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RESEARCH ARTICLE

INCIDENCE OF SURGICAL SITE INFECTION IN ABDOMINAL SURGERY IN A TERTIARY CARE CENTER IN ASSAM

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Abstract

Background: Despite the advancement in sterilization methods, aseptic and antiseptic practices, still post-operative surgical site infections are a dilemma for practicing surgeons, not only that it increases the morbidity and mortality of the patient but also it increases the money expenditure and also post op hospital stay. Incidence of surgical site infections in each hospitals is thereby important so as to have a check for improving quality of patient care.

Materials and methods: The study was conducted from June 2020 to May 2021 in a total of 150 patients in JMCH. Wound swabs were collected for isolating the organisms causing the infection, whenever an infection is detected according to CDC/NNIS criteria.

Results: Incidence of surgical site infection in abdominal surgery was found to be 13.3% in our study. The most common organism causing wound infection was *Klebsiella*.

Conclusion: The study shows that the incidence of SSI is similar to other studies.

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Introduction:-

In modern surgery, post-operative infections and sepsis is still a significant problem for health care practitioners across the globe. For the patients undergoing surgery, there is a risk of acquiring infection at the site of incision as a result of the same surgical procedures.¹

Surgical site infections (SSI) are defined as those infections presenting up to 30 days after a surgical procedure if no prosthetic is placed and up to 1 year if a prosthetic is implanted in the patient². The center for disease control and prevention have given this definition to standardize the data collection for the national nosocomial infection surveillance program (NNIS)^{3, 4}. SSIs are classified in to incisional SSIs which can be superficial or deep or organ/space SSIs which affect rest of the body other than the body wall layers. It is one of the most common health cares associated infections following 1-3% of all surgical procedures⁵. The rate of SSI are much higher in abdominal surgery than with other types of surgery, with several prospective surgeries indicating an incidence of 15%-20% depending on the level of contamination. It also remains as one of the critically serious problem in postoperative complications constituting approximately 20% of all health care associated infections⁶.

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SSI have been the cause for increasing morbidity, mortality and expense of money related to surgical operations and also remains as a major problem even in hospitals with modern facilities and with standard protocols of pre op preparation and antibiotic prophylaxis. Although SSI is a relatively serious problem, still there are very less published reports regarding bacterial pathogens which are involved in SSI at Jorhat medical college

Aims:

1. To evaluate the incidence of surgical site infection in abdominal surgery in JMCH
2. To isolate and identify common organism causing surgical site infection in abdominal surgery in JMCH

Material and Methods:-

Hospital based Cross sectional observational study conducted in Department of General Surgery, Jorhat Medical College and Hospital, Jorhat, Assam upon 150 patients over a period of one year 1st June 2020 to 31st May 2021. All patients admitted in general surgery ward who had undergone elective and emergency abdominal surgical procedure having post op surgical site infection are taken as samples.

Inclusion Criteria:

1. All patients who had undergone elective and emergency surgeries in Department of General Surgery, JMCH.
2. Cases were included according to Wound infection definition based on CDC definition.

Exclusion Criteria:

1. Patients underwent abdominal surgery for Vascular, Gynecological, Urological, plastic surgical indications.
2. Patient who refused for the study.

After obtaining clearance from institutional ethical committee, an informed consent was taken from the patients who were eligible to participate in the study and was enrolled. Patients had undergone detailed history taking. The following factors were assessed and recorded in history taking such as the presenting complaints of the patient, duration of illness, any associated co morbidities like diabetes, hypertension and also whether the patient was having the habit of smoking or alcoholism.

Consequently, general and clinical examination were performed to detect any abnormality present. The following investigations were also done during the pre-operative period such as estimation of pre-op Hemoglobin, Total Leucocyte Count, Random Blood Sugar and Serum Albumin.

After that, preoperative assessment was done to check whether bowel preparation was done or not and also to check the type of Skin preparation was used (clipping, shaving or depilatory cream). Whether the patient took pre-op bath or not was also noted.

During the time of operation, all routine precautions including autoclaved gowns and trays, sterile gloves and instruments, standard surgical scrub were taken. The type of Anesthesia given (General, Spinal, and Epidural) were noted at first. Minimum tissue handling, maintaining adequate hemostasis were especially considered. The type of operation whether it is elective or emergency was noted. The type of drain whether it is open or closed or if no drain is given was also noted. The wound class of the surgical wound and the duration of surgery was noted at the end.

In order to diagnose SSI, the wound was examined on day 2, then every day till the day of discharge. The SSI was diagnosed clinically by observing whether the patient was having fever, any local rise of temperature over the surgical wound, any swelling over the wound, any erythema or any discharge. If discharge is present, the type of Discharge is also noted.

Wound infection was diagnosed on basis of CDC/NNIS definitions. Isolation and identification of organisms were done by collecting wound swab $\pm$ tissue which was subjected to culture and sensitivity. Patients were treated accordingly. Then the patients were discharged. A Performa was filled along with these steps within the follow up period.

Prognosis and treatment outcome of each group was analyzed during hospital stay of the patient with the length of hospital stay. Data collected by these methods were later compiled and analyzed.

Statistical analysis:

Statistical analysis data collected were entered and calculated in IBM SPSS Statistics version 23 software. For all the nominal data, Frequency and Percentage were calculated.

For comparison between 2 nominal data chi square test or Fisher exact test was done. For parametric data mean $\pm$ standard deviation was done and for non-parametric data, Median (Inter quartile range) was calculated.

For data comparison between SSI and non-SSI, Mann Whitney U test was done. The $p < 0.05$ were taken to be statistically significant.

Results:-

Total of 150 patients were enrolled for our study, out of which 20 patients were found to have SSI. The overall incidence of our study was 13.33%.

Table no.1:- Incidence of surgical site infection.

	No. of patients	Percent
Absent	130	86.67
Present	20	13.33
Total	150	100.0

Table no. 2:- Incidence in relation to age group.

		Infection		Total
		Absent	Present	
Age	30 and below	24	5	29
		18.5%	25.0%	19.3%
	31-45	28	9	37
		21.7%	45.0%	24.7%
	46-60	47	5	52
		35.9%	25.0%	34.7%
	Above60	31	1	32
		23.9%	05.0%	21.3%
Total		130	20	150
		100.0%	100.0%	100.0%

$\chi^2=7.7591, p=0.051, NS$

On analysis of incidence in relation to age for SSI in this study, it was found that maximum incidence was in 46-60 age group (34.7%).

Table no. 3: Incidence in relation to sex

		Infection		Total
		Absent	Present	
Sex	F	59	6	65
		45.7%	30%	43.3%
	M	71	14	85
		54.3%	70%	56.7%
Total		130	20	150
		100.0%	100.0%	100.0%

$\chi^2=4.204, p=0.04, sig$

This study showed male preponderance for SSI which was found to be statistically significant.

Table no.4:- Incidence in relation to woundclass.

		Infection	
		Absent	Present
Wound class	I	25	2
		19.2%	10.0%
	II	51	2
		39.2%	10.0%
	III	43	5
		33.3%	25.0%
	IV	11	11
		8.3%	55.0%
Total		130	20
		100.0%	100.0%

$\chi^2=30.96, p=0.00001, HS$

In this study we had 2 patients with Class I (10.0%), 2 patients with class II (10%), 5 patients with class III (25%) & 11 patients with class IV (55%). Here maximum SSI rate was noted in class IV which is statistically highly significant.

Table no.5:- Incidence in relation to type of anesthesia.

		Infection		Total
		Absent	Present	
Anesthesia	GA	109	18	127
		83.7%	90%	84.6%
	SA	21	2	23
		16.3%	10%	15.4%
Total		130	20	150
		100.0%	100.0%	100.0%

$\chi^2=0.507, p=0.477, NS$

In this study, out of 127 patients with general anesthesia the SSI was noted in 18 cases and two cases in 23 patients with spinal anesthesia which is statistically not significant.

Table no.6:- Incidence in relation to duration of surgery.

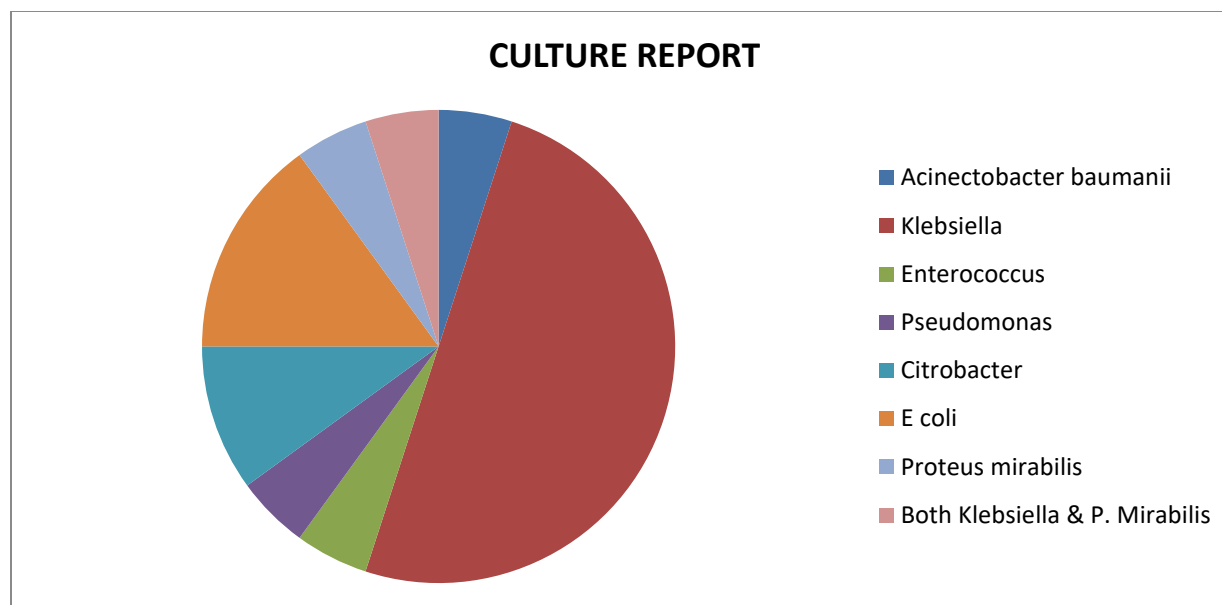
Infection	N	Mean	St. Deviation	t and p value
Duration of surgery (min)				
Present	20	162.00	64.18	t=1.945
Absent	130	131.8804	66.88712	p=0.034, sig

The mean duration of surgery in cases where SSI was noted was 162.00 minutes in infected cases and 131.88 minutes in patients where no infection was seen. This was found to be statistically significant (p=0.034).

Table no.7:- Incidence in relation to hospital stay.

infection	N	mean	St. deviation	p value
Post op stay Present	20	33.05	20.46	0.664
Absent	130	10.32	6.331	Not sig

The mean postoperative stay in infected cases was 33.05 days, when compared to 10.32 days in non-infected cases which is statistically not significant



Discussion:-

The overall incidence of SSI in our study is 13.33% which compares favorably with studies of Raka *et al.* (12%) and Razavi *et al.* (17.4%).

Of the 150 patients in this study, SSI was noted in 20 patients (13.33%). This incidence is much higher than those reported in Western literature such as United Kingdom (3.1%), Holland (4.3%), etc.^{7,8,9} Studying the age-related incidence of SSI, we found the highest incidence of 34.7% in 46-60 years age group, the 31-45 years age group being the next largest incidence group, but overall incidence in each age group did not significantly differ. Hence, age was not much of an influencing factor in our study.

In Sex incidence, there was marginal though statistically significant higher incidence in males, but no obvious or specific reason could be found to explain this. Probably, the higher number of males in the sample could be a reason.

The incidence rate of SSI differed by wound classification in our study, maximum incidence of SSI was noted in Class IV wounds which is statistically highly significant. Class III group showed the next highest incidence of infection followed by class II and I.

There was no significant correlation observed between the SSI and the type of anesthesia used and thus not can be considered to be a major factor.

No significant relationship was noted between SSI and the length of hospital stay. The average duration of post-operative stay in the infected patients and non-infected patients was 33.05 ± 20.46 and 10.32 ± 6.331 respectively, which shows no statistical relevance. Hence, this study tells that duration of hospital stay is not a major contributory factor for SSI.

However, significant correlation was noted between duration of surgery and SSI. The literature shows that with the duration of above 2 hours, the risk of SSI increases.¹⁰ The average duration of surgery in cases with SSI in this study was 162.00 minutes, which agrees with the above-mentioned study.

Study of the bacteriological profile shows most of the cases had single organism infection, the commonest organism isolated being *klebsiella* species followed by *E coli* and *Citrobacter* species, which is different from organism profiles described in others studies.

In a prospective cohort study conducted by **Aroub Alkaaki, et al (2018)** about “surgical site infections following abdominal surgery in a tertiary care center. A total of 337 patients were studied, incidence of SSI was 16.3%, the bacteria most commonly isolated were extended spectrum beta lactamase producing *E.coli*, followed by *Enterococcus* species .¹¹

Dr Reina khatilkar, et al (2017):8% patients developed SSI. Infection with *E coli* and *staphylococcus aureus* were more common.¹²

Amith Agarwal, et al (2014): conducted a prospective study, showed that overall incidence there was 15.7%.*E.coli* was found to be the most common organism causing SSI in abdominal operation.

Conclusion:-

- 1 This study shows that the incidence of SSI is 13.3% in JMCH
- 2 This study increased incidence of SSI in male gender.
- 3 This study also showed increased incidence of SSI in 46-60 yr age group
- 4 The incidence of infection by Gram-ve bacteria was higher than that of Gram +ve bacteria
- 5 There is considerable potential for the reduction of morbidity and cost of hospitalization, through introduction of well implemented infection control policies.

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