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Post-operative Wound Infection in Emergency Abdominal Surgeries

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KEYWORDS

INTRODUCTION

Surgical Site Infections (SSIs), previously called post operative wound infections, result from bacterial contamination during or after a surgical procedure. Surgical site infection (SSI) has always been a major complication of surgery and trauma and has been documented for 4000-5000 years.

Surgical site infections are the third most common hospital associated infection, accounting for 14-16 per cent of all infections in hospitalized patients. Surgical site infection concerns 2 million cases annually worldwide (1) This post operative infection is known to be one of the most common causes of nosocomial infections (2,3).

The criteria used to define surgical site infections have been standardized and described three different anatomic levels of infection: superficial incisional surgical site infection, deep incisional surgical site infection and organ/space surgical site infection(4).

According to the degree of contamination wounds may be classified as clean, potentially contaminated, contaminated, and dirty. The risk of infection is greater in all categories if surgery is performed as an emergency(5).

The risk of wound infection is influenced but not entirely determined by the degree of contamination also by multiple risk factors include diabetes mellitus, hypoxemia, hypothermia, long term use of steroids or immunosuppressive agents, malnutrition. Surgical site infection is the most important cause of morbidity and mortality in the post operative patients, but it is preventable in most of the cases if proper assessment and appropriate measures are taken by the surgeons, nursing staffs, patients and others in the perioperative period.

This study was done to determine the incidence of post-operative wound infection, identify the risk factors, the causative bacteria and their antibiotic susceptibility patterns in Emergency Abdominal Surgeries.

MATERIALS AND METHOD

This was a prospective study carried out in the dept. of Surgery, Dr.STGH, Haldwani, Nainital in the year 2016. 200 emergency Abdominal surgeries were performed from august 2014 to july 2016. Study of risk factors and other relevant information were collected including age, sex, history of diabetes, obesity, duration of pre operative hospital stay, type of operation, duration of surgery. Wound infection was diagnosed if any one of these criteria were fulfilled : Serous or Non purulent discharge from the wound, pus discharge from the wound, serous or non purulent discharge from the wound with sign of inflammation and when wound was deliberately opened by the surgeon due to localised collection. Swabs from the infected wound site, were collected and processed for cultures and antibiotic sensitivity. Percentage of relevant data's were calculated and studied.

RESULTS

Out of 200 patients who were operated for emergency abdominal surgery 38 (19%) patients developed surgical site infections.

Out of 47 female patients 12 (25.53%) developed SSI, while in male group out of 153 male patients 26 (16.99%) had surgical site infections.

Regarding age group patients of age group 40-49 years were more prone to wound infections (23.52%)

Out of 200 patients with emergency abdominal operations, rate of SSI in different operations were observed. The highest rate of SSI (66.67%) was in burst appendix cases and lowest in volvulus, intussusception and gunshot cases.

Table :Relation between SSIs and Surgical Category

Type of operation	Status of SSI		Total
	Yes(%)	No(%)	
Open appendicectomy	7(21.21)	26(78.78)	33
Exploratory laparotomy with appendicectomy and peritoneal lavage	4(66.67)	2(33.33)	6
Exploratory laparotomy with omental patch repair	16(15.38)	88(84.61)	104
Ileal repair/ileostomy	6(30)	14(70)	20
Adhesiolysis/RA	2(14.28)	12(85.71)	14
Jejunal repair (blunt trauma abdomen)	1(14.28)	6(85.71)	7
Hernia reduction	1(16.67)	5(83.33)	6
Liver abscess drainage and peritoneal lavage	1(25)	3(75)	4
RA (gun shot injury abdomen)	0(0)	3(100)	3
RA repair of sigmoid volvulus	0(0)	1(100)	1
Repair of intussusception	0(0)	1(100)	1
Peritoneal lavage	0(0)	1(100)	1
Total	38	162	200

Rate of SSI was highest, 10 in 27 (37.03%) operations done through lower midline incision, whereas rate of SSI was 3 among

26 (11.53%) in mid midline, 17 among 108 (15.74%) in upper midline, and 7 among 33 (21.21%) in grid iron incisions.

With regard to association between delay to initiate operation and rate of SSI it was observed that the surgical site infection rates were 6.67%, 8%, 9.30%, 21.42%, 22.72% and 35.71% when operations were initiated <6, 6-12, 12-24, 24-48, 48-72 and >72 hours later respectively. The rate of infection increased as the time lapse between appearance of first symptom and initiation of operation were increased.

With respect to duration of operation and percentage of SSI rate of SSI increased with prolongation of duration of operation. The difference in percentage of SSI with duration of operation was statistically significant (P < 0.001).

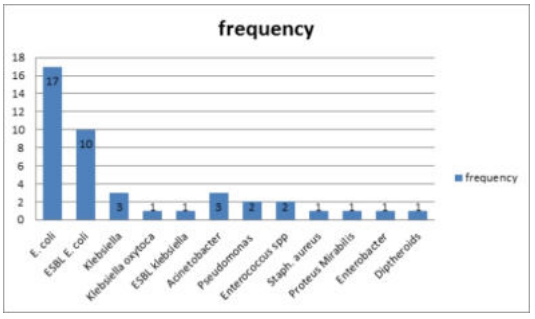
Table : SSIs based on duration of operations.

Duration of operation (Hours)	SSI		Total
	Present	Absent	
<1 hr	0(0%)	14(100%)	14
1-2 hr	22(15.60%)	119(84.39)	141
>2 hr	15(33.33%)	30(66.67)	45
Total	38	162	200

In relation to appearance of infection on postoperative days it was observed that most of the infections (89.45%) were started between 4th and 8th post operative days (POD) and it was highest 13 (34.21%) on 5th POD.

Multiple samples of discharge/ pus from the wounds were sent for culture and sensitivity test. E.coli were found as the commonest organism (27 among 38 cases) causing 71.05% of the surgical site infections.

Fig:SSIs distribution based on organism



Escherischia coli were sensitive to tigecycline 17(94.11%) cases, chloramphenicol 7 (41.1%) cases, amikacin 5 (29.41%) cases, polymyxin-B 8 (47.05%) cases, Ceftriaxone 3 (17.64%) cases, ceftriaxone-sulbactum 3(17.64%) cases, gentamicin 5 (29.41%) cases, levofloxacin 1 (5.88% cases) and Imipenem 6 (35.29%) cases, amoxi-clav 2 (11.76% cases).

Klebsiella pneumoniae were sensitive to tigecycline, imipenem and amikacin in 100 per cent cases each and to polymyxin B, gentamicin and levofloxacin in 50 percent cases and to chloramphenicol in 25% cases.

In relation to co-morbidity, it was observed that 60 patients had co-morbid disorders associated with the main surgical disease and 140 patients had no co-morbid disorder. Among the patients with co-morbid disorders 23 (38.33%) developed surgical site infection (SSI), whereas, in the patients without any co-morbidity only 15 (10.71%) developed SSI.

DISCUSSION

Overall rate of SSI was 19%. This finding is consistent with the finding of Razavi et al. where they found 139 patients among 802 (17.40%) suffered from SSI(6). The overall SSI rate of present study was consistent with findings of study carried out by Renvall et al., in which SSI rate in acute surgery was 12.4 percent(7).

It was observed that rate of SSI in different age groups it was highest 23.52% (8 among 34) in the 40-49 years age group.

Regarding sex distribution of the patients, among the total 200 cases 153 (76.5%) were male and 47 (23.5%) were female. Rate of SSI in males were 16.99%, whereas among females it was 25.53%.

It was observed that host factors like type of disease, presence/absence of comorbidity and types of co-morbidity and other factors like delay to initiate operation and duration of surgery were associated with the rate of surgical site infection.

Out of 200 patients with emergency abdominal operations, rate of SSI in different operations were different. The highest rate of infection (66.67%) was in appendicular perforation and lowest in gunshot, volvulus, intussusception and pyoperitoneum.

Regarding incision-wise infection rate In present study infection rate was higher in midline incisions that may be attributed to less vascularity of the linea alba and most contaminated and dirty cases were operated through these incisions.

With regard to delay to initiate operation and rate of SSI, it was observed that the surgical site infection rate was 6.67%, 8%, 9.3%, 21.42%, 22.72 and 35.71% when operation was initiated <6, 6-12, 12-24, 24-48, 48-72 and >72 hours later respectively. The rate of SSI increased as the time lapse between first manifestation of symptoms and initiation of operation prolonged.

With respect to duration of operation and percentage of SSI it was observed that the infection rate varies with duration of operation. The infection rate was as high as 33.33 per cent when duration of operation was more than two hours. The rate of SSI increased statistically very significantly with that of duration of operation.

In relation to appearance of infection it was observed that most of the infections were started between 4th and 8th post operative days (PODs) and it was highest (34.21%) on 5th POD.

In relation to co-morbidity, it was observed that 60 patients had co-morbid disorders associated with the main surgical disease and 140 patients had no co-morbid disorder. Among the patients with co-morbid disorders, 23 (38.33%) developed surgical site infection (SSI), whereas, in the patients without any co-morbidity only 15 (10.71%) developed SSI.

Out of 200 patients 38 showed growth of various microorganisms. E. coli were found in 27 (71.05%) cases, the commonest organism causing surgical site infections (SSIs). Klebsiella were the second most common organism found in 5 (13.15%) cases. Acinetobacter were causing 3 (7.89%) cases of SSI. Pseudomonas and Enterococcus were causing 2 (5.62%) each. These are supported by the findings of study conducted by Sultan et al. in 2007. They detected Esch. Coli as principal incriminated organism for SSI(8).

For the prevention of surgical site infection antibiotics such as Ceftriaxone, piperacillin-tazobactem, Ciprofloxacin, Metronidazole were used in pre-operative and postoperative period in all of the cases. This has contrasting evidence as showed by Rasul and Ashraf in their study conducted in 1979 who did not use antibiotics in any of 65 selected cases and there was not a single incidence of wound infection(9). Regarding sensitivity of the micro-organisms it was observed that, Escherischia coli were sensitive to tigecycline (94.11% cases), chloramphenicol (41.17% cases), amikacin (29.41% cases), polymyxin B (47.05% cases), Ceftriaxone (17.64% cases), ceftriaxone-sulbactum(17.64% cases), gentamicin (29.41% cases), levofloxacin (5.88% cases) and Imipenem (35.29% cases), amoxiclav(11.76% cases).

Klebsiella pneumoniae were sensitive to tigecycline, imipenem and

amikacin in 100 per cent cases each and to polymyxin B, gentamicin and levofloxacin in 50 per cent cases and to chloramphenicol in 25% cases. These findings are similar to that of Sultan et al.

All the organisms isolated (100.00%) were sensitive to Tigecycline because this is an excellent newer drug with broad spectrum of activity and another fact is that it is not a commonly used drug. so, development of resistance is uncommon. Use of newer drugs should be reserved for specific cases and must not be used empirically or prophylactically.

CONCLUSION

Surgical site infection is a major complication of surgeries. It is one of the important cause of post operative morbidity and mortality. a rise in SSI incidence should be a cause of financial concern too. Emergency surgeries, duration of surgery, were a few identified risk factors for SSI causation. The spectrum of bacteria most frequently involved in surgical infections has changed over a period of time. *Streptococcus* being the most frequent and feared pathogen nearly a century ago was replaced by *Staphylococcus* about eight decades later, and Gram- negative isolates as principal offenders in recent years. E. coli was the commonest bacteria isolated from SSIs in this study. The rate of infection is a reflection of patient care and standard of treatment in any hospital. An effect to reduce the rate of SSI should be our aim and for this proper surveillance regarding wound infection and its causative factors should be studied regularly and effective steps should be taken to reduce the rate of SSI.

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