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Surgical Site Infection (SSI) In Abdominal Surgeries

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ABSTRACT

Aims and Objectives: To determine the incidence and types of surgical site infections following laparotomies, to study the risk factors and to study the causative organisms and their sensitivity patterns in patients who developed SSI.

Results: Of 300 patients who underwent laparotomies. 160 had elective procedures, 140 had emergency procedures. There was male predominance in the study. Risk factors include diabetes (most common), obesity, COPD,HB < 10 gm%, Smoking and immune compromised status. The most commonly implicated organism in this study was MRSA accounting for 25 % of the cases of SSI, E. Coli(23%) and Klebsiella (18%).

Conclusion: The incidence of SSIs following laparotomies is 22 %. Emergency laparotomies were statistically more likely to develop SSI.

INTRODUCTION

Infections that occur in the wound created by an invasive surgical procedure are generally referred to as surgical site infections (SSIs). SSIs are one of the most important causes of healthcare – associated infections (HCAIs),second only to urinary tract infection (UTI) in incidence.SSI not only affects the quality of life of the patient; it isalso a major reason for extended hospital stay and financial burden both to the healthcare providers and the patient(10-14). The present study aims to determine the frequency of surgical site infections in patients undergoing various abdominal surgical procedures, the associated risk factors, the organisms implicated and their sensitivity patterns among inpatients in the general surgical wards of Dr S.N. Medical College and associated group of hospitals ,Jodhpur , Rajasthan

MATERIALS AND METHODS

Sample: Patients admitted to surgical wards at Dr S.N. Medical College and associated group of hospitals, Jodhpur, Rajasthan for laparotomy, from Jan 2016 to Dec 2016; who developed surgical site infection (SSI) were studied.

Study design: A prospective observation study was performedon the 300 patients who underwent laparotomies. The type of SSI, the risk factors encountered, the causative organisms isolated and their sensitivity patterns were studied.

Inclusion criteria: Patients who underwent laparotomies.

Exclusion criteria: Surgery other than laparotomies.

Methods
Pre-Operative Phase:

All patients received a prophylactic antibiotic one hour before surgery for elective surgeries and at the time of incision for emergency surgeries. The antibiotic given was a third generation cephalosporin, ceftriaxone or cefotaxime, 1 g, given intravenously.

Intra-Operative Phase:

The surgical team decontaminated their hands with an antiseptic soap and providence- iodine scrub (1) . Skin preparationwas done by the surgeon in all cases. Preparation was done immediately before skin incisions by a

providence-io dine scrub (2), then cleansed with surgical spirit and coated with a 5 % providence-iodine solution. Sterile drapes were used in two layers.

Post-Operative Phase:

Sterile dressings were applied over the surgical site and the wounds kept covered for 48 hours (3), after which thedressing was removed with aseptic precautions and the wound left exposed to the environment. Broad-spectrumantibiotics, whether oral or parenteral, were continued for a minimum of 5 days post-operatively in all the patients (4).

RESULTS

Of the 300 patients who underwent laparotomies.160 had elective procedures and 140 had emergency procedures. Data has been recorded as follows.

A. Patient factors:

1. Age: The age had greater impact in the study with older agebeing more commonly infected.

2. Sex: There is increased incidence among males than females.

3. Risk factors: The risk factors which were included in this studies were diabetes mellitus, obesity, HB < 10 gm %, COPD. The most common risk factor with increased risk of development of SSI encountered in this study was diabetes mellitus. SSI developed in 46 % of diabetics.

Table 1: Association of co-morbid conditions with SSI

		TOTAL (N = 450)	SSI	W/O SSI	CHI SQUARE	P VALUE
DIABETES MELLITUS	Present	100	46(46%)	54	50.34	0.0001
	Absent	200	20	180		
OBESITY	Present	103	35 (33.7%)	68	13.11	0.0001
	Absent	197	31	166		
HB < 10 gm %	Present	88	30 (34.1%)	58	10.6	0.0001
	Absent	212	36	176		
COPD	Present	47	20 (38.5%)	27	13.71	0.0003
	Absent	253	46	207		

4. Pus for culture and sensitivity - organisms isolated and their sensitivity patterns the most commonly implicated organism in this study was MRSA (Methicillin Resistant Staphylococcus Aureus), accounting for 25 % of the cases of SSI, followed by E. Coli and Klebsiellaspecies, each of which accounted 23% and 18% respectively . Other commonly encountered organisms were Proteus species and Pseudomonas aeruginosa.

Table 2: Organisms implicated in abdominal SSI and their sensitivity pattern

Organism	Percentage	Sensitivity
MRSA	25 %	Vancomycin, Linezolid
E.Coli	23 %	Gentamycin, Amikacin
Klebsiella species	18 %	Amikacin, Cefoperazone+ Sulbactum , Ceftazidime + Sulbactem
Proteus species	16 %	Amikacin, Doxycycline, Ciprofloxacin
Pseudomonas aeruginosa	12 %	Cefotaxime, Ceftazidime+ Sulbactem
Staphylococcus aureus	6 %	Piperacilin + Tazobactem , Ciprofloxacin

Table 3: Comparison of the present study with two similar studies on abdominal SSIs from developing countries

	University clinical centre of kosovo	Imam Khomeini hospital , Iran	Present study
Number of patients who had abdominal surgeries	225	802	300
Incidence of abdominal SSI	27 (12%)	139 (17.4 %)	66 (22 %)
SSI in emergency abdominal	11 (10 %)	29 (14.9 %)	40 (28.5 %)

surgeries			
SSI in elective abdominal surgeries	16 (13.9 %)	110 (18.1 %)	26 (16.6 %)
Risk factors for SSI	Increased duration of surgery and hospital stay, inadequate post-operative surveillance	Increased duration of surgery and hospital stay, co-morbidities	Diabetes mellitus, Smoking, anaemia, Co-morbidities

DISCUSSION

The present study was undertaken on 300 patients who developed SSI following either elective or emergency laprotomies in patients, admitted to the surgical unit from Jan 2016 to Dec 2016, at Dr S.N. Medical College and associated group of hospitals ,Jodhpur , Rajasthan

Incidence: The overall incidence of SSI for all surgeries performed in the surgical unit during the study period was 22 %. Different studies from various parts of India have shown rates ranging from 6.09 to 38.7 %, with the majority of studies having a rate of 14 -17 %. The most common age group developing SSI was > 60 years, for both males and females. Most studies in literature show an increase in the incidence of SSI with increasing age, probably reflecting the deteriorating immune status and development of co-morbidities as age advances. The incidence for SSI was 16.6 % for elective laparotomies and 28.57 % for emergency abdominal surgeries, which shows that emergency laparotomies were statistically far more likely to develop SSI than elective procedures (p value < 0.0001). This is in conformity with another study conducted at an Indian teaching hospital by Mahesh C B et al (p value < 0.002).

Risk factors: Among the patient-related risk factors observed in this study, incidence of SSI among smokers (5-9) is35% and among non smokers is 12 % with statistically significance difference. The most common co-morbidity was Diabetes Mellitus, the rate of SSI among diabetics is 46 %and among non diabetics is 10% which is statistical significance difference. The other risk factors which were included were Obesity, Hb< 10gm%, COPD all of which showedstatistical significance SSI rates.

Bacteriology: The most common organism implicated inthis study was MRSA. The Gram-negative organisms implicated were found to be most sensitive to the Amino glycosides Amikacin or Gentamicin, followed by third generation cephalosporin's and penicillin's and to tetracycline and doxycycline.Resistance of enteric organisms to Ciprofloxacin is in conformity with reports of increasing resistance to this drug as reported by Chand Wattalet al in a study conductedin a tertiary hospital at New Delhi.

CONCLUSIONS

The incidence of SSIs following laparotomies is 22 %. Emergency laparotomies were statistically more likely to develop SSI than elective laparotomies. A large share of abdominal SSIs was occupied by surgeries with clean-contaminated wounds, which is similar to other studies. It reflects the higher proportion of such cases in laparotomies. Diabetes mellitus was the most common co-morbidity encountered. Increase in age, smoking , diabetes mellitus, obesity, hb< 10 gm %, COPD, were the risk factors identified. The most common organism implicated in the developmentof abdominal SSI was MRSA. Signs of systemic inflammation may be masked by the prolonged use of antibiotics. Most were superficial incisional infections, which, as they were recognized early and managed appropriately, did not progress to deeper and more serious infections. Increased awareness among hospital staff with regard to infection control and strict adherence to the aseptic precautions is the need of the hour.

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