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ORIGINAL ARTICLE

To study the bacteriological profile of surgical site infections

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ABSTRACT:
Aim: The aim of the present study is to identify bacterial etiology of surgical site infections. **Material and methods:** The study was a cross sectional study. Using sterile cotton swabs, two pus swabs/ wound swabs were collected aseptically from each patient suspected of having SSI. Gram stained preparations were made from one swab for provisional diagnosis. The other swab was inoculated on nutrient agar, 5% sheep blood agar (BA) and MacConkey agar (MA) plates and incubated at 37°C for 24-48 hours before being reported as sterile. Growth on culture plates was identified by its colony characters and the battery of standard biochemical tests. All the isolates were tested for antimicrobial susceptibility by Kirby Bauer disk diffusion technique on Muller Hinton Agar. **Results:** Out of 230 samples, 120 samples were culture positive (52.17%) (Table1). Among 120 positive samples 67(55.83%) were males. Maximum no. of culture positive samples in age 20-30 years (32.5%) followed by 30-40 (17.5 %) and then followed by 40-50 (15.83%) of age group respectively. Out of 120 culture positive samples *S.aureus* (26.67%) was the most common pathogen isolated followed by *Escherichia coli*. (23.33%), *Citrobacter spp*. (15.83%) and *Pseudomonas aeruginosa* (9.17%), *Klebsiella spp* 10(8.33%), *CONS* 8(6.67%), *Enterobacter spp.* 7(5.83%), *Acinetobacter spp* 3(2.5%) and *Proteus spp.* 2(1.67%) respectively (Table 3). **Conclusion:** We conclude that SSIs are common among patients undergoing surgeries.
Key words: wound infection, surgical site infection, *S.aureus*

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INTRODUCTION

Surgical site infections (SSI), one of the most common causes of nosocomial infections are a common complication associated with surgery, with a reported incidence rates of 2-20%.[1] They are responsible for increasing the treatment cost, length of hospital stay and significant morbidity and mortality. Despite the technical advances in infection control and surgical practices, SSI still continue to be a major problem, even in hospitals with most modern facilities.[2] These infections are usually caused by exogenous and/ or endogenous micro organisms that enter the operative wound either during the surgery (primary infection) or after the surgery (secondary infection). Primary infections are usually more serious, appearing within five to seven days of surgery.[3] Majority of SSIs are uncomplicated involving only skin and subcutaneous tissue but sometimes can progress to necrotizing infections. The usual presentation of infected surgical wound can be characterized by pain, tenderness, warmth, erythema, swelling and pus formation.[4,5] A number of patient related factors (old age, nutritional status, pre existing infection, co-morbid illness) and procedure related factors (poor surgical technique, prolonged duration of surgery, pre operative part preparation, inadequate sterilization of surgical instruments) can influence the risk of SSIs significantly.[2] In addition to these risk factors, the virulence and the invasiveness of the organism involved, physiological state of the wound tissue and the immunological integrity of the host are also the important factors that determine whether infection occurs or not.[6]

Surveillance data suggest that the types of causative organisms associated with SSI have not significantly changed over the past 10–15 years; however, the proportion of different types of causative organisms has changed. Antimicrobial-resistant organisms are causing an increasing proportion of SSIs, and there has been a rise in the number of infections caused by atypical bacterial and fungal organisms. These changing proportions have been attributed to the increasing acuity of surgical patients, the increase in the number of immunocompromised patients, and the increasing use of broad-spectrum antibiotics.[7] Surgical site infections are still a threat to patients, in spite of the newer antibiotics available today. Although properly administered antibiotics can reduce postoperative surgical site infections secondary to bacterial contamination, widespread use of prophylactic antibiotics can lead to emergence of multi drug resistant bacteria. The higher rates of surgical site infections are associated with higher morbidity, mortality and increased medical expenses.[8] Over the past many years, there has been a huge increase in the number of SSI cases as reported by hospitals and it has been observed that many of the cases which were deemed serious were caused by

gram negative organisms. Furthermore, the irrational use of high dose broad spectrum antibiotics and antimicrobial resistance has further accelerated this scenario. In developing countries like India, where hospitals have inadequate infrastructure, poor infection control practices, overcrowded wards and practice of irrational use of antimicrobials, the problem of SSIs gets more convoluted. The aim of the present study is to identify bacterial etiology of surgical site infections.

MATERIAL AND METHODS

The study was a cross sectional study. Total 230 patients with SSIs either sex or any age, who had surgical wound pus, discharge, or signs of sepsis were include in this study. Patients with cellulitis and suture abscess were exclude from this study. Using sterile cotton swabs, two pus swabs/ wound swabs were collected aseptically from each patient suspected of having SSI. Gram stained preparations were made from one swab for provisional diagnosis. The other swab was inoculated on nutrient agar, 5% sheep blood agar (BA) and MacConkey agar (MA) plates and incubated at 37°C for 24-48 hours before being reported as sterile. Growth on culture plates was identified by its colony characters and the battery of standard biochemical tests.[9,10]All dehydrated media, reagents were procured from Hi Media Laboratories Pvt. Ltd., Mumbai, India.

Statistical Analysis: Data was entered in Microsoft excel spreadsheet and analysed using appropriate statistical software application.

RESULTS

Out of 230 samples, 120 samples were culture positive (52.17%) (Table1). Among 120 positive samples 67(55.83%) were males (Table 1). The age wise distribution of the gender has been shown in the (Table 2) with maximum no. of culture positive samples in age 20-30 years (32.5%) followed by 30-40 (17.5 %) and then followed by 40-50 (15.83%) of age group respectively. Out of 120 culture positive samples *S.aureus* (26.67%) was the most common pathogen isolated followed by *Escherichia coli*. (23.33%), *Citrobacter spp*. (15.83%) and *Pseudomonas aeruginosa* (9.17%), *Klebsiella spp* 10(8.33%), *CONS* 8(6.67%), *Enterobacter spp*. 7(5.83%), *Acinetobacter spp* 3(2.5%) and *Proteus spp*. 2(1.67%) respectively (Table 3).

Table-1: Gender wise distribution of Culture positive Patients

Gender	No of patients=120
Male	67 (55.83%)
Female	53 (44.17%)

Table-2: Age wise Distribution of Culture Positive Patients

Age in year	Culture Positive
Below 20	17 (14.17)
20-30	39 (32.5)
30-40	21(17.5)
40-50	19 (15.83)
50-60	15(12.5)
Above 60	9(7.5)

Table-3: Distribution of Organisms Causing Surgical Site Infection

Organism	No. of isolates (%)
Staphylococcus aureus	32(26.67)
Escherichia coli	28 (23.33)
Citrobacter spp.	19(15.83)
Pseudomonas aeruginosa	11(9.17)
Klebsiella spp.	10(8.33)
CONS	8 (6.67)
Enterobacter spp.	7(5.83)
Acinetobacter spp.	3 (2.5)
Proteus spp.	2 (1.67)
Total	120

DISCUSSION

Despite the modern aseptic procedures followed in the hospital, SSI remains as a serious problem for patients and surgeons. Hospitals serve as a reservoir for SSIs as they harbour a variety of pathogenic microbes and multi drug resistant strains. Wound Infections are the most commonly reported entity following surgical procedures from the hospitals. Regardless of the current advances in surgical procedures, availability of broad spectrum antibiotics, clean and safe wound management practices and modern hospital management systems, SSIs still remain a challenge for

practicing surgeons and health care personnel's. Moreover, the patients undergoing surgery have an extra threat of microbial colonies circulating in the hospital environment which may make them susceptible to SSIs. The burden of antimicrobial resistance adds to the burden. Most of the SSIs are hospital acquired and vary from one health care facility to another.

Out of 230 samples, 120 samples were culture positive (52.17%). Whereas various other studies from India have shown the rate of SSI to vary from 6.1% to 38.7%.[11-14] The main Reason behind may be due to the lack of attention towards the infection control measures, inappropriate hand hygiene practices and overcrowded hospitals. In our study, it was observed that rate of infection was higher in male patients (55.83%). The results were similar to a study by Isibor OJ et al, who reported that (74.6%) males were more commonly affected than females (25.5%).[15] In contrast to our study Anguzu JR et al reveals that 20% Females shows almost equal distribution of 19% of males.[16]

The findings in the study revealed that maximum no. of culture positive samples in age 20-30 years (32.5%) followed by 30-40 (17.5 %) and then followed by 40-50 (15.83%) of age group respectively. Similar results was showed by Anguzu JR who concluded that maximum no of SSI was in 16-45years of age group (24%) patient. This may be due to heavy work load, stress at this age group and less number of patients.[16] *S.aureus* (26.67%) was the most common pathogen isolated followed by *E.coli* (23.33%). This result is consistent with reports from other studies SP Lilani, Aggarwal A[12,17] *S. aureus* infection is most likely associated with endogenous source as it is a member of the skin and nasal flora and also with contamination from environment, surgical instruments or from hands of health care workers.[15]

CONCLUSION

We conclude that SSIs are common among patients undergoing surgeries.

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