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STUDY OF MICROBIOLOGICAL FLORA IN POST OPERATIVE EAR SURGERY IN A TERTIARY HEALTH CARE CENTRE

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ABSTRACT

Background: Postoperative infection following mastoid exploration under strict aseptic conditions and antibiotic coverage postoperative cases of cortical and modified radical mastoidectomy do pose challenging infections. **Aim:** The present study identifies the organism and antibiotics to which they are sensitive. This measure prevents postoperative permanent disease and discharge and improves the success rate of surgery without complications. **Materials and Methods:** A total number of 120 patients of mastoid exploration with discharge were the subjects of present study. The study was carried out from Feb 2018 to Feb 2021. **Result:** Males were 72 who constituted 60% and females were 48 who constituted 40%. Emergency procedures were 85 who constituted 71% and elective procedures were 35 who constituted 29%. 48% (58) were clean surgeries and 52% (62) were clean contaminated surgeries, 109 (91%) of patients showed significant growth and 11 (9%) of patients had no growth. 50% of the patients had culture positivity and duration of surgery was greater than 2 hours. Diabetes is the most common risk factor followed by hypertension. A total of 109 samples showed growth, 114 organisms were isolated. E. coli was the organism which was predominant followed by Staphylococcus aureus. Ampicillin showed maximum resistance followed by ceftazidime. Cefipime and Piperacillin showed least resistance to E.coli. Among 38 isolates, 12 (33%) were ESBL producers. **Conclusion:** The present study provides information about the incidence of commonest organism E. coli in post operative mastoid exploration to enable treatment of a patient immediately to prevent complications from re- infection.

Keywords: Mastoid exploration, antibiotics, surgical site infections.

Introduction:

Infections at the surgical site post-operative mastoid exploration are those that develop in the incisions made during surgery and affect the tissues next to the wounds that were made visible.[1] Infections at surgical sites are one of the most prevalent health issues that affect people worldwide in 20 to 25 percent of nosocomial infections occur worldwide.[2] These infections are brought on by exogenous and endogenous bacteria that penetrate the surgical wound throughout the process.[3]

Infections at the surgical site mastoid exploration usually appear 30 days after the postoperative procedure, with the exception of situations with additional implants, when the time frame might be up to a year. An infection at the surgical site can affect the deep tissue or the incision at any moment between zero and thirty days after the procedure.[4] Rates of surgical site infections have been found to range from 2.5% to 41.9% worldwide.[5] 4% to 30% of surgical site infections occur in India.[6] The incidence of an infected surgical wound is linked to Preoperative care, the operating room environment, and postoperative care are risk factors that are connected to the frequency of surgical wound infection.

Overweight, growing older, poor nutrition, jaundice, diabetes, smoking, cancer, the presence of a past scar, or radiation at the wound site are major causes of wound disruption. Staphylococci, Pseudomonas, Streptococci, Enterococci, E. coli, Klebsiella, Enterobacter, Citrobacter, Acinetobacter, Proteus, and S. aureus are among the pathogenic bacteria that frequently cause surgical site infections. S. aureus is a part of the natural flora, can be isolated from the nose up to 60% of the time, and is very contagious. The health care system of any hospital is measured by the prevalence of surgical site infection.

A thorough and regular surveillance of diverse hospital acquired illnesses is required given the rise in nosocomial infections and antibiotic resistance. Surgery for mastoid exploration is carried out under strict aseptic precautions. Postoperative infection of the external auditory canal and mastoid cavity in canal wall down procedures pose a clinical dilemma. The present study involves collecting aural swabs for culture and sensitivity in all these postoperative cases to offer appropriate antibiotic and preventing continuation of discharge disease and complications.

Materials and methods: A total number of 120 patients of mastoid exploration with discharge were the subjects of present study. The study was carried out from Feb 2018 to Feb 2021. Patients in the age group of 21 to 45 years and patients who were treated on the basis of culture sensitivity report before surgery were included in the study. Patients with congenital or acquired immunocompromised conditions including diabetes mellitus, chemo radiotherapy or cytology toxic therapy or on steroids for any systemic diseases, patients taken up for surgery for active intervention without subsidence of discharge even with antibiotics and patients with reports of sterile or no growth in discharge on culture and sensitivity were excluded from the study. Informed consent was acquired after all patients received thorough information about the trial. In the postoperative ward, wounds were inspected for indications of infection. The vicinity of the incision was cleansed with saline when infection was thought to be present. Using two sterile swabs, exudates were collected from the depth of the wound. a brief clinical history that includes the patient's age, gender, disease type, diagnosis, and kind of operation. Given antibiotics were noted. The wound was assessed on the third, fifth, and up until discharge days. After surgery, patients were monitored for 30 days to look for any post-operative infections. Each and every pus swab was processed and identified using accepted procedures for identification. Antibiotics were run in accordance with Clinical and Guidelines from the Laboratory Standards Institute (CLSI). Antibiotics included ampicillin, gentamicin, ciprofloxacin, ofloxacin, imipenem, ceftriaxone, cefepime, ceftazidime, cefazolin and cefotaxime. The antibiotic discs were obtained. Following the recommendations of the Clinical and Laboratory Standards Institute (CLSI), the isolates were verified using the double disc diffusion method.

Results: A total number of 120 patients of mastoid exploration with discharge were the subjects of present study.

Table 1: Distribution based on sex distribution.

Sex distribution	
Males (number,%)	Females (number,%)
72,60%	48,40%

Table 1 shows that males were 72 who constituted 60% and females were 48 who constituted 40%.

Infection rate was 8%. Among the cases studied, emergency procedures were 85 who constituted 71% and elective procedures were 35 who constituted 29%. 48% (58) were clean surgeries and 52% (62) were clean contaminated surgeries, 109 (91%) of patients showed significant growth and 11 (9%) of patients had no growth.

Table 2: Correlation between culture positivity and duration of surgery.

Duration of surgery	Number	%	Culture Positivity
0-1 hrs	20	16.7	15
1-2 hrs	40	33.3	34
>2 hrs	60	50	60

Table 2 shows that 50% of the patients had culture positivity and duration of surgery was greater than 2 hours, 33.3% of the patients had duration of surgery of 1-2 hours and 16.7% of the patients had duration of surgery of 0-1 hrs.

Table 3: Distribution of patients with underlying risk factors.

Risk factor	Number	%
Diabetes	56	46.6
Hypertension	34	28.4
Diabetes+Hypertension	13	10.8
Smoking	10	8.4
Alcohol	7	5.8

Table 3 shows that diabetes is the most common risk factor followed by hypertension.

Table 4: Organisms isolated.

Organisms	Number	%
Staphylococcus aureus	29	26.6
Enterococcus sp.	10	9.2
E.coli	38	34.9
Klebsiella	11	10.1

Pseudomanas sp.	12	11
Proteus mirabilis	8	7.3
Acinetobacter sp	6	5.5

Table 4 shows that a total of 109 samples showed growth, 114 organisms were isolated. E. coli was the organism which was predominant followed by Staphylococcus aureus.

Table 5: E.coli resistance pattern.

Antibiotics	Number	%
Ampicillin	38	100
Gentamycin	25	66
Ciprofloxacin	12	33
Ceftriaxone	19	50
Cephazolin	19	50
Ceftazidime	31	81
Cefotaxime	25	65
Cefepime	7	18
Piperacillin	7	18
Imipenem	Nil	

Table 5 shows that Ampicillin showed maximum resistance followed by ceftazidime. Cefipime and Piperacillin showed least resistance to E.coli. Among 38 isolates, 12 (33%) were ESBL producers.

Discussion:

Worldwide and from hospital to hospital, the incidence of surgical site infections post operative mastoid exploration ranges from 2.5% to 41.9%. 10 The infection rate in our study was 8%, which is similar to that mentioned in S Selvaraj et al study[7] (8.3%), which is much less than Patel et al. study[8] reported 16% of surgical site infections but somewhat more than Anvikar et al. study[9] (6.09%).

In present study, males were 72 who constituted 60% and females were 48 who constituted 40%. In S Selvaraj et al[7] study, similar values were observed, 17 (56.6%) mere males and 13 (43.3%) were females. Similar findings were made by Mawalla et al.[2], who noted a male predominance of 39 (60%) over females 26 (40%) in surgical site infections. The reason might be due to cigarettes smoking in males. Smoking affects wound healing by impairing tissue oxygenation and causing localised hypoxia through vasoconstriction.

Emergency procedures were 85 who constituted 71% and elective procedures were 35 who constituted 29% in the present study. Similar findings were seen in S Selvaraj et al study[7], who found that surgical site infections post operative mastoid exploration occurred at a rate of 73.3% during emergency procedures versus 26.6% during elective procedures. This study agreed with Patel et al[8]. It was also stated that infections predominated similarly in above elective operations (12.6%) and emergency surgeries (24.1%).

In the present study, 48% (58) were clean surgeries and 52% (62) were clean contaminated surgeries. Similar results were reported in S Selvaraj et al[7] study, the surgical site infections incidence in clean surgeries was 14 (46.6%) and clean contaminated surgeries was 16 (53.3%). These results were much higher than Madhusudhan et al[10] study, in which 12% clean contaminated and 11% clean surgeries were reported. From surgeon to surgeon, the rate of surgical site infections varies. The degree of contamination of surgical site is affected by the skill and experience of of the surgeon. There may be some time for preoperative procedures during emergency surgeries, which are frequently performed by junior doctors and on-call physicians.

Compared to Neelesh Naik et al.[11], who similarly reported 81.1% of substantial growth in their study, 23 (76.6%) of the patients in S Selvaraj's[7] study demonstrated considerable growth. In S Selvaraj study, 23.3% of the samples showed no growth, which is slightly more than Neelesh Naik et al[11] findings of 18.2% culture-negative samples. Antibiotic therapy prior to culture of material from an allegedly infected place may be the cause of culture negative. In present study, 109 (91%) of patients showed significant growth and 11 (9%) of patients had no growth. In present study, 50% of surgical site infections lasting more than 2 hours produced positive culture results. Similar results were found in the S Selvaraj study[7], 40.1% of surgical site infections lasting more than 2 hours produced positive culture results. This is in line with the findings of Varsha et al.[12], who observed a higher culture positive of 12.5% in procedures lasting longer. 17 Long-lasting procedures result in increased exposure to air, prolonged trauma, anaesthesia stress, and occasionally blood loss at the surgical site.

In present study, diabetes followed by hypertension is significant risk factor for surgical site infections. Diabetes, followed by alcoholism and smoking, is a significant risk factor for surgical site infections, according to a study by S Selvaraj et al[7]. This is consistent with research by Ramesh et al.[13], who identified alcohol use and diabetes as significant risk factors for surgical site infections. Similar results were reported by S.M. Patel et al.[8], who found that individuals with diabetes mellitus accounted for 36.4% of surgical site infections.

In S Selvaraj et al study[7], 19 (70.37%) yielded single organism among 23 culture positive isolates. Corresponding yield of 92.16% was observed in Neelesh Naik et al[11] which is higher than that reported in S Selvaraj et al study. In S Selvaraj et al[7] study, 4 (14.8%) dual organisms which is much higher than Neelesh Naik et al.[11] who reported 7.84% of dual organisms causing surgical site infections.

In the present study and S Selvaraj et al[7] study, S. aureus is the predominant isolate among gram positive and in gram negative E. coli was the most commonly isolated. This is concordant with Ramesh et al[13]. who has also isolated a similar pattern of organisms. It has been found that in clean surgeries, S. aureus from the patient's skin flora or exogenous environment is the usual pathogen. Whereas in other categories of surgical procedure, the frequently isolated pathogen is clean contaminated the polymicrobial flora closely resembling the normal endogenous microflora of the affected site. The organisms commonly involved in surgical site infections change from time to time and from place to place and so does their sensitivity to various antibiotics.

E. coli was the commonest isolate among the gram negatives and was sensitive to cefepime, ciprofloxacin and showed maximum resistance to ampicillin and ceftazidime. All the E. coli isolates were sensitive to imipenem. In the present study, among 38 isolates, 12 (33%) were ESBL producers. In S Selvaraj et al[7] study, ESBL detection was done among the 6 isolates of E. coli, and 2 (33.3%) isolates were ESBL producers. This is much higher than Saraswathi et al.[14] who had isolated 14.2% of ESBL in their study.

Conclusion: The present study provides information about the incidence of commonest organism E. coli in post operative mastoid exploration to enable treatment of a patient immediately to prevent complications from re- infection. The same can be substituted by the appropriate antibiotic within 48 hours. Similar studies about microbiological flora in all surgical branches could be of significant help in reducing postoperative sequelae including morbidity and mortality.

References:

1. Patherick ES, Dalton JE. Methods for identifying surgical wound infections after discharging from hospital, a systematic review. BMC Infects 2006;6:170-78.
2. Brain Mawalla, Stephen E Mshana, Philipo L Chaly. Predictors of surgical site infections among patients undergoing major surgery at Buganda medical centre in northwest Tanzania. BMC Surgery 2011;11:21.
3. Nichols RL. Current strategies for prevention of surgical site infections. Curr infect Dis Rep 2004;6(6):426-434.

4. Dana KA, Timothy RB, David LD, et al. Schally principles of surgery. New York, USA, McGraw Hill companies. Chapter 6, 2010;9th ed:113-133.
5. Olsonmm, Lee JT. Continuous 10 years wound infection surveillance, result advance and unanswered questions. Arch Surg 1990;125:794-803.
6. Mustafa A, Bukhari A, Kakru DK, et al. Incidence of nosocomial mound infection in post-operative patients. JK Practitioner 2004;11:38-40.
7. Sivasankari Selvaraj, Thenmozhi Valli Pitchai Rathinam, Anitha Chandrahausan, Senthamarai Srinivasan, Venugopal Venkatesan. A study on the post surgical wound infections in a tertiary care hospital in Kanchipuram. J. Evolution Med. Dent. Sci./ eISSN-2278-4802, pISSN- 2278-4748/ Vol. 05/ Issue 22/ Mar. 17, 2016.
8. Patel SM, Kinariwala DM, Paul SD, et al. Study of risk factors including NNIS risk index in surgical site infections in abdominal surgeries. Gujarat E Medical journal 2011;66(1).
9. Anvikar AR, Deshmukh Ans, Kayakarte RP, et al. A one year prospective study of 3280 surgical wounds. Indian J Medical Microbiological 1999;17(3):129-132.
10. Madhusudhan NS, Mareena Thomas. Study of surgical site infections in clean & clean contaminated surgeries in a tertiary care hospital. International journal of biomedical research 2014;5(8).
11. Neelesh R Naik, Rama NK, Sharadhadevi Mannur. Antibiotic susceptibility pattern of bacterial isolates causing surgical site infections. National Journal of Basic Medical Science 2012;3(2).
12. Varsha Shahene, Upendra Lele. Surgical site infections, a one year prospective study in a tertiary care center. Qa Surgical site infections on university, International journal of health sciences 2012;6(1).
13. Ramesh A, Dharni R. Surgical site infections in a teaching hospital clinco microbiological and epidemiological profile. Int I Boil Med Res 2012;3(3):2050-2053.
14. Saraswathi R, Velayutharj A, Shailesh Kumar. Prevalence of pathogenic microbes in post-operative wound infection in various surgical specialties. International Journal of Developmental Research 2014;4(8):1783-1786