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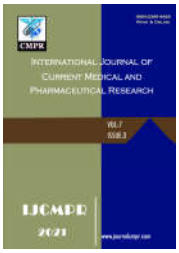

Research Article

POST-OPERATIVE WOUND INFECTION FOLLOWING ABDOMINAL SURGERY: A CLINICAL STUDY

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ABSTRACT

Background: Surgical site infection is the most common hospital acquired infection and a major cause of prolong hospitalization, discomfort, increased medical cost and post-operative morbidity. The goal of this study was to describe the incidence of Surgical Site Infection, its relation with age, sex, duration of operation, wound drainage and co-morbidity among the abdominal surgeries.
Methods: This study was conducted at department of general surgery, government medical college & associated group of hospital Kota, Rajasthan. A total of 100 patients who underwent emergency or elective abdominal surgery were taken up for the study, all patients undergoing abdominal surgery were included in our study. Patients undergoing vascular, gynaecological, urological or plastic procedures were excluded.
Results: During this period 100 patients underwent elective and emergency surgeries, out of which 14% cases developed post-operative SSI. Higher incidence of SSI was noted among the emergency cases (25%). Higher incidence of SSI was found with increasing age, diabetes, obesity, and in contaminated & dirty cases. Commonest organism isolated was extended-spectrum β-lactamase-producing Escherichia coli.
Conclusion: Post-operative wound infections represent a significant burden of disease both for the patients and health services in terms of the morbidity and costs. Possibly modifiable independent risk factors for SSI after abdominal surgery including open surgical approach, contaminated wound and emergency surgery. SSI can be reduced by adequate preoperative patient preparation, preoperative control of remote site infections, appropriate antibiotic administration, reducing the duration of surgery to minimum, appropriate use of drains and intraoperative maintenance of asepsis. Employing methods that could reduce the incidence of SSI, would reduce patient morbidity and lessen the associated economic burden.

INTRODUCTION

Post-operative wound infection also known as surgical site infection (SSI), the surgical expertise always faces a risk of surgical site infection. The surgeon deals with infection in three set-ups. First a condition where infection already exists, second where significant factors required for infection are already present and third where surgery is performed for some disease not related to infection and this surgery leads to predisposition to infection.

SSI is defined by the Centers for Disease Control and Prevention as a wound infection that occurs within 30 days of an operative procedure or within a year if an implant is left in place and the infection is thought to be secondary to surgery.[1] It is classified as superficial incisional, deep incisional and organ space SSI. Even in this era of improved antibiotics, surgical site infections could not be eradicated and are responsible for major morbidity and increased health care cost among hospitalized patients. It is one of the most common health-care–associated infections, occurring following 1%–3% of all surgical procedures.[2] The rates of SSI are much higher with abdominal surgery than with other types of surgery, with several prospective studies indicating an incidence of 15%–25% depending on the level of contamination.[2] Bacterial colonization on the patient's skin, alimentary & genital tract are the principal contributing sources that lead to SSI. The organism most often isolated is Escherichia-coli. A number of factors are reported to increase the likelihood of post-operative infections. e.g. age of patient, duration of surgery, type of surgery, type of wound, comorbid conditions like Diabetes Mellitus, obesity, CKD, immunodeficient conditions etc. Numerous risk factors may contribute to the development of SSI, with the most recognized factors being these incorporated in the Centers for Disease Control and Prevention and National Nosocomial Infections Surveillance System SSI risk index, including wound classification, American Society of Anaesthesiologists (ASA) score and duration of the operation.[3] The primary objectives of this study were to describe the

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incidence and risk factors associated with SSI in patients undergoing abdominal surgery.

Pic : Superficial SSI Post-operative abdominal wound infection: redness, swelling, discharging pus

MATERIAL & METHODS

This study was conducted at department of general surgery, government medical college & associated group of hospital Kota, Rajasthan from January 2019 to December 2019. A total of 100 patients who underwent emergency or elective abdominal surgery were taken up for the study, the target population consisted of all patients aged 14 years or more undergoing abdominal surgery. All patients undergoing abdominal surgery were included in our study. Patients undergoing vascular, gynaecological, urological or plastic procedures were excluded, Patients who left the operating theatre with an open packed wound or with a vacuum-assisted dressing were also excluded. The patients were studied by interviewing, examination and laboratory investigations noted in a set proforma. All the patients undergoing elective surgery were given prophylactic antibiotics within 1 hour of commencement of surgery. Patients were followed up to 30 days postoperatively in wards or Outpatient department.

Statistical analysis

Data was entered in computerised database and was analysed using relevant statistical tests. The study variable was presented as percentage.

RESULT

In total, 100 patients were enrolled in the study, the youngest patient was 14 years of age and the oldest was 70 years of age. The mean age of patients was 41.2 years, 58% patients were males.

Males had higher incidence of wound infection compared to females.

Sex	No of cases	No of pt. with infections	Percentage
Male	58	9	15.51%
Female	42	5	11.90%

The age relationship of SSI was linear, SSI increased with increasing age. In 14-30 years, age group it was 8.33% (2/24) while in >50 years age group it was 26.08%.

Age (in years)	No of cases	No of pt. with infections	Percentage
14 to 20 years	9	1	11.11%
21 to 30 years	15	1	6.66%
31 to 40 years	24	2	8.33%
41 to 50 years	29	4	13.79%
>50 years	23	6	26.08%

Twenty-one were diabetic, and 13 were smokers. The presence of diabetes increased the occurrence of wound infection.

		No of cases	No of pt. with infections	Percentage
Diabetic	Elective	13	4	30.76%
	Emergency	8	3	37.5%
Non-Diabetic	Elective	50	2	4%
	Emergency	29	5	17.24%

In our study increased incidence of wound infection was noted with obesity.

	No of cases	No of pt. with infections	Percentage
Obesity	18	7	38.88%

The overall incidence of SSI was 14%. In emergency surgery the incidence was more compare to elective cases.

Types of surgery	No of cases	No of pt. with infections	Percentage
Elective	68	6	8.82%
Emergency	32	8	25%

Most patients (76%) had an ASA score less than 3. A total of 17 cases were performed laparoscopically. Most patients [68%] underwent elective surgery.

The incidence of SSI was minimum in clean wounds 7.14% followed by clean contaminated 21.42%, contaminated 28.57% and maximum in dirty wounds 42.85%.

Incidence of SSI in relation to operative time: Incidence of wound infection increases with an increase in operating time.

Duration	No of cases	No of infections	Percentage
<1 hr	48	2	4.16%
1-2 hr	33	7	21.21%
>2 hr	19	5	26.31

Risk of SSI in relation to Drain: Incidence of SSI increases with placement of abdominal drain during surgery.

	No of cases	No of infections	Percentage
Drain used	67	11	16.41%
Drain not used	27	3	11.11

The average day of appearance of SSI was 5 days. In elective surgeries group maximum SSI was found in colonic surgery – 24.18 %, while minimum in cholecystectomy 6.8%. In Emergency surgery group maximum incidence of SSI was observed in hepato-biliary surgeries 36.14% while minimum with appendicular pathology 5.32%. The overall ratio of superficial to deep SSI was 1.8. Superficial SSI were more common than deep SSI in cleaner class of wound while deep SSI were more common in dirtier class.

The most common organism isolated from pus cultures was E. coli 50%. The other organisms were MRSA21.42%, klebsiella and non-MRSA staphylococcus 14.28% each, pseudomonas sp. 7.14% samples.

In the present study Escherichia-coli was found to be 100% sensitive for Imipenem, Meropenem and Ceftriaxone-tazobactam. Sensitivity was also seen for amikacin, gentamicin and piperacillin-tazobactam.Klebsiella and pseudomonas were sensitive for amikacin, gentamicin, imipenem, Meropenem. Piperacillin-tazobactam was found to be 79 % sensitive for pseudomonas. Linezolid was the most sensitive antibiotic for Staph. Aureus followed by the third generation cephalosporins.

DISCUSSION

In our study incidence of SSI in post-operative abdominal cases was 14%, compatible with reported rates in the literature.[2,4]However, our rate is slightly higher that reported in studies done in Saudi Arabia, 12%[5] and 10.5%.[6]Large number of studies reported surgical site infection in abdominal surgeries between 3.4% and 36.1% [14, 17]. Present study shows increased incidence of SSI with age which is also noted in similar studies carried out earlier.[12,14,17]Multivariable analysis identified open surgical approach, emergency operation, length of the operation and male sex as independent predictors of SSI. Open surgical approach and emergency surgery were documented as risk factors for SSI in previous reports.[7]We found that patients who had open surgery were 5 times more likely to get SSI than those who had laparoscopic surgery. Emergency surgery increased the risk of SSI threefold compared to elective surgery. The rate of SSI was significantly higher in male patients (1.3times).

Diabetics had higher incidence of wound infection compared to non-diabetics. William G. Cheadle[8] found that diabetes increases the risk of SSI. Obesity was found to increase the risk of SSI with 38.88 % of obese individual developing SSI. Lynch, Ranney *et al*[9] showed that obesity is an independent risk factor for the development of SSI. Incidence of post-operative infections were higher in cases where drain was used (16.41 %) compared to cases without drain (11.11 %). Similar observation was made by Cohen [10]

It was observed that increased preoperative hospital stay lead to higher incidence of SSI which was also noted by other scholars.[11,16,17]This increased incidence of SSI can be explained by either more endogenous bacteria are present or commensal flora is replaced by hospital flora. E. Coli was the most common organism associated with SSI and was most commonly associated with dirty wounds, which was similar to a study conducted by Lul Raka *et al* and M Fiorio *et al*.[14,17]In clean wounds, MRSA was most commonly found which is similar to findings of the study done by Liliani *et al*.[16] Duration of the surgery was also found to affect the incidence of SSI with maximum occurrence in operations requiring more than 2 hours and least in operations requiring less than one hour. Various studies also found similar findings.[16,17] Doherty at al found that rate of development of SSI roughly doubles with every hour of operative time.[15]The reason appears to be that the operative time increases the chances of operative team puncturing its gloves, more bacteria accumulate in the wound, drying and maceration of the wound edges due to prolonged operative time can lead to interruption of the blood supply which compromises the microcirculation. The incidence of SSI was found to be more in patients with remote site infection. Edwards LD found that preoperative remote site infection increases the risk of SSI by 3-5 folds.[13]

CONCLUSIONS

The incidence of SSI in our study was more compared to developed countries because of financial limitations compared to developed countries, inadequately trained staffs, overcrowded wards, ignorance in part of patients and their relatives and insufficient equipment and supplies are other major factors for this difference. Multiple risk factors play role in development of SSI which can be broadly classified into-Bacterial factor, Patient factor and local wound factor. The interaction between these three determines the development of SSI and so it is difficult to prove an independent association of a specific factor for development of SSI. The overall incidence of SSI in cases of abdominal surgeries was found to be 14% in our study. This however, can be reduced by decreasing the preoperative hospital stay, appropriate antibiotic administration, preoperative control of remote site infections, adequate preoperative patient preparation, reducing the duration of surgery to minimum, sensible use of drains and intraoperative maintenance of asepsis and following operation theatre discipline properly. Control of obesity, treatment of infective foci, and diseases like diabetes mellitus may help in controlling the morbidity associated with surgical wound infections.

Conflict of interest- Nil

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