

SURGICAL SITE INFECTIONS : A STUDY TO IDENTIFY INCIDENCE,RISK FACTOR AND ANTIMICROBIAL SENSITIVITY AT A TERTIARY CARE CENTRE

General Surgery

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ABSTRACT

surgical site infection is most common complication following surgical procedures. The aim of the study was to determine the incidence, associated risk factors and antimicrobial sensitivity pattern at SVMC, Tirupati. **Materials and methods:** This is a prospective study carried at surgical ward of SVMC, Tirupati from April 2022 to October 2022. All the patients were followed for 30 days for development of surgical site infection. Infected cases were identified using CDC criteria. All the data are expressed in percentage. **Results:** The overall prevalence of surgical site infection is 19%. The incidence was more common in age group above 40 years. The risk factors associated with SSI are long stay in hospital (14%), abdominal surgeries, long duration of surgery, diabetes. The most common organism isolated is Staphylococcus aureus (30%). **Conclusion:** Surgical site infection is most common following surgery. Significant determinants are long stay in the ward, abdominal surgeries, emergency surgeries, diabetes. Effective infection control measures and good regular surveillance will improve the SSI rate to an acceptable level.

KEYWORDS

surgical site infection (SSI), Nosocomial infection, antimicrobial susceptibility.

INTRODUCTION

Surgical site infections are among the most common hospital acquired infection worldwide.

They make up to 14 – 16 % of inpatients infection (1). In spite of advanced techniques wound infection is regarded as most common nosocomial infection especially in patients undergoing surgery (2). It is an important cause of illness resulting in prolonged stay at the hospital and increasing treatment cost (3). Global estimates of SSI have varied from 0.5% to 15% (4). Studies in India have consistently shown higher rates ranging from 23-28 % (5).

Increasing age of the patients, gender, and type of surgery are some of the detrimental factors (6). Nosocomial infection due to resistant organisms have been a problem with an increase in the incidence of Methicillin Resistant Staphylococcus Aureus (MRSA), Vancomycin Resistant Enterococcus (VRE) and Pseudomonas Aeruginosa (7). A hospital environment is loaded with drug resistant organisms which in turn adds to the disease burden of the patients prone to developing nosocomial infection. Periodical assessment of the antimicrobial susceptibility pattern of organisms causing nosocomial infection enables health care institutions to monitor irrational use of antibiotics.

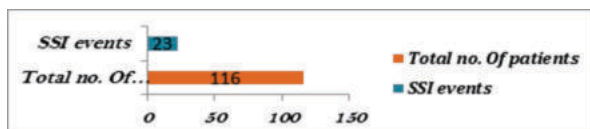
MATERIALS AND METHOD

This is a prospective study carried on patients in surgical ward from April 2022 to October 2022. A total no. of 116 patients details were collected after informed consent. An SSI case was identified using CDC definition which states that infection would be regarded as SSI if it occurs within 30 days of procedure and has at least one of the following: purulent discharge from the wound, pain or tenderness, localized swelling, fever (8).

Patients demographic data such as age, sex and occupation were collected. Data regarding type of procedure, duration of procedure, hospital stay and other comorbid conditions were collected. The etiological agent and the antimicrobial susceptibility pattern were identified. The pus from surgical site was cultured on Blood agar and MacConkey agar. The etiological agent was identified using routine test for identifications. The Kirby Bauer disc diffusion method was used for the antimicrobial susceptibility pattern. All the data is expressed in percentage.

RESULTS:

A total number of 116 patients details were collected and out of those 23 patients were found to be affected with Surgical Site Infections.



The overall incidence of the surgical site infections in the present study was 0.19. A total of 116 patients' details were collected and they were grouped into: below 20 years – 16(14%), 20-30 years – 19(16%), 30-40 years – 30(26%), 40-50 years – 27(23%) and above 50 years – 24(21%). 23 patients were identified with SSI and were grouped into various age groups; below 20 years – 1(4%), 20-30 years – 3(13%), 30-40 years – 6(26%), 40-50 years – 6(26%) and above 50 years – 7(31%). (Table 1)

Table – 1: Age wise distribution of patients

Patient Age	Total no. of patients screened (%) (n=116)	SSI events (%) (n=23)
Below 20	16(14%)	1(4%)
20-30	19(16%)	3(13%)
30-40	30(26%)	6(26%)
40-50	27(23%)	6(26%)
Above 50	24(21%)	7(31%)

Out of 116 surgical patients, 54(47%) were females and 62(53%) were males. Among 23 Surgical site infected patients, 12(52%) were females and 11(48%) were males. (Table 2)

Table – 2: Gender wise distribution of patients

Patient Gender	Total no. of patients screened (%) n=116	SSI events (%) n=23
Female	54(47%)	12(52%)
Male	62(53%)	11(48%)

Out of 116 patients, 34(29%) patients were stayed in hospital below 10 days and 82(71%) patients above 10 days. Among 23 surgical site infected patients, 9(39%) patients were stayed in hospital below 10 days and 14(61%) patients above 10 days. (Table 3)

Table – 3: Distribution of patients based on hospital stay

Hospital Stay	Total no. of patients screened (%) n=116	SSI events (%) n=23
Below 10 days	34(29%)	9(39%)
Above 10 days	82(71%)	14(61%)

Out of 116 patients, 66 were undergone Elective surgery and 50 were undergone Emergency surgery. Among 23 surgical site infected patients, 04(8.7%) were undergone elective surgery and 19(38%) were undergone emergency surgery. (Table 4)

Table – 4: Categorization of patients based on type of surgery

Type of surgery	Total no. of patients screened (%) n=116	SSI events (%) n=23
Elective	66	04(8.7%)
Emergency	50	19(38%)

Out of 116 patients, 37(32%) had the duration of less than or equal to 1 hour, 63(54%) with 1 hour to 2 hour and 16(14%) with greater than or equal to 2 hour. Among 23 surgical site infected patients, 6(26%) had the duration of less than or equal to 1 hour, 10(44%) with 1 hour to 2 hours and 7(30%) with greater than or equal to 2 hours.(Table 5)

Table –5: Categorization of patients based on duration of surgery

Duration of operation	Total no. of patients screened (%) n=116	SSI events (%) n=23
<1 hour	37(32%)	6(26%)
1 hour to 2 hours	63(54%)	10(44%)
>2 hours	16(14%)	7(30%)

Out of 116 patients, 6(5%) were Superficial incisional, 110(95%) were Deep incisional and 0(0%) were Organ/body space. Among 23 surgical site infected patients, 23(100%) were with deep incisional wound infections and 0% with superficial incisional and organ/body space infections.(Table 6)

Table –6: Distribution of patients based on type of SSI

Type of SSI's	Total no. of patients screened (%) n=116	SSI events (%) n=23
Superficial incisional	6(5%)	0(0%)
Deep incisional	110(95%)	23(100%)
Organ / body space	0(0%)	0(0%)

Out of 116 patients, 29 have undergone Appendectomy surgery, in which 8(27.58%) were found to be infected; 14 undergone Hydrocele surgery with 1(7.14%) infected; 12 undergone Hysterectomy surgery with 3(25%) infected; 6 undergone Surgical debridement surgery and no one was infected; 28 undergone Herniotomy surgery with 7(25%) infected; 15 undergone Laprotomy surgery with 3(20%) infected; 12 undergone Mastectomy surgery with 1(8.33%) infected; (Table 7).

Table-7: Incidence of surgical site infections in relation to different types of surgical procedures

Type of surgical procedures	No. of patients	Frequency and percentage of surgical site infections (%)
Appendectomy	29	8(27.58%)
Hydrocele procedure	14	1(7.14%)
cholecystectomy	12	2(16%)
Surgical debridement	06	0(0%)
Hernia procedures	28	7(25%)
Laparotomy	15	4(26%)
Mastectomy	12	1(8.33%)

Organisms isolated from various clinical samples

Out of 23 SSI's, 31 organisms were isolated from various clinical samples (blood, and pus) such as Staphylococcus – 7, Streptococcus – 4, E.coli – 5, Klebsiella – 4, Pseudomonas – 6 and Proteus – 5.(Table 7)

Table 8: Distribution of Organisms isolated from various clinical samples

Specimen type	Staphylococcus	Streptococcus	E. coli	Klebsiella	Pseudomonas	Proteus
Blood	4	-	-	4	-	3
Pus	3	4	5	-	6	2
Total	7(23%)	4(13%)	5(16%)	4(13%)	6(19%)	5(16%)

Table- 9: Antimicrobial susceptibility pattern of bacterial pathogens isolated from SSI

Organism	Antimicrobial Agents								
	Pat ter n	Ceftri axone	Amik acin	Gent amic in	Ampi cillin	Ciprofl oxacin	Cefta zidine	Penci llin	Metroni azole
Staphylococcus n= 7	R S	04 03	NT	02 05	NT	04 03	02 05	05 02	05 02
Streptococcus n= 4	R S	03 01	02 02	01 03	NT	02 02	01 03	02 05	NT

E. coli n= 5	R	02	02	02	02	03	01	05	NT
	S	03	03	03	03	02	04	00	
Klebsiella n= 4	R	02	02	01	03	03	01	NT	NT
	S	02	02	04	01	01	03		
Pseudomonas n= 6	R	05	03	02	NT	04	01	04	NT
	S	01	03	04		02	05	02	
Proteus n= 5	R	03	03	01	03	NT	NT	NT	NT
	S	02	02	04	02				

DISCUSSION

Surgical site infection constitute a global health problem both in economic and health terms. It is the most frequent nosocomial infection in most hospitals and are an important cause of increased cost, morbidity, and mortality (9). Multiplicity of factors influence SSI rate in clinical practice. In the present study some of the risk factors were evaluated to establish their influence on SSI rate, they include gender, age, duration of surgery, diabetes, stay in the Hospital, type of surgery. Studies by Agarwal (1972), and Anvikar (1999) have shown surgical site infection rate in India to be between 4 to 30% (7). An overall infection rate of 19% was observed in this study. There was no significant relationship observed between gender and SSI, which was consistent with other studies (10, 11). Age was found to be a significant risk factor of SSI. Just like other studies the prevalence of SSI was found to be higher in old age group (12). Emergency surgical procedure increased the rate of surgical site infection. The higher rate in emergency operation is attributed to inadequate pre operative preparation and the severity of the underlying condition that necessitated emergency procedure (13). In the present study patients who had longer duration of surgery had increased risk of post operative infection when compared with those that had shorter duration of surgery. Some studies are in agreement with this findings (14). There was no mortality in this study. SSI depends on the host susceptibility, condition of the wound and the amount and type of microbial contamination of the wound. Staphylococcus aureus is the most prevalent (23%) agent of surgical wound infection (15). Other organisms are pseudomonas and proteus. Cephalosporins and macrolides were found to be effective in management of SSI.

CONCLUSION :

Surgical site infection is most common following surgery. Significant determinants are long stay in the ward, abdominal surgeries, emergency surgeries, diabetes. Effective infection control measures and good regular surveillance will improve the SSI rate to an acceptable level. Prevention should be emphasized and done according to the CDC's Health Care Infection Control Practices Advisory Committee published guidelines for prevention of infections of 1999. Emphases are placed on the following:

- Treatment of any identified bacterial infection before surgery,
- Ensuring short hospital stay.
- Bathing patients before operations.
- Hair care, should be done aseptically.
- Preparation and maintenance of operating room, antibiotic intake:- in view of common agents of SSI, parental antibiotic that are active against Staphylococcus aureus.
- Adequate wound surveillance
- Staff health care.

Following these practice will help decrease the incidence of surgical site infection.

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