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Research Article

Prevalence and Risk Factors Associated With Surgical Site Infections in Kims Hospital of Konaseema District of Andhra Pradesh

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ABSTRACT
Introduction Surgical site infection (SSI) remains a common and widespread problem, which contributes to significant morbidity and mortality, prolongs hospital stays, and consequently increases healthcare costs.Wound infection can be defined as the invasion of organisms through tissues following a breakdown of local and systemic host defenses, leading to cellulitis, lymphangitis, abscess, and bacteremia. Infections of surgical wounds are called surgical site infections (SSIs)[1]. SSIs are defined as infections occurring within 30 days after surgery or within one year if an implant is left in place after the procedure and affects either the incision or deep tissue at the operation site [2]. The current study aimed to assess the prevalence of SSI and its associated risk factors among patients who underwent any surgical intervention in KIMS Hospital, Amalapuram in Konaseema district of Andhra Pradesh.
Methodology After getting Ethics Committee approval, this cross-sectional study carried out over a period of one year from January 2024 to December 2024 in KIMS Hospital of Konaseema district of Andhra Pradesh..
Inclusion criteria All adult patients of both genders above 18 years who underwent surgery and were admitted to the surgical wards during the study period were included in the present study.
Exclusion criteria All pediatric cases were excluded from the study. Patients who underwent second surgery at the same site for any reason, patients on immunosuppressant therapy or any known immunodeficiency disease, patients on antibiotics already for any other infections, and patients with infection elsewhere in the body were also excluded from the study.
Results A total of 485 patients underwent different types of surgeries, including elective as well as emergency procedures, during the study period. About 29 SSIs were documented, and hence, the overall prevalence of SSI rate during the study period was 5.97% (n =485).
The number of cases that developed SSIs in relation to the type of surgery is shown in Table 1. Out of 485 patients who underwent various surgeries, 235 patients underwent abdominal surgeries, 86 pelvic surgeries, 93 bone and joint surgeries and 71 of them underwent ENT surgeries. Out of 235 abdominal surgeries, 20 (8.5%) cases developed SSIs, 4 (4.6%) SSIs in pelvic surgeries, 5 (5.37%) in Bone & joint surgeries. No SSI was recorded in ENT surgeries.
In the present study, it was observed that E.coli 9 (31%) was the most common isolate followed by Staphylococcus aureus 8 (27.5 %), Klebsiella pneumonia 4 (13.7%), Pseudomonas aeruginosa with 4 (13.5%), Acinetobacter baumanii 3 (10.3%) and least for coagulase negative staphylococci 1 (3.4%). The risk factors of the study population according to the SSI. Most cases of SSI were diagnosed in males (65.5%). Most of the SSIs were diagnosed in emergency surgeries (58.6%). The SSI has been categorized into superficial, deep, and organ SSIs. In the present study, it was observed that 18(62%) had superficial SSI, and 11 (37.9%) had deep ones. Among the individuals with diabetes mellitus, about 55% of them developed SSI. Among those who had a habit of alcoholism, about 48.2% developed SSI. Those who stayed more than seven days,51.7% of them were diagnosed with SSI.

Keywords: SSI, abdominal surgeries, risk factors

INTRODUCTION

Surgical site infection (SSI) remains a common and widespread problem, which contributes to significant morbidity and mortality, prolongs hospital stays, and consequently increases healthcare costs.

Wound infection can be defined as the invasion of organisms through tissues following a breakdown of local and systemic host defenses, leading to cellulitis, lymphangitis, abscess, and bacteremia. Infections of surgical wounds are called surgical site infections (SSIs)[1]. SSIs are defined as infections occurring within 30 days after surgery or within one year if an implant is left in place after the procedure and affects either the incision or deep tissue at the operation site [2]. According to the National Nosocomial Infection Surveillance Program (NNIS), it is classified into superficial, deep, and organ/space infections [3].

Sources of SSIs include the patient's own normal flora, organisms present in the hospital environment that are introduced into the patient by medical procedures, specific underlying diseases, trauma, or burns that may cause a mucosal or skin surface interruption [4]. SSIs are serious operative complications that occur in approximately 2% of surgical procedures and account for 20% of healthcare-associated infections. Many studies have reported that SSIs rank third among common nosocomial infections, next to the urinary tract and respiratory tract infections [2,5]. Recent studies reported that the SSI rate ranges from 19.4% to 36.5% all over the world, whereas it ranges from 3% to 12% in India [6-8]

The current study aimed to assess the prevalence of SSI and its associated risk factors among patients who underwent any surgical intervention in KIMS Hospital, Amalapuram in Konaseema district of Andhra Pradesh.

METHODOLOGY

After getting Ethics Committee approval, this cross-sectional study carried out over a period of one year from January 2024 to December 2024 in KIMS Hospital of Konaseema district of Andhra Pradesh..

Inclusion criteria

All adult patients of both genders above 18 years who underwent surgery and were admitted to the surgical wards during the study period were included in the present study.

Exclusion criteria

All pediatric cases were excluded from the study. Patients who underwent second surgery at the same site for any reason, patients on immunosuppressant therapy or any known immunodeficiency disease, patients on antibiotics already for any other infections, and patients with infection elsewhere in the body were also excluded from the study.

Data collection procedure

Data about the patients gender, demographic details, clinical details including the name of the procedure, date and duration of surgery, preoperative hospital stay, nature of the surgery, postoperative hospital stay, and the onset of illness (SSI) were collected by reviewing the patient's case sheet.

After 48 hours of surgery, if there was any evidence of wound infection - local inflammatory changes such as edema, redness, warmth or discharge from the wound site, then the patient was considered to have SSI. If there was any discharge, samples were collected before dressing the wounds. If only inflammatory changes were present without any discharge, the wounds were monitored for the development of discharge from the wound until the patient was sent home. If inflammatory signs were noticed within 48 hours, the patients were followed up. In addition, these patients were educated and followed up via mobile phone for the development of SSIs over a period of 30 days. The suspected wound infections were cleaned with sterile normal saline, followed by 70% alcohol, and then the specimen was collected using a sterile swab. Two swabs were taken from the depth of the wound, and/or the aspirates were collected in a sterile disposable syringe and transported to the laboratory within two hours. The color, consistency, and odor of the samples were observed and recorded.

A direct thin smear was made from each wound swab and/or aspirates on a clean grease-free glass slide and was air dried. It was then heat-fixed, and Gram staining was done. The presence of pus cells and microorganisms was observed under the oil immersion (100X) objective. The samples were cultured onto nutrient agar, 5% sheep blood agar, and MacConkey agar plates by Standard

microbiological techniques. After 24 hours of incubation aerobically at 37°C, plates were read, and the isolates were identified based on colony morphology, Gram stain, motility, and biochemical tests.

Statistical analysis

The data obtained were compiled and analyzed using Microsoft Excel and the results were analyzed using SPSS (Statistical Package for the Social Sciences) version 24. All the data collected in the study was categorical and were expressed in a table as frequency and percentage.

RESULTS

A total of 485 patients underwent different types of surgeries, including elective as well as emergency procedures, during the study period. About 29 SSIs were documented, and hence, the overall prevalence of SSI rate during the study period was 5.97% (n =485). The number of cases that developed SSIs in relation to the type of surgery is shown in Table 1. Out of 485 patients who underwent various surgeries, 235 patients underwent abdominal surgeries, 86 pelvic surgeries, 93 bone and joint surgeries and 71 of them underwent ENT surgeries. Outof 235 abdominal surgeries, 20 (8.5%) patients developed SSIs, 4 (4.6%) SSIs in pelvic surgeries, 5 (5.37%) in Bone & joint surgeries. No SSI was recorded in ENT surgeries.

Table 1: Prevalence of SSIS according to different surgeries

Site of Surgery	No. of Surgeries	No. of SSIs (%)
Abdominal surgeries	235	20 (8.5%)
Pelvic surgeries	86	4 (4.6%)
Bone & joint surgeries	93	5 (5.37%)
ENT surgeries	71	0
Total	485	29 (5.97%)

In the present study, it was observed that E.coli 9 (31%) was the most common isolate followed by Staphylococcus aureus 8 (27.5 %), Klebsiella pneumonia 4 (13.7%), Pseudomonas aeruginosa with 4 (13.5%), Acinetobacter baumanii 3 (10.3%) and least for coagulase negative staphylococci 1 (3.4%) (Table-2)

Table : 2 – Proportion of organisms isolated from various SSIs

Isolated organism	No. of isolates	Percentage (%)
Escherichia coli	9	31%
S.aureus	8	27.5%
K.pneumoniae	4	13.7%
P.aeruginosa	4	13.7%
A.baumanii	3	10.3%
CONS	1	3.4%
Total	29	

Table: 3 – Distribution of risk factors

Risk factor	Frequency of SSI	Percentage (%)
Gender	Male - 19 Female – 10	65.5% 34.5%
Type of surgery	Emergency – 17 Elective - 12	58.6% 41.3%
Extent of wound	Superficial – 18 Deep - 11 Organ - 0	62% 37.9%
Diabetes milletus	Yes – 16 No - 13	55% 44.8%
Alcoholism	Yes – 14 No - 15	48.2% 51.8%
Length of hospital stay	1– 7 days >7 days	51.7% 72.4%
Drain	Yes – 18 No - 11	62% 37.9%

Table 3 describes the risk factors of the study population according to the SSI. Most cases of SSI were diagnosed in males (65.5%). Most of the SSIs were diagnosed in emergency surgeries (58.6%). The SSI has been categorized into superficial, deep, and organ SSIs. In the present study, it was observed that 18(62%) had superficial SSI, and 11 (37.9%) had deep ones. Among the individuals with diabetes mellitus, about 55% of them developed SSI. Among those who had a habit of alcoholism, about 48.2% developed SSI. Those who stayed more than seven days in the hospital, 51.7% of them developed SSI.

DISCUSSION

Surgical site infections (SSI), one of the most common causes of nosocomial infections, are a common surgery-related complication, with reported incidence rates ranging from 19.4% to 36.5% all over the world, whereas it ranges from 3% to 12% in India[6-8]. In our study, a total of 485 patients underwent various surgeries. Out of 485 surgeries done, 29 (5.97%) cases were reported to develop SSI which correlates with the study of Mohan N, Gnanasekar D et al [9] where the SSI rate was 5.6% . In the present study, among 481 patients who underwent various surgeries, 235 patients underwent abdominal surgeries, 86 pelvic surgeries, 93 bone and joint surgeries and 71 of them underwent ENT surgeries. Of these, 20 (8.5%) patients developed SSIs in abdominal surgeries, 4 (4.6%) in pelvic surgeries, 5 (5.37%) in Bone & joint surgeries which correlates with the study of Mohan N, Gnanasekar D et al [9] and Anurag Singh, Shikha Pandey[11]. Another study done by Allegranzi et al[10] also reported that abdominal surgeries are commonly done and have high rates of SSIs.

The occurrence of SSIs in the present study was more in males (65.5%) when compared to females (34.5%), and it is statistically significant. A study by Hernandez et al. in 2005 also reported more occurrences among males (65.6%) [12] . On the contrary, a study done by Shanmugam et al. reported almost equal occurrences among females (52%) and males (48%) [13]. The increasing occurrence among males was attributable to the nature of the infected wounds with which they come to surgical departments.

In the present study, SSIs developed more in emergency surgeries-17(58.6%) compared to elective surgeries -12 (41.3%) which correlates with the study of, Anurag Singh, Shikha Pandey et al [11], where it was 81.25%. But in an another study by Mohan N, Gnanasekar D et al[9] , thedevelopment of SSIin

elective surgeries was5.6%. The increased prevalence of SSI in emergency surgeries could be attributed to a relatively short time frame without sufficient patient preparation and surgical preparedness, as well as contaminated wounds, as seen in road traffic incidents. Similar findings were seen in a study by Dessie et al., where SSIs were reported in 61.7% of emergency cases and 38.3% of elective cases[14].

In the present study, it was observed that superficial and deep SSIs were observed with the ratio of 62 % and 37.9 % respectively. There was no SSIs observed in the organ site. This is similar to the study done by Anurag Singh, Shikha Pandey[11]et al.

In our study, E.coli 9 (31%) was the most common isolate followed by Staphylococcus aureus 8 (27.5 %), Klebsiella pneumonia 4 (13.7%), Pseudomonas aeruginosa with 4 (13.5%), Acinetobacter baumanii 3 (10.3%) and least for coagulase negative staphylococci 1 (3.4%). E. coli (31%) was the commonest gram negative bacilli isolated and S.aureus the commonest gram positive bacteria. These findings correlates with the study of Negi V, Pal S, Juyal D, et al [15]. Similar observations have been reported by various other authors - Ahmed MIet al,Mulu W, Kibru G, Beyene G et al, Chakarborty SP, Mahapatra SK et al[16-18].

In our study, 16 (55%) diabetic patients had SSI, which was higher than non-diabetics with statistical significance. The occurrence of SSIs among diabetics in the present study concurs with the study of Lilienfeld et al [19] and Talbot [20] who reported that SSI among diabetics was 50%.

Bacteriological studies have demonstrated that SSIs are widespread, and the etiological agents involved can vary by geography, operation, surgeon, hospital, or even ward [21]. In recent years, gram-negative germs have become a more common cause of serious infections in many hospitals. Furthermore, irrational usage of broad-spectrum medicines and the resulting antimicrobial resistance (AMR) have exacerbated the situation.

CONCLUSION

Surveillance of SSI, combined with feedback from surgeons, will help to reduce the SSI rate, and this surveillance system should be developed in all hospitals. Additionally, guidelines for antibiotic use among surgical patients should be developed and strictly followed, which may provide an estimate of the incidence of SSI.

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