack of medical facilities have all been implicated in the high frequency of CSOM. In our study, 1(1%) patient presented with a surgical site infection on the 4th week of surgery due to hair infection with lice; similar results were concluded by Shaheen MM et al in their study.[11]

Another important factor that was seen associated in our study was the surgical factor, the surgical technique and approach and the surgeon's expertise. The experience and skill level of the surgeon play a significant role in minimising intraoperative errors and optimising outcomes. We have found 2 (2%) patients with the wound gaping and infection after suture removal, as the surgeries were performed by the junior trainee surgeons; however, no graft rejections were seen. Although it is not a common condition, it is an important factor for outcome failure as surgical training is an important part of residency and for future practices. No such study has been done showing the surgical complications due to the surgeon's skill. A limitation of this study is the small number of patients for each group. More research with bigger patient populations is required to better understand how different illnesses affect tympanoplasty success rates.

CONCLUSION

Tympanoplasty-related postoperative problems are complex and include surgical, pathological, patient-related, and postoperative care components. Preoperative and postoperative management of these variables can greatly improve surgical results and patient satisfaction. In order to reduce problems and promote the best possible healing, careful surgical technique, postoperative care, and customized patient education are essential.

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