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Original Article

Study Of Outcomes of Tympanoplasty And Effect Of Bacteria In Quiescent Stage Of Mucosal Type Of Chronic Otitis Media

Jagyasmita Balasamant^{1,*}, Rajesh Kumar Padhy^{1,‡}, Amruta Kar^{1,‡}
Rakesh Kumar Giri¹, Pallavi Agarwal¹

Affiliation:

¹Ind year P.G Student,^{1,*}Associate professor, Department of Otorhinolaryngology,

^{1,‡}Assistant professor, Department of microbiology Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India

The name of the department(s) and institution(s) to which the work should be attributed:

Department of Otorhinolaryngology, Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India

Address reprint requests to Dr. Jagyasmita Balasamant.

Ind year P.G Student, Department of Otorhinolaryngology, Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India or at smitasamal35@gmail.com

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ABSTRACT: Background: The aims of this study were to determine whether any organism does exist in middle ear cavity in mucosal type of chronic otitis media, if so isolate their types and assess their effect on graft uptake results.

INTRODUCTION

Mucosal type of Chronic Otitis Media (COM) is a common disease worldwide. Terms like Chronic otitis media-tubotympanic or non-cholesteatoma type are also used synonymously¹. The disease may pass through acute, inactive, quiescent or healed stage. There is discharge in middle ear & external auditory canal with congestion of middle ear mucosa in acute

Materials and Methods: Patients from 10 years of age and above with diagnosis of chronic otitis media mucosal type were included for tympanoplasty. Swab was collected from middle ear cavity for direct smear examination and culture prior to surgery in operation theatre and inoculated into Blood agar, Chocolate agar and *Mac Conkey* agar within half an hour. The isolates were identified with the use of standard bacteriological technique as described by American Society of Microbiology. All patients underwent tympanoplasty.

Observation: Graft uptake results were assessed after 6 weeks. 70 patients were enrolled for study. Majority of the patients were of the age group 11-20 years (42%). Among which male were more common with 71.4%. Bacteria were isolated from 43 cases (61.4%). *Pseudomonas aeruginosa* were isolated in 18(41.8%), *Staphylococcus aureus* in 11(25.7%), *Klebsiella* in 6(13.9%), *Proteus* in 3(6.9), *E. coli* in 3(6.9%) and *Acinetobacter* in 2(4.7%). All patients had undergone tympanoplasty. Graft uptake was (87.1%). All 9 failure cases had residual perforation. In bacteria isolated group, 37 out of 43 had graft uptake.

Conclusion: Success rate of tympanoplasty in quiescent stage was comparable with dry ear. *Pseudomonas aeruginosa* was the most common organism. Presence of bacteria in middle ear during surgery did not increase the risk of graft failure.

KEYWORDS: Bacteriology; Chronic otitis media; Tympanoplasty.

stage is hereby defined within two weeks after cessation of frank otorrhoea. Surgical treatment of chronic otitis media-mucosal type is type 1 tympanoplasty, wherein the closure of perforation of pars tensa is done mainly to prevent recurrent ear discharge & to improve hearing. Success of tympanoplasty is related on the basis of intact pars tensa. Despite high success rate and the nature of the procedure, the effect of many influencing factors is also involved. This include the age of the patient, site and size of the perforation, length of time the ear has been dry prior to surgery the presence of infection at the time of surgery and the status of the opposite ear⁴. General trend is to operate in inactive stage of the disease process. Surgery is done after at least 6 week of stoppage of otorrhoea so patients have to wait till that period. Patient may develop discharge just before surgery due to aggravating factors like upper respiratory tract infection, water entry in ear. In these cases patients will have to bear a lot financial loss and inconvenience. If myringoplasty can be done in quiescent stage, these types of difficulties can be overcome easily. With operation at this stage of increased vascularity results of more graft uptake can be expected⁵. Some literature support operation in the quiescent stage and claim higher success rate than surgery done in inactive stage⁵. Monobacterial or mixed growth is isolated from ear discharge. *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Bacillus*, *E.coli*, *Haemophilus influenzae*, *Streptococcus*, *Bacteroids* are common bacterial organism isolated from ear discharge. Regarding the role of anaerobic organism found in COM is controversial⁶. Although infection is one of the factors for graft failure, presence of organism in middle ear during surgery as the cause of graft failure is controversial⁷. Active stage is converted to quiescent stage after medication so early quiescent stage is a relatively sterile condition. So this study was undertaken with the aims of assessing the middle ear of its bacteriological status at early quiescence stage of COM and to correlate this with graft uptake results of underlay myringoplasty.

MATERIALS AND METHODS

This is a prospective study conducted in HI-TECH MEDICAL COLLEGE AND HOSPITAL in Department of Otorhinolaryngology and Department of Microbiology, from 1st October 2013 to 30th December 2014. Age greater than ten year; all gender and patient in early quiescent stage of chronic otitis media were included. Preoperative

work up was done with detail history, general physical examination, ear examination with otoscope and microscope if needed. Discharge seen in external auditory canal (EAC) was marked as frank otorrhoea. Capsule Amoxycillin (30 mg/kg/day) and ear drop Betamethasone combined with Neomycin were prescribed. Patient was asked to follow in ENT OPD, 2 times in a week so that exact day of stoppage of otorrhoea could not be missed. Informed consent was taken for surgery. Patient was planned for surgery within 2 weeks counted from the day of stoppage of frank otorrhoea. Appropriate sized sterile metallic aural speculum was inserted in external auditory canal. Operating microscope was used to visualize the perforated tympanic membrane through which small cotton ball held by crocodile forceps were left in middle ear cavity for some time and the swab taken. Swab was kept in sterile vial and inoculated within half an hour in culture medium in Microbiology Laboratory. Swab was inoculated in Blood Agar, Mac Conkey Agar and Chocolate Agar at 37°C in aerobic condition for 48 hour. Bacterial growth was identified by morphology, culture character, morphology, pigment production, haemolysis, motility, conventional biochemical tests, Gram staining if necessary. Underlay myringoplasty was done through postaural approach; temporalis fascia was used as graft. Follow up was done in 3rd, 6th and 10th post operative day, then 6th to 10th week. In 3rd post operative day culture reports were collected and wound status was evaluated. Pack was removed in 10th post operative day. In 6th to 10th week graft uptake results were noted as uptake or failure. Any residual perforation from pin point to total rejection was reported as failure. Graft uptake results were correlated with organism isolated.

EXCLUSION CRITERIA: Acute otitis media

Frank otorrhoea, patient receiving antibiotics within 72 hour before surgery and revision surgery cases.

OBSERVATION

This study included 70 cases of mucosal type of chronic otitis media. Various factors regarding clinical presentation, microbiological study and operative treatment had been analyzed. Majority of the patients were of the age group 11-20 years (41.4%). Among which male were more common with 68.4%. Less number of patients were found in 51-60 years (4%). The minimum and maximum days required to stop otorrhoea after prescribing oral antibiotics and ototopical medication were 5

days and 18 days respectively with mean duration of 11.8 days. Bacteria were isolated from 43 cases (61.4%). *Pseudomonas aeruginosa* were isolated in 18(41.8%), *Staphylococcus aureus* in 11(25.7%), *Klebsiella* in 6(13.9%), *Proteus* in 3(6.9), *E. coli* in 3(6.9%) and *Acinetobacter* in 2(4.7%). All patients had undergone tympanoplasty. Graft uptake was seen in 61 (87.1%) patients and failure was observed in 9(12.9%) cases. All 9 failed cases had

residual perforation and there were no cases with total rejection of the graft. None of the patients developed facial nerve palsy, sensorineural hearing loss or infection at graft harvested site. Middle ear discharge was noticed in 43 ears (61.4%) and 37 among them (86%) had graft uptake. No discharge was seen in 29 cases and all of these had graft uptake.

Table 1. Age and sex distribution.

Age in years	Males	Females	Number of patients (n=70)	Percentage (%)
11-20	16	13	29	41.4
21-30	13	5	18	25.5
31-40	9	2	11	17.6
41-50	5	1	6	8.4
51-60	4	1	5	7.1

Table 2. Frequency and type of aerobic bacteria isolated from middle ear.

Bacteria isolated	Number of cases (n=43)	Percentage (%)
<i>P. aeruginosa</i>	18	41.8
<i>S.aureus</i>	11	25.7
<i>Klebsiella</i>	6	13.9
<i>acinetobacter</i>	2	6.9
<i>Proteus</i>	3	6.9
<i>E. coli</i>	3	4.7

Table 3. Middle ear discharge correlated with aerobic culture.

Organism	No discharge	Discharge	Total
No growth	6	21	27
Growth	3	40	43
Total	9	43	70

Table 4. Correlation of bacteriological status with graft uptake results.

Bacteria isolated	Failure	Uptake	Total
Yes	6	37	43
No	3	24	27
Total	9	61	70

DISCUSSION

Due to changing pattern of bacteriological profile of chronic otitis media, it has become very important to find out the organism causing the disease⁸. In the present study the prevalence of chronic otitis media was higher in the age group of 11-20 years (42%) which is in accordance with Poorey et al.(2002)⁹ where they found that maximum patients (46%) were in the second decade of life. The sex distribution in the present study was 71.4% male and 28.6% female which

suggests male preponderance. This goes in favour with the study of Vijaya D(1998)¹⁶.

Tympanoplasty in wet ears were analysed retrospectively by Raj et al.(1999)¹⁰, and Caylan R et al.(1998)⁸. Most of the studies had small number of discharging ears that precludes the conclusion. Tympanoplasty can be done under local anaesthesia comfortably in adults. Wet tympanoplasty were done under general anaesthesia and included both paediatric as well as adult cases by and Gersdorff M et al.(1995)¹¹. Patients receiving antibiotics

within 72 hours before surgery were excluded from the study because it could affect culture of the organisms. Revision cases were less in number and for the sake of uniformity in patient selection these cases were excluded from the study. Caylan et al.(1998)⁸ also excluded the revision cases. It took five to 18 days to control frank otorrhoea after the start of oral and oto-topical medication. Mean duration was 11.8 days. Reports are not available in literature that quote the specific period needed for the similar purpose. Approaches for tympanoplasty are dictated by indications with also an element of personnel preference of the operating surgeon but in our study all the cases were done via postaural approach. According to Brown et al. (2002)⁵ in his study in tympanoplasty, there was no statistical significance in the success rate for the different approaches used. As for the underlay technique, which was used in all cases in the present study, it is acknowledged that underlay technique remains the most common technique nowadays. Bacteria were isolated from 43 cases (61.4%). All the growths were as monobacterial. *Pseudomonas aeruginosa* were isolated in 18(41.8%), *Staphylococcus aureus* in 11(25.7%), *Klebsiella* in 6(13.9%), *Proteus* in 3(6.9), *E. coli* in 3(6.9%) and *Acinetobacter* in 2(4.7%). This coincides with studies of Sinha P et al.(199)¹³ and Geradorff M et al.(1995)¹⁴ where *Pseudomonas aeruginosa* was the most common organism isolated from chronic discharging ears. Graft uptake was assessed after 6 week of surgery. By this time, gel foam would have been dissolved completely. The time required for complete healing is 6 week. Brown et al.(2002)⁵ used minimum of 4 weeks from the date of operation to assess the results. Raj et al.(1999)¹¹ had assessed the intactness of graft after 3 month and Gersdorffs et al.(1995)¹⁴ after 3 years but both of these were retrospective reviews. In our study, graft uptake rate was 86.4% as assessed at or after 6 weeks. All failure cases had pinpoint perforation, not a single one had complete rejection of the graft. Our results are similar to those of Raj et al. (1998)¹⁰ who in a review of tympanoplasty done in 50 patients with mucoid discharge, found primary closure rate of 84%. He had assessed after 3 month for the intactness of graft. Among the failure cases, 6 were done in the first week of quiescent and 3 during second week. All the failure cases had unilateral disease in our study. Presence of organism in middle ear during surgery did not affect the outcome of surgery (Probability of being failure if organism present was 5.25%, Probability of being

uptake if no growth seen was 84.4%, Relative risk was 0.4, Odd ratio was 0.36, p-value using chi-square test was 0.391). Middle ear discharge found during the surgery has been described as a risk factor to cause graft failure as shown by the study of Geradorff el al.(1995)¹⁴. The author attributes such good results to probable increase in vascularity of middle ear which could have facilitated faster and better healing and take up. In our study, there is no correlation between the presence of discharge in middle ear and graft uptake results (correlation=-0.081, $p>0.05$). Discharge seen in middle ear during surgery in quiescent stage is not always the source of infection. In our study, bacteria were isolated only from 15(31.9%) ears. This low yield may be due to oral antibiotics and ototopical medication used to make the ear quiescent. Our findings are different from those of Carlin et al.(1987)⁸ who had observed that out of 60 wet ears only in 11(18.3%) pathogens were actually present.

CONCLUSION

From the above discussion it can be concluded that success rate of myringoplasty in early quiescent stage of chronic otitis media was 87% which is comparable to results done in inactive stage of disease. Organisms were isolated in 32% of middle ear cavity at surgery for myringoplasty in that stage of COM. Most common aerobic bacteria found in middle ear cavity was *Staphylococcus aureus* (80%), followed by *P. aeruginosa* and *E.coli* which were seen in 13.3% and 6.7% of cases respectively. Presence of bacteria in middle ear during surgery did not increase the risk of graft failure (Relative Risk 0.4, Odd Ratio 0.36, $p=.391$)

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