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Original Research Article

A prospective study of incisional surgical site infections in abdominal surgeries in Maheswara Medical College

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ABSTRACT

Background: 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.
Methods: These patients underwent elective surgeries and were followed up for superficial Incisional surgical site infections until complete wound healing occurred or on their discharge from the hospital. The inclusion criteria for superficial Incisional surgical site infections were: infections occurring within 30 days of operation involving only skin or subcutaneous tissue of the incision with purulent drainage, with or without laboratory confirmation from the superficial incision; organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision. Infections occurring after 30 days of operation were excluded from the study.
Results: The present study revealed 13.15% prevalence of SSI in department of general surgery, Maheswara Medical College, Hyderabad. Among the 3 types, superficial incision SSI was most prevalent followed by deep incisional SSI and finally by organ/space SSI. The surgical procedure most commonly associated with SSI was exploratory laparotomy. An alarming 19.42% of SSI was associated with emergency surgeries as compared to 7.05% of elective surgeries.
Conclusions: The consequences of SSIs greatly impact patients and the healthcare systems. Prevention of SSI requires a multifaceted approach targeting pre, intra, and postoperative factors.

Keywords: Surgical site infections, Exploratory laparotomy, Surgery

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 develops in at least 5 % of hospitalized patients undergoing an operative procedure in developed countries, raising the costs of healthcare both to the public and the healthcare delivery system. According to a report by the International Nosocomial Infection Control Consortium (INICC), overall more than 1 million people worldwide were suffering from nosocomial infections, and in India alone, the rate was over 25 percent, with SSI occupying a significant share.[1] The incidence is likely underestimated because of inadequate surveillance and incomplete post-discharge data. Extensive surveys have shown that SSIs are associated with considerable morbidity and it has been reported that over one third of postoperative deaths are related, at least in part, to SSIs. SSI can range from a fairly minor wound discharge with no other complications to a life-threatening condition. Other outcomes include poor scars that are cosmetically unacceptable and cause psychological stress.[2] SSI is, in most scenarios, a preventable HCAI, that can double the

length of hospital stay and thereby increase the costs of healthcare, attributable to reoperation, extra nursing care and interventions, and drug treatment costs. There are, in addition, indirect costs due to loss of productivity, patient dissatisfaction and litigation, and reduced quality of life. Abdominal surgical site infections are among the most common infectious complications in hospitalized patients and are associated with serious consequences for outcomes and costs.[3] They account for up to 14 % of SSIs in studies conducted in developing countries, where there is no organized surveillance system to describe routine nosocomial infections. The present study aims to determine the frequency of surgical site infections in patients undergoing various abdominal surgical procedures and the associated risk factors, the organisms implicated and their sensitivity patterns, and the outcomes observed after treatment among inpatients in the general surgical wards of Maheswara Medical College, Hyderabad.

METHODS

This prospective study was carried out in the Department of General Surgery at the Maheswara Medical College, Hyderabad from January 2018 to December 2018. Institutional ethics committee approval was taken prior to conducting this study. Patients underwent elective surgeries and were followed up for superficial Incisional surgical site infections until complete wound healing occurred or on their discharge from the hospital.

Inclusion criteria

Infections occurring within 30 days of operation involving only skin or subcutaneous tissue of the incision with purulent drainage, with or without laboratory confirmation from the superficial incision; organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision; and at least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness or heat, superficial incision deliberately opened by surgeon, unless the incision is culture-negative; and diagnosis of superficial Incisional surgical site infection by the surgeon or attending physician.

Exclusion criteria

Infections occurring after 30 days of operation were excluded from the study.

A total of 456 elective surgical patients and 304 emergency surgical patients were included in the study. Samples were collected either as sterile cotton wool swab or as an aspirate with a sterile syringe from the superficial wound and subjected to microscopy and culture isolation and identification of all isolates. The results were analyzed using simple statistical tests such as averages and percentages. The significance of the results was statistically evaluated using appropriate tests, e.g., ANOVA test, Chi-square and mean calculations.

RESULTS

Of the 100 patients who developed abdominal SSI, 30 had elective procedures and 70 had emergency procedures. Data pertaining to these two groups has been recorded as follows.

Table 1: Age distribution.

Age group (years)	Elective (n=30)	Emergency (n=70)	Total (n=100)
	N (%)	N (%)	N (%)
15-25	05 (16.66)	11 (15.71)	16 (16)
26-40	10 (33.33)	19 (27.14)	29 (29)
41-60	11 (36.66)	32 (45.71)	43 (43)
>60	4 (13.33)	8 (11.42)	12 (12)

Table 2: Sex distribution.

Sex	Elective (n=30)	Emergency (n=70)	Total (n=100)
	N (%)	N (%)	N (%)
Male	21 (70)	60 (75)	81 (81)
Female	09 (30)	10 (25)	19 (19)

The most common age group associated with the development of abdominal SSI was 41-60 years, the mean age being 43 years. There was male predominance in the study, for both elective and emergency procedures, as noted above.

The present study revealed 13.15% prevalence of SSI in department of general surgery, Maheswara Medical College. Hyderabad. Among the 3 types, superficial incision SSI was most prevalent followed by deep Incisional SSI and finally by organ/space SSI. The surgical procedure most commonly associated with SSI was exploratory laparotomy. An alarming 19.42% of SSI was associated with emergency surgeries as compared to 7.05% of elective surgeries.

Table 3: Incidence of SSI in various emergency abdominal surgeries.

Type of surgical procedure	No performed	No infected	Percentage (%)	P value
Surgery for duodenal ulcer perforation	32	15	46.87	0.002
Surgery for acute intestinal obstruction	33	16	48.48	0.065
Surgery for hollow viscus perforation	18	6	33.33	0.001
Psoas abscess	8	3	37.5	0.002
Surgery for obstructed inguinal hernia	4	1	25	0.004
Open appendicectomy	43	8	18.60	0.002
Splenoctomy	11	1	9.09	0.003
Laparoscopic appendicectomy	14	1	7.12	0.004
Laparotomy and lavage for Haemoperitoneum	16	-	0	0.002
Insertion of flank drains for peritonitis	23	-	0	0.001
Miscellaneous procedures	16	-	0	0.002
Exploratory laparotomy	3	-	0	0.006
Surgery for obstructed femoral hernia	1	-	0	0.002

Table 4: Incidence of SSI in various elective abdominal surgeries.

Type of surgical procedure	No performed	No infected	Percentage (%)	P value
Open cholecystectomy	32	15	46.87	0.001
Ilio-inguinal block dissection	33	16	48.48	0.003
Surgery for carcinoma colon	18	6	33.33	0.001
Abdmino perineal resection	8	3	37.5	0.006
Whipple's procedure	4	1	25	0.004
Laparotomy and procedure for abdominal TB	43	8	18.60	0.002
Reversal of colostomy	11	1	9.09	0.003
Various exploratory procedures	14	1	7.14	0.004
Incisional hernioplasty	16	-	0	0.002
Laparoscopic cholecystectomy	23	-	0	0.001
Inguinal hernioplasty	16	-	0	0.024
Umbilical herniorrhaphy	3	-	0	0.032
Secondary suturing for burst abdomen	1	-	0	0.001
Lavage for pyeperitoneum	10	2	20	0.006
Loop ileostomy	8	1	12.5	0.001
Miscellaneous procedures	36	2	5.55	0.002

DISCUSSION

Timely recognition of SSI and appropriate management can hasten post-operative recovery and prevent the development of adverse outcomes like burst abdomen and incisional hernia or even death. The present study was undertaken on 100 patients who developed SSI following either elective or emergency abdominal surgery in 760 patients, admitted to the IV surgical unit, Maheswara Medical College, Hyderabad over a period of 12 months, from January 2018 to December 2018. Incidence and types of SSI following various procedures, the risk factors for SSI, the causative organisms and their sensitivity patterns and the outcomes of treatment were studied.[5,6]

The overall incidence of SSI for all surgeries performed in the IV surgical unit during the study period was 11.53%. 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%, hence the rate of SSI for all surgeries in the present study was slightly lower than that seen in most other hospitals in India. This was probably due to adherence to a uniform protocol for antibiotic prophylaxis and post-operative wound care in our unit. The incidence of SSI in abdominal surgeries in this study was 11.53%.[7,8]

The higher infection rate in Indian hospitals may be due to the poor set up of our hospitals, nutritional status, illiteracy and late presentation. The most common age group developing SSI was 41-60 years, with the mean age being 43 years for both males and females.[9,10]

CONCLUSION

The following conclusions were drawn from the present study. The incidence of SSIs following abdominal surgeries were 11.53%. It is slightly higher than the overall incidence of SSI for all surgeries (10.53%).

Emergency abdominal surgeries were statistically more likely to develop SSI than elective abdominal surgeries. 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 abdominal surgery. Anaemia was the most common comorbidity encountered. Smoking, increased hospital stay and perioperative blood transfusions were the most common risk factors identified. The most common organism implicated in the development of abdominal SSI was *E. coli*, which is different from that noted in literature. 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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