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AN INSTITUTIONAL BASED OBSERVATIONAL STUDY TO ESTIMATE THE INCIDENCE OF SURGICAL SITE INFECTION IN ABDOMINAL SURGERIES

Surgery

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ABSTRACT

Background- Surgical site infections (SSIs) are the second most frequently cited hospital-acquired infection in the United States and lead to significant morbidity, prolonged hospitalization, increased medical costs, and overall compromised patient outcomes. **Methods-** This study was performed in surgical unit of the Department of General Surgery at MDM Hospital affiliated to Dr S.N. Medical College, Jodhpur, Rajasthan, India. Patients below 13 years of age and patients undergoing non-abdominal surgeries were excluded from the study. The study period was from July 2018 to January 2021. **Results-** 14.13 % cases of emergency in group A and 39.75 % cases of emergency in group B developed SSI during post-operative period. SSI was more commonly seen in midline incision compared to para-median incision in both groups. 16.16 % and 41.11 % cases with midline incision in group A and group B respectively developed SSI. Maximum SSI was seen in wounds with incision size greater than or equal to 20 cms (18.94 % in group A and 41.33 % in group B). 22.58. % and 56.25 % cases with duration of surgery between 151-180 minutes in group A and group B respectively developed post-operative SSI. **Conclusion-** It is concluded from the present study that emergency surgery, midline abdominal incision, large length of incision and longer duration of surgery are predisposing factors for development of SSTI in laparotomy wounds

KEYWORDS

SSI, abdominal surgery, duration of surgery

INTRODUCTION

Surgical site infections (SSIs) are the second most frequently cited hospital-acquired infection in the United States and lead to significant morbidity, prolonged hospitalization, increased medical costs, and overall compromised patient outcomes.[1] Their perceived prevalence, or incidence, is related not only to clinical variables, such as the category of surgery (clean, clean-contaminated, contaminated or dirty), length of operation and patient's physiological status, but also to other issues including reproducible definitions of SSI, the adequacy of post discharge surveillance (30 days after surgery in general and 1 year after orthopaedic procedures) as well as the use of unbiased, trained, independent observers.[2]

Consistent definitions of SSI type (superficial, deep or organ space) are important and interval data afforded by scoring systems give more meaningful information than simple categorical data. Infection can weaken an abdominal closure and result in wound dehiscence and incisional hernia. Surgical site infections have been shown to compose up to 20% of all of healthcare-associated infections. At least 5% of patients undergoing a surgical procedure develop a surgical site infection.[3]

MATERIAL AND METHODS

An institutional based interventional observational and comparative study was performed in surgical unit of the Department of General Surgery at MDM Hospital affiliated with Dr S.N. Medical College, Jodhpur, Rajasthan, India. Patients below 13 years of age and patients undergoing non-abdominal surgeries were excluded from the study. The study period was from July 2018 to January 2021.

Patients were divided into two groups. In two hundred fifty patients, a negative suction drain was placed in subcutaneous plane at the time of closure of abdomen after laparotomy (Group A) whereas in hundred patients, no negative suction drain was placed in subcutaneous plane (Group B).

In this study, detailed history was taken and systemic examination was done of all the patients included. Patients underwent pre-operative routine blood and radiological investigations as required. Patients were assessed for elective/emergency abdominal surgery.

After pre-anaesthetic workup and informed consent, surgery was planned. Operative details of the procedure, duration of surgery, mode of anaesthesia, elective/emergency, incision site and size were noted. Post-operative daily observation of surgical site and drain amount and content were recorded. Post-operative details in terms of surgical site infection, seroma formation, wound dehiscence and burst abdomen were noted. Sample for culture and sensitivity was taken from surgical site in case of SSI. Drain was removed after collection if drain was nil for 48 hrs. Any patient who died in the postoperative period due to a systemic cause was excluded from the study.

RESULTS

Table 1: Distribution of patient according to age

Variable	Group A	Group B
Age in yrs	41.86±18.38	42.07±18.50
Male : Female	153:62	85:25

In this study, most of the patients (35.35%) were between to 31 to 50 years in group A, whereas most of the patients (34.55%) in group B were between 13 to 30 years of age. Mean age of group A and B was 41.86 and 42.07 years respectively. Male patients in group A was 72.50%, whereas in group B was 77%. Male to female ratio in group A was 2.63:1 and in group B was 3.31:1.

Table 2: SSI incidence with type of surgery

Elective/ Emergency	Group A			Group B		
	N	SSI	%	N	SSI	%
Elective	31	2	6.45	27	10	37.03
Emergency	184	26	14.13	83	33	39.75
Total	215	28		110	43	
P value	0.385			1.000		

Fisher exact test

Most of the case in group A (85.5%) & in group B (75.45%) were operated as emergency surgery. SSI was more commonly seen in emergency cases, 14.13 % cases of emergency in group A and 39.75 % cases of emergency in group B developed SSI during post-operative period.

Table 3: SSI incidence in according to length of incisions

Size of incision	Group A			Group B		
	N	SSI	%	N	SSI	%
< 8 cm	0	0	0	1	0	0
8 cm – 13 cm	30	0	0	17	6	35.29
14 cm – 19 cm	90	10	11.11	17	6	35.29

≥20 cm	95	18	18.94	75	31	41.33
Total	215	28		110	43	
P value	0.021 (S)			0.799		

SSI incidence increased with increased incision size in both the groups. Maximum SSI was seen in wounds with incision size greater than or equal to 20 cms(18.94 % in group A and 41.33 % in group B).

Table 4: SSI relation with duration of surgery

Duration of surgery (min)	Group A			Group B		
	N	SSI	%	N	SSI	%
≤90	18	0	0.00	10	3	30.00
91 – 120	90	10	11.11	37	12	32.43
121 – 150	74	9	12.16	44	18	40.90
151 – 180	31	7	22.58	16	9	56.25
≥181	2	2	100	3	1	33.33
Total	215	28		110	43	
P value	0.0008			0.538		

In most of the patients (41.86%), duration of surgery was 91-120 min in group A, whereas in group B, duration of surgery was 121-150 min in majority of cases(40%). Mean duration of surgery in group A & group B was 122, 123 min respectively. With increase in the duration of surgery, increase in incidence of SSI was noted. In group A, 22.58 % patients while in group B, 56.25 % patients with duration of surgery between 151 – 180 min had SSI.

DISCUSSION

In present study, most of the patients (35.35%) were between to 31 to 50 years in group A, whereas most of the patients (34.55%) were between 13 to 30 years of age in group B. Mean age of group A and B were 41.86 and 42.07 years respectively. Similarly Vashist[4] also conducted that maximum numbers of patients (58%) were in the age group of 20-40 years.

In present study: 85.5% of group A & 75.45% of group B were operated as emergency surgery. In group A; 14.42% & in group B; 24.55% were operated as elective surgery. Ahmet [5]in a study found that "no surgical site infection" group included 76% cases operated as elective and 24% cases operated as emergency. In incisional surgical site infection group, 80.9% cases were operated as elective and 19.1% cases were operated as emergency. A study by Chowdri[6] included patients who underwent elective cholecystectomy and divided randomly patients in study and control group. Vaghani[7] included emergency cases of exploratory laparotomy for ileal perforation. Gupta[8] included all emergency exploratory laparotomy cases and divided in study and control group. Vashist[9] included all emergency perforation peritonitis cases in their study.

In both the groups, cases who underwent emergency surgery had more incidence of SSI as compared to elective surgery. 14.13 % cases of emergency in group A and 39.75 % cases of emergency in group B developed SSI during post-operative period. Among elective surgeries, 6.45% in group A while 37.03% in group B developed SSI. In a study conducted by Shrestha[10], more incidence of SSI was observed in those who had undergone emergency LSCS (90.2%) compared to elective LSCS (9.8%) and was statistically significant (p=0.007). Alkaaki[11] in his study on SSI following abdominal surgery concluded that emergency surgery increased the risk of SSI fivefold compared to elective surgery.

Surgical site infections were found more commonly in midline incisions in both groups (16.16 % in group A and 41.11 % in group B) followed by paramedian incisions (3.03 % cases of group A and 28.57 % cases of group B). Shrestha[10] in her study concluded that increased rate of SSI was observed in women who were given vertical incision which was statistically significant (p=0.0001).

SSI incidence increased with increased incision size in both the groups. Maximum SSI was seen in wounds with incision size greater than or equal to 20 cms (18.94 % in group A and 41.33 % in group B) while wounds with incision size less than 8 cms had least SSI incidence (0 % in both group A as well as group B). Paulson[76] in a study stated that the rate of SSI is linearly related to the length of the incision with larger incisions sustaining much higher rates of SSI and Less surface area for infection and use of incision protectors may influence the rate of SSI in smaller incisions.Incidence of SSI also increased with increase in the duration of surgery in both the groups. In group A, no patient with duration of surgery less than or equal to 90 min had SSI while in group B, 30 % patients of same group developed SSI. Maximum incidence of SSI was seen in cases with duration of surgery between 151-180 min (22.58 % of group A and 56.25 % of group B).

In a study conducted Chang[12], it was seen that on average across procedures, the mean operative time was approximately 30 minutes longer in patients with SSIs as compared to those patients without. In a study by Bekelis[13], it was concluded that longer operative duration was associated with increased incidence of SSIs for neurological procedures. Sugiura[14] in his study on risk factors of surgical site infections after pancreatoduodenectomy concluded prolonged operation times lead to increased wound susceptibility by increasing bacterial exposure and the extent of tissue trauma, and decreasing the tissue concentration of antibiotics.

CONCLUSION

It is concluded from the present study that emergency surgery, midline abdominal incision, large length of incision and longer duration of surgery are predisposing factors for development of SSTI in laparotomy wounds

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