ORIGINAL RESEARCH PAPER

General Surgery

STUDY OF SURGICAL FACTORS ASSOCIATED WITH SURGICAL SITE INFECTIONS IN EMERGENCY NON TRAUMATIC ABDOMINAL OPERATIONS.

KEY WORDS: Non-traumatic abdomen, SSI, acute abdomen.

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ABSTRACT

Introduction: Surgical site infections (SSIs) are defined as infections occurring up to 30 days after surgery. The problem gets more complicated in case of emergency surgeries, where we have the least scope to prevent SSIs preoperatively due to urgency of surgical intervention. **Aim:** To determine surgical factors responsible for surgical site infection in emergency non traumatic abdominal operations. **Methodology:** This was a hospital based observational study carried out in department of general surgery in a tertiary care hospital of north India. A total of 100 patients undergoing emergency non-traumatic abdominal operations were included. **Results:** It was observed that type of wound, duration of surgery and type of surgery were significantly associated with SSI.

INTRODUCTION:

Surgical site infections (SSIs) are defined as infections occurring up to 30 days after surgery and affecting either the incision or deep tissue at the operation site[1]. The CDC and prevention emphasizes on good patient preparation, aseptic procedure, proper surgical technique and selective antimicrobial prophylaxis to decrease SSI. SSI continues to be a major problem associated to any operative procedure. The problem gets more complicated in case of emergency surgeries, where we have the least scope to prevent SSIs preoperatively due to urgency of surgical intervention.

There have been different reasons why people go for surgery; it can be an emergency reason or elective. According to Seltzer, a primary concern in healthcare today is the prevention of infection.[2] SSIs are the leading type of infection among hospitalized patients. Nurses play a vital role in patient care, the nurse will make sure the equipment are sterile and will stay sterile till the end of surgery. Careful handling of the surgical equipment reduces the chances of surgical site infections, and those who incorporate best practice standards can reduce the morbidity and mortality associated with SSIs. Although when people go for surgery, most people never consider seriously what the side effect of the surgery might be and therefore are not fully prepared for the consequences that occur if something negative happens, SSIs, is one of the side effects that occurs after a patient goes for surgery.

Advances in the control of infection in surgery have occurred in many ways, such as, aseptic operating theatre techniques have replaced toxic antiseptic techniques, antibiotics have reduced post-operative infection rates, delayed primary or secondary closure remains useful in contaminated wounds. When enteral feeding is suspended during the peri-operative period, and particularly with underlying disease such as immunosuppression, cancer, shock or sepsis bacteria tend to colonize the normally sterile upper gastrointestinal tract. They may then translocate to the mesenteric lymph nodes and cause the release of endotoxin, which further increases the susceptibility to infection and sepsis, through activation of macrophages and pro-inflammatory cytokine release. The use of selective decontamination of the digestive tract (SDD) is based on the prevention of this colonization[4].

According to the sources, infection may be classified into two types, primary and secondary. Primary infections are those acquired from community or endogenous source. Secondary infections are acquired from operating theatre or ward or from contamination at or after surgery. According to severity, surgical site infections can be divided into two types, major and minor. Criteria of major SSI are — significant quantity of pus, delayed return home and systemically ill patients[4].

SSI is the most important cause of morbidity and mortality in the post-operative patients, but can be prevented if proper assessment and appropriate measures are taken by the surgeons, nursing staffs, patients and others in the perioperative period.

AIM:

To determine surgical factors responsible for surgical site infection in emergency non traumatic abdominal operations.

METHODOLOGY:

This was a hospital-based observational study conducted in Department of Surgery, Dr. RPGMC Kangra at Tanda. Patients undergoing emergency non-traumatic abdominal operations were selected. They were enrolled after obtaining written informed consent from the participants or their legally acceptable representatives.

All patients who fit into inclusion criteria of emergency non traumatic abdominal operation were included in the study.

After informed consent patient was subjected to emergency surgery. Operative findings including cause of peritonitis, contents of peritoneal fluid, type of intestinal obstruction, strangulated or gangrenous loops of intestinal obstruction were recorded.

Patient was observed for SSI as per CDC guidelines up to 30 days. Each patient was followed up to 30 days after discharge.

OBSERVATIONS:

A total of 100 patients undergoing emergency non-traumatic abdominal operations were included in this study at Department of Surgery, Dr RPGMC Kangra at Tanda. Results of the study are as follows:

The age of patients ranged from 19 years to 60 years with a mean age of 39.65±14.28 years with male predominance of 60%.

The majority of patients 62/100(62%) were operated after 48 hours of start of symptoms followed by 25% between 24 - 48 hours, 11% between 12-24 hours and 2% of the patients within 12 hours of onset of symptoms.

The most common type of surgery was repair of duodenal ulcer perforation in 48% followed by appendicectomy (33%), repair of ileal perforation (7%), resection and anastomosis of small intestine for intestinal obstruction in 5% and adhesiolysis in 2% patients. SSI was present in 17% cases operated for non-traumatic abdominal surgical emergencies

Table 1: Distribution Of SSI As Per Type And Duration Of Surgery

		SSI present	SSI absent	P value
Type of surgery	Repair of ileal perforation / Ileostomy for enteric perforation and thorough peritoneal toileting	5 (71%)	2 (29%)	0.001
	Repair of duodenal ulcer perforation and thorough peritoneal toileting	7 (15%)	41 (85%)	
	Appendicectomy	2 (7%)	31 (93%)	
	Adhesiolysis	0	2 (100%)	
	Resection and anastomosis of small intestine	2 (40%)	3 (60%)	
	Resection of Sigmoid Volvulus and primary anastomosis/ Hartman's Procedure	1 (33%)	2 (67%)	
	Herniorrhaphy	0	2 (100%)	
Duration of surgery	<1 hours	1 (2%)	39 (98%)	0.003
	1-2 hours	9 (22%)	31 (78%)	
	>2 hours	7 (35%)	13 (65%)	

With regard to interval between start of symptoms and timing of surgery and rate of SSI, it was observed that the SSI rates were 11.76%, 35.29%, 41.18% and 11.76% when operations were initiated 12-24, 24-48, 48-72, and more than 72 hours later respectively. The rate of SSI increased as the time lapse between appearance of first symptoms and initiation of operation were increased. However, association between the time of surgery after appearance of symptoms with rate of SSI was not statically significant (P=0.68).

In our study, rate of SSI in grid iron, Lanz, Midline, and inguinal incision was 12%, 12.5%, 20%, and 0%. The type of incision was not significantly associated with SSI (P=0.709).

Table 2: Distribution Of SSI As Per Type Of Wound

Type of wound	SSI present	SSI absent	P value
Clean	1 (12%)	8 (88%)	<0.001
Clean contaminated	2 (4%)	49 (96%)	
Contaminated	4 (22%)	15 (78%)	
Dirty	10 (48%)	11 (52%)	

DISCUSSION:

While analysing the rate of SSI in different non traumatic abdominal emergency operations we observed that rate of SSI was significantly higher in repair of ileal perforation/ ileostomy for enteric perforations (71%), resection and anastomosis of small intestine (40%), and colonic resection in sigmoid volvulus (33%) than appendectomy (7%) and closure of duodenal perforations (15%). Our findings are consistent with the findings of Wagh et al who reported that out of 60 appendicular perforation cases, 15 (25.0%) developed SSI, out of 60 small intestinal obstruction cases, 6 (10.00%) developed SSI, out of 31 ileal perforation cases, 13 (41.9%) developed SSI, out of 23 peptic ulcer perforation, 13 (56.5%) developed SSI, out of 20 sigmoid volvulus cases, 6 (30%) developed SSI[5]. The highest rate of SSI (56.5%) was in repair of peptic ulcer cases and lowest in obstructed hernia operations. The association between the type of operation and rate of SSI was statistically significant (p = 0.001).

In our study, majority (62%) of patients were operated after 48 hours of onset of symptoms. On the analysis of correlation of rate of SSI to the time interval between onset of symptoms to the time of surgery, we observed SSI increased to 52.9% as compared to 47.1% in the cases who presented before 48 hours of onset of symptoms. We observed that the rate of infection increased as the time lapse between appearance of first symptom and initiation of operation were increased. This difference was statistically significant. Wagh et al reported that regard to association between timing of surgery and appearance of symptoms and rate of SSI, it was observed that the SSI rates were 11.1%, 17.2%, 23.1%, 26.2%, 32.5%, 40.6% when operations were initiated <6,6-12, 12-24, 24-48, 48-72, and 72 hours later respectively[5]. However, association between the timing of the surgery after appearance of symptoms with the rate of SSI was not statistically significant (p =0.17).

In the present study, we observed that the rate of SSI was 35% when length of surgery was more than 2 hours, 22% when duration of surgery was 1-2 hours and 2% SSI when duration of surgery was <1 hour. We observed that the rate of SSI increased of statistically significance with the increase in duration of surgery. In a study by Ansari et al, SSI rate was 11.4% if duration of surgery was >24 hours which was significantly different (P<0.0001)[6]. In a study conducted in Brazil in 2017 by Carvalho et al, for each hour of the duration of surgery, the risk of SSI increased by 34%[6].

In our study, rate of SSI in grid iron, Lanz, Midline, and inguinal incision was 12%, 12.5%, 20%, and 0% respectively. We observed that type of incision was not significantly associated with SSI (P=0.709). Vinay and Reddy reported that SSI is found to be more in patients with midline incisions (11%) but the results were not statistically significant (P=0.521)[7].

On analysing the association between class of wound and SSI we noted that SSI was significantly higher in contaminated (22%) and dirty wound (48%) as compared to clean (12%) and clean contaminated wounds (4%). Our findings are in accordance with study conducted by Suturiya et al in which they observed SSI 2.99%, 4.95%, 15.6%, and 28.4% in clean, clean contaminated, contaminated and dirty wounds[8]. In addition, Gogoi et al. in 2020 in a prospective study carried out on 280 patients estimated SSI rates were 6.67%, 18.33%, 20% and 25.5% in clean, clean contaminated, contaminated and dirty wounds respectively[9].

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