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A STUDY ON INCIDENCE OF SURGICAL SITE INFECTION AND ITS OUTCOMES IN PATIENTS UNDERGOING LAPAROTOMY- A PROSPECTIVE OBSERVATIONAL STUDY

General Surgery

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ABSTRACT

Aim: To determine the incidence of surgical site infection (SSI) and associated risk factors in laparotomy. **Method:** Fifty patients who underwent laparotomy were studied for a period of 2 years. The patients were studied by interviewing and examination. **Result:** The overall SSI incidence was 18% (9/50). Factors like wound class (dirty > clean wound), increased surgical duration were involved. Staphylococcus was found to be the common organism causing SSI. **Conclusion:** SSI can be reduced by appropriate antibiotic administration, preoperative patient preparation, reducing the duration of surgery, intraoperative asepsis maintenance.

KEYWORDS

Infection, Laparotomy

INTRODUCTION

The occurrence of infection in the post-operative period continues to a serious complication. Joseph Lister proposed the antisepsis principles in the late 1860s that reduced postoperative mortality and morbidity significantly.[1]Surgical site 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 and is thought to be secondary to surgery.[2]It is a common health-care–associated infection following all surgical procedures.[3] The rates of SSI are higher with abdominal surgery, with previous studies indicating an incidence of 15–25% depending on the contamination level.[3,4]

In developed and developing nations, surgical complications are frequently caused by SSI.[5]The incidence is 2–5% in United States, costing around 1.6 billion dollars to the health care system,[5]whereas expenses in India is not estimated. SSI, though preventable, is associated with high morbidity and mortality. In addition to the devastating impact on the patient's course of treatment, it is associated with prolonged length of hospital stay and high cost.[5,6]Hence, this study is intended to determine the incidence of SSI in patients undergoing laparotomy along with associated risk factors.

Methodology:

This is a prospective observational study done in the Department of General Surgery, Narayana Medical College, Nellore from December 2019 to October 2021.

Inclusion Criteria

All patients between 16 to 60 years of age who undergo laparotomy.

Patients with infection over abdominal wall prior to surgery, those with advanced cancer, liver cirrhosis, ascites, chronic renal failure, immunocompromised patients, those on immunomodulatory drugs and steroids for long term were excluded.

Antibiotic selection

First generation Cephalosporin – Cefazolin (1 – 2g) was used in all the patients prophylactically.

Pre-operative preparation

Shaving the surgical site was done on night before the day of surgery. All patients were advised to take shower on the day of surgery with soap and were given injection cefazolin(1– 2g)intravenously 30 minutes before the incision. All aseptic precautions were taken during surgery.

Post-operative care

Antibiotics were given in the post-operative period depending upon the type of surgery and wound classification. The inspection of the wound was done starting from 48 hours post-surgery day till the day of discharge and followed for 30 days after surgery.

If there were any signs of infection like, erythema, local rise of temperature, purulent discharge, Swabs from the wound or pus were sent for culture and sensitivity to determine the organism and antibiotic to be given.

After the incidence of SSI, the patients were conservatively managed. If the patient did not recover or deteriorate during conservative management reoperation was done. Any additional operation at the same site of operation during the first month after the previous procedure is referred to as reoperation. Ifthe patient had SSI during the follow-up period, then the patient was admitted to the ward and managed accordingly. All the data was collected for further analysis.

RESULTS:

A total of 50 patients who have undergone laparotomy were included in this study. Out of these, 9 patients (18%) had surgical site infection. The incidence of SSI based on gender, age, BMI, type of surgery and wound classification are represented in Table 1. The incidence based on post-operative day, systemic condition, organisms isolated and outcome of SSI are represented in Table 2. The mean time taken for surgery in the patients with SSI was 193.33minutes, whereas it was 144.88minutes in those who are not infected.

Risk factor		SSI-Absent N(%)	SSI-Present N(%)	P-value[#]
Gender	Female	14 (77.7)	4 (22.3)	0.56[NS]
	Male	27 (84.4)	5 (15.6)	
Age	<30	11 (91.7)	1 (8.3)	0.7[NS]
	31-45	16 (76.2)	5 (23.8)	
	46-60	11 (84.6)	2 (15.4)	
	>60	3 (75)	1 (25)	
BMI	<18.5	6(75)	2(25)	0.69[NS]
	18.5-24.9	24(85.7)	4(14.3)	
	25-29.9	10(76.9)	3(23.1)	
	>30	1(100)	0(0)	
Type of surgery	Emergency	11 (68.7)	5 (31.2)	0.94[NS]
	Elective	30 (88.2)	4 (11.8)	
Wound class	1	9 (90)	1 (10)	0.01[**]
	2	26 (89.7)	3 (10.3)	
	3	5 (71.4)	2 (28.6)	
	4	1 (25)	3 (75)	

SSI: Surgical Site Infection; NS: Non-significant;**: Highly significant;#: Chi-square test

Table1: Incidence based on gender, age, BMI, type of surgery and woundclassification

Risk factor	No. of SSI cases (%)	Risk factor	No. of SSI cases (%)
Post operative day		Organisms isolated	
2	0 (0)	Enterococci	1 (11.1)
3	1 (11.1)	Pseudomonas	2 (22.2)

4	1 (11.1)	Staphylococcus	3 (33.3)
5	0 (0)	E coli	2 (22.2)
6	2 (22.2)	Klebsiella	1 (11.1)
7	3 (33.3)	-	-
8	2 (22.2)	-	-
Systemic factor	Outcome		
Anemia	3 out of 6 (50)	Conservatively managed and discharged	5 (56)
Hypoproteinemia	5 out of 8 (62.5)	Readmission after initial discharge	1 (11)
Diabetes mellitus	5 out of 21 (23.8)	Reoperation	2 (22)
Smoking	5 out of 14 (35.7)	Death	1 (11)
SSI: Surgical Site Infection			

Table 2: Incidence based on the risk factors

DISCUSSION:

The total incidence of SSI in the present study was 18% compared to 11% and 17.4% in other studies.[7,8] Incidence was higher when compared to other countries like USA with 2 -5%.[9] In our country, there is no proper investigation, surveillance, or feedback on SSI rates. The majority of research was conducted in isolation, and overall SSI rates differ from hospital to hospital, necessitating a coordinated effort to develop and implement methods to tackle this problem. The incidence of surgical site infection varies in different countries;[10] it was 9.4%in high-income countries, 14% in middle-income and 23.2% in low-income countries. The incidence was high in the present study compared to developed countries. In literature, an incidence of 1.9%,2.2%,1.6%,1.4%,1.6%,2.0% in USA, Europe, Germany, England, France, and Portugal respectively was reported.[11]

Many studies previously have shown that there is an increase in incidence by advancingage,[12] but there were no such findings in this study. Age did not play a significant role in the current study. A study[7] reported the incidence of SSI in a tertiary care center in India; in emergency it was 29.7% and in elective surgery it was 8%, which is in contrary to the present one. As reported in the current one, a study[13] also showed an increase in the incidence among patients with obesity and morbid obesity in abdominal surgery. Regarding the woundcondition,[7] the incidence rate in clean, clean contaminated, contaminated and dirty wounds was 4.9%,16.1%, 23.5% and 43.1% respectively. The incidence of SSI was more if the duration of the surgery was > 2hours as reported in the current study. Similarly, the incidence in patients who had surgery >2hours was 16.8%, whereas those with <2 hours it was8.3%.[14]Prolonged surgery might have led to increased hypothermia and increased exposure of tissue which may lead to favourable circumstances for bacterial colonization.

The median time of occurrence of surgical site infection was 7 days in the present study, whereas another study[15] the occurrence was 10 days. In previous studies,[7,16] diabetes mellitus was a significant risk factor for the development of surgical site infection in laparotomy (33% and 21.1%incidence). Present study also showed similar results in relation to diabetes mellitus. Uncontrolled blood sugars in patients with diabetes preoperatively, and increased blood glucose level in first 48 hours after surgery is considered as a risk factor for SSI.

Smoking was considered as a risk factor for the development of infection in post-operative period,[15,16] with an36.1% incidence of infection; similarly35.7% is reported in the present study. Anemia and hypoproteinemia were considered as risk factors for the development of SSI in abdominal surgery in a study,[7]as also reported in the present study. The tissue hypoxia caused due to reduced hemoglobin may be the cause of increased incidence of SSI in anemia.

The common organism isolated in the present study was Staphylococci, followed by E coli, Pseudomonas, Enterococci and Klebsiella. Similarly, in another study, Staphylococci, E coli, Klebsiella were isolated in 5.34% of patients with SSI.[14]

In a study, 3.88% of patients were readmitted into hospital due to SSI after initial discharge,[17] whereas it accounted for 11.1% in the present study. One patient was admitted with prolonged history of abdominal pain, severe sepsis with peritonitis, and expired. Two patients had to be re-operated to debride the necrotic tissue over the surgical site and then were managed postoperatively with antibiotics till recovery.

CONCLUSION:

The incidence of SSI was high. There was no statistically significant correlation between age, sex, BMI, type of surgery (emergency/ elective) with SSI. The risk factors like the surgical wound type and duration of surgery had significant effect on SSI. We suggest regular feedback and surveillance of SSI to introduce protocols to prevent SSI.

REFERENCES:

1. Wilson AP, Gibbons C, Reeves BC et al. Surgical wound infection as a performance indicator: agreement of common definitions of wound infection in 4773 patients. BMJ 2004;329(7468):720.
2. Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control. 2008;36:309–32.
3. Azoury S, Farrow N, Hu Q, et al. Postoperative abdominal wound infection — epidemiology, risk factors, identification, and management. Chron Wound Care Manage Res. 2015;2:137–48.
4. Aga E, Keinan-Boker L, Eithan A, et al. Surgical site infections after abdominal surgery: incidence and risk factors. A prospective cohort study. Infect Dis. 2015;47:761–7.
5. de Lissovoy G, Fraeman K, Hutchins V, et al. Surgical site infection: incidence and impact on hospital utilization and treatment costs. Am J Infect Control. 2009;37:387–97.
6. Allegranzi B, Nejad SB, Combescure C, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet. 2011;377:228–41.
7. Akhter MSJ, Verma R, Madhukar KP, Vaishampayan AR, UnadkatPC. Incidence of surgical site infection in postoperative patients ata tertiary care centre in India. J Wound Care. 2016;25(4):210–7.
8. Razavi SM, Ibrahimpoor M, Sabouri Kashani A, Jafarian A.Abdominal surgical site infections: incidence and risk factors at anIranian teaching hospital. BMC Surg. 2005;5(1):2.
9. Anderson DJ, Kaye KS, Classen D, Arias KM, Podgorny K, BurstinH, et al. Strategies to Prevent Surgical Site Infections in AcuteCare Hospitals. Infect Control Hosp Epidemiol. 2008;29(S1):S51–61.
10. Bhangu A, Ademuyiwa AO, Aguilera ML, Alexander P, Al-Saqqa SW, Borda-Luque G, et al. Surgical site infection after gastrointestinal surgery in high-income, middle-income, and lowincome countries: a prospective, international, multicentre cohort study. Lancet Infect Dis. 2018;18(5):516–25.
11. Harihara Y, Konishi T. Surgical site infection surveillance. Nihon Geka Gakkai Zasshi. 2006;107(5):230-4.
12. Cruse PJ, Foord R. The epidemiology of wound infection. A 10- year prospective study of 62,939 wounds. Surg Clin North Am. 1980;60(1):27–40.
13. Winfield RD, Reese S, Bochicchio K, Mazuski JE, Bochicchio GV. Obesity and the Risk for Surgical Site Infection in Abdominal Surgery. Am Surg. 2016;82(4):331–6.
14. Mukagendaneza MJ, Munyaneza E, Muhawenayo E, Nyirasebura D, Abahuje E, Nyirigira J, et al. Incidence, root causes, and outcomes of surgical site infections in a tertiary care hospital in Rwanda: a prospective observational cohort study. Patient Saf Surg. 2019;13(1):10.
15. Gundel O, Gundersen SK, Dahl RM, Jørgensen LN, Rasmussen LS, Wetterslev J, et al. Timing of surgical site infection and pulmonary complications after laparotomy. Int J Surg. 2018;52:56–60.
16. Alkaaki A, Al-Radi OO, Khoja A, Alnawawi A, Alnawawi A, Maghrabi A, et al. Surgical site infection following abdominal surgery: a prospective cohort study. Can J Surg. 2019;62(2):111–7.
17. Misha G, Chelkeba L, Melaku T. Incidence, risk factors andoutcomes of surgical site infections among patients admitted toJimma Medical Center, South West Ethiopia: Prospective cohortstudy. Ann Med Surg. 2021;65:102247.