**General Surgery** 



# A COMPARATIVE STUDY OF SURGICAL SITE INFECTION BETWEEN ELECTIVE AND EMERGENCY ABDOMINAL SURGERIES IN TERTIARY CARE HOSPITAL

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**ABSTRACT Background:** Surgical site infection (SSI) is the second most common complication following surgical procedures due to entry of virulent bacteria, altered wound microenvironment and changed host defense. Prevention of SSI requires a Multifactorial approach focussed on pre, intra and postoperative factors. Surgical site infections (SSI) are serious postoperative complications with significant impact on morbidity of the patients. The study was aimed to study the risk factors in causing surgical site infection following emergency versus elective laprotomy. **Materials And Methods:** It is a Prospective and Comparative study. Study of Hundred(100) patients who underwent elective and emergency laprotomy were taken up for the study after fulfilling the selection criteria. A written informed consent was taken from the patients before enrolment into the study. Thorough history was obtained by structured proforma. Patients were post operatively followed up until discharge for any surgical site related complications. Routine blood investigations was done and pus sent for culture and sensitivity and Antibiotics given according to Sensitivity report. **Results:** In our study 50 patients who underwent elective laprotomy 5(10%) of them developed surgical site infection and 50 patients who underwent emergency laprotomy 10(20%) patient develop surgical site infection. Malnutrition, increasing age, contaminated wound were found in relation with higher incidence of SSI. In both elective and emergency cases dirty wound has highest incidence of SSI staphylococcus aureus commonest organism isolated in both elective and emergency cases. **Conclusion:** Higher incidence of SSI was seen with Increasing age of the patient, contaminated wound, malnutrition. Awareness among hospital staff regarding for infection control and strict following of the aseptic precautions is the need of the hour.

KEYWORDS : Surgical site infection; Elective surgery; Emergency surgery; Laparotomy

### INTRODUCTION

Surgical site infection (SSI) is defined by the Centre for Disease Control and Prevention as a wound infection that occurs within 30 days of an operative procedure or within a year if an implant is left in place and the infection is thought to be secondary to surgery.<sup>1</sup> Surgical site infections (SSI) is a significant barrier in the early recovery of patient. While once considered a necessary evil, as famously described by Osler: "Except on few occasions, the patient appears to die from the body's response to infection rather than from it",<sup>2</sup> there has been a slow yet powerful paradigm shift towards early identification and appropriate treatment of these infections.

In abdominal surgeries SSI has been identified as one of the most important causes for postoperative morbidity.<sup>3</sup> In an era dominated by Enhanced Recovery Programs<sup>4</sup> and day care surgery,<sup>5</sup> with the ultimate goal of early recovery and return to normalcy, SSI's is a significant obstacle.

Surgical site infections are classified based on bacterial load at the time of surgery<sup>6</sup>:-

Class I clean wounds.

Class II clean / contaminated wounds.

Class III contaminated wounds.

Class IV dirty wounds.

Prevention is better than cure for SSI, and prevention begins with identification of risk factors. This allows for early identification of the patients who are more prone for development of SSI. This study was therefore conducted to identify the risk factors associated with SSI's and correlating that factors with the type and severity of infections encountered, so as to allow for early treatment of patients. The aim of the study were to compare the incidence, severity and microbiological profile of surgical site infections following emergency and elective laprotomy.

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## MATERIALAND METHODS

This study is a Prospective and Comparative study on 100 patients with 50 elective and 50 emergency laprotomy done in Governent Medical College and associated group of hospitals, Kota, during the period of February 2021 to December 2022.

### Subject & Selection Method:

A total of 100 patients who underwent elective and emergency abdominal surgeries at the Department of General Surgery, Goverment medical college kota were included.

### **Inclusion Criteria:**

The patients underwent abdominal surgeries both elective and emergency, for various reason were studied.

### **Exclusion Criteria:**

Patients with pre-existing infections were excluded. Procedure methodology : After taking written informed consent, a structured questionnaire performa was used to obtain the data of the selected patients retrospectively. The objectives and method of study explained to the patients. The selected patients were counselled about the study and informed written consent was taken. Post operatively patients were followed up for any wound related complications. Routine blood investigations and pus from wound sent for culture and sensitivity and antibiotic started according to sensitivity report<sup>78</sup>.

#### Statistical Analysis :

Data processing and statistical analysis was done with the help of a staff statistician using SPSS 17.0.1 (Statistical Package, Software for windows, Chicago: SPSS. Inc)

# RESULTS

This study was conducted from February 2021 to December 2022. A total of 100 eligible patients with 50 elective and 50 emergency abdominal surgeries done in Government Medical College and Associated Group of Hospitals. Kota. The data collected, analysed and

22

the final results were tabulated as below

#### Table 1: SSI Incidence

	No. Of cases	No. of infection	Percentage of SSI
ELECTIVE	50	5	10%
EMERGENCY	50	10	20%
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The incidence of SSI in elective surgery was 10% while in emergency surgery it was 20%.

### Table 2: SSI Incidence In Relation To Age

AGE	ELECTIVE			EMERGENCY		
(years)	Number	Number	Percent	Number	Number	Percent
	of	1	age	of	of cases	age
	patients	infected		patients	infected	
<30	12	-	0	10	1	10
30-40	14	0	0	12	-	0
40-50	11	2	18.2	13	4	30.76
50-60	9	1	11.1	13	5	38.5
60-70	4	2	50.0	2	-	0
	P=	-0.098			<b>P</b> =0.033	

In elective surgery group higher incidence of SSI was found in the 60-70 year age group patients (50%) followed by 40-50 years age group (18.2%). No SSI was reported in patients <40 year age group. In emergency surgery group higher incidence of SSI was found in the 50-60 year age group (38.5%) followed by 40-50 years age group(30.76%), followed by <30 years group (10%). No SSI was reported in patients between 30-40 years and 60-70 years age group because majority of surgery in these group were clean or clean contaminated.

 Table 3 : SSI Incidence In Relation To Malnutrition (Albumin<3gm/dl)</th>

ELECTIVE			EMERGENCY		
Number of patients	Number of case infected	e	Number of Patients	Number of case infected	Percentag e
9	4	44.4	10	10	100
P=0.003					

P=0.003

Four(4) patient out of 9 patients in the Elective surgeries group (44%) had developedSSI, while in the emergency surgeries group all malnourished patients had developed SSI (100%). The P value is (P=0.003) indicating highly significant relation between malnutrition and SSI.

#### Table 4: SSI Incidence In Relation To Nature Of Surgery

	ELECTIVE			EMERGENCY		
	Number of Patients	of case	Percent age	Number of Patients	Number of case infected	Percent age
CLEAN	21	0	0	7	Nil	0
CLEAN CONTA MINAT ED	19	2	10.5	26	1	3.8
CONTA MINAT ED	9	2	22.2	9	3	33.3
DIRTY	1	1	100	8	6	75

Two(2) cases Out of 19 clean contaminated cases, developed SSI(10.5%)., Two(2) cases Out of 9 contaminated cases developed SSI (22.2%). Only one was dirty case (Open cholecyctectomy for Empyema gall bladder) and SSI occurred in that patient (100%). The incidence of SSI was highest among dirty cases (100%) followed by contaminated (22.2%) followed by clean contaminated (10.5%). In emergency cases none of the patients in clean surgeries had SSI. One(1) case out of 26 clean contaminated cases developed SSI(33.8%). Three(3) case out of 8 dirty cases developed SSI(75%). The incidence of SSI in dirty cases was highest(75%) followed by contaminated (33.3%) followed by clean contaminated (3.8%) and clean cases (0%).

In elective surgery group Four(4) patients out of 5 patients who developed SSI had superficial incisional infection(80%), followed by 1 patient (20%) had deep incisional infection. None of them had

organ/space infection.

Table 5: SSI Incidence In Relation To Nature Of Wound Infection
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	ELECTI	PERCENT	EMERGEN	PERCENTA
	VE	AGE	CY	GE
Superficial	4	80%	6	60%
Deep	1	20%	3	30%
Organ/Space	Nil	0%	1	10%

In the emergency surgery group six(6) patient out of 10 patients who had SSI had superficial incisional infection(60%) followed by 3 patients (30%) had deep incisional infection followed by 1 patient (10%) had organ/space infection.

### Table 6: Organisms Causing SSI

Organisms	Elective	Emergency
S.aureus	3	5
E.coli	1	1
Enterococcus	1	3
Acinectobacter	0	0
Pseudomonas	0	1

Amongst the elective cases who developed SSI the highest isolated organism was S. aureus found in 3 patients (60%), followed by E. coli and Enterococcus seen in 1 patient each (20%).

Amongst the emergency who developed SSI the highest isolated organism was S. aureus found in 5 patients (50%), followed by Enterococcus found in 3 patients (30%), and E. coli, Pseudomonas seen in 1 patient each (10%). In some surgeries, patients had mixed bacterial infections.

#### DISCUSSION

In present study, incidence of surgical site infections is 15%. In India several studies results have shown SSI incidence rates ranging from 6.09% to 38.7%, with the majority of studies results in range from 14-17%. In our study, incidence of surgical site infections in elective group was 10% while in emergency group it was 20%.

In study done by Raka et al<sup>12</sup> showed incidence of SSI in elective and emergency surgeries as 13.9%,10% and study done by Razavi et al<sup>11</sup> showed incidence of SSI in elective and emergency surgeries as 18.1%, 14.9%. Latika et al<sup>9</sup> study showed incidence of SSI in elective and emergency abdominal surgeries as 16.6% and 28.57% respectively.

In our study, the elective surgery group SSI incidence was highest in 60-70 years age group (50%) followed by 40-50 years age group(18.2%) and in emergency surgery group SSI incidence was highest in 50-60 years age group (38.5%) followed by 40-50 years age group(30.76%). Similar results were present in all studies showing increase in the incidence of SSI with increase in the age probably reflecting comorbidities development & deteriorating immune status as age advances.<sup>11</sup>

Malnutrition is an important risk factor for SSI. Albumin level less than 3 was considered as malnutrition in our study. In elective surgeries group Fourty four percent(44%) of patients with malnutrition had SSI and Hundred percent(100%) of patients with malnutrition had SSI. The P value(P=0.003) indicating highly significant relation between malnutrition and SSI.

In present study in the elective group the SSI incidence was highest among dirty cases (100%) followed by contaminated (22.2%) and in clean contaminated (10.5%). In emergency group, the incidence of SSI was highest among dirty cases (75%) followed by contaminated (33.3%) and in clean contaminated (3.8%). Similarly Kumar A et al study showed incidence of SSI in Clean (8.6%), Clean contaminated (17.5%) and Contaminated (29.2%) with contaminated cases more prone for SSI.<sup>10</sup>

In Razavi et al study they found incidence of SSIs in contaminated wounds (45.8%), clean contaminated wounds (26.7%) and clean wounds (13.6%).  $^{11}$ 

In Raka et al study incidence of SSI was highest in dirty cases (100%),contaminated cases (46.1%), clean contaminated (9.8%) and clean cases  $(3.1\%)^{12}$ 

In present study among the elective cases who had SSI, 80% had superficial incisional infection followed by deep incisional infection in 20%. None of patient had organ/space infection. Among the emergency cases who had SSI, 60% had superficial incisional infection followed by deep incisional infection in 30% and 10% of them had organ/space infection. Raka et al<sup>12</sup> study shows Superficial incisional SSIs were most common, followed by deep incisional, and then organ-space.12

In our study, in the elective cases, the highest isolated organism was S. aureus (60%), followed by E. coli and Enterococcus 20% each. And amongst the emergency cases, the highest isolated organism was S. aureus (50%), followed by Enterococcus (30%), and E. coli and pseudomonas (10%) each . In some surgeries, patients had mixed bacterial infections.

In Kumar A et al study the most common pathogen cultured in SSI were A beta hemolytic streptococci and staphylococcus aureus. Staphylococcus aureus is one of the most common pathogen isolated in SSI around the world.

### CONCLUSION

Surgical site infections has always been a major concern for surgeon, risk factor analysis, optimal management in the perioperative period and targeted therapy of established infections can decrease the burden of SSI. This Study provides information on various risk factors for SSI in tertiary hospital. In study it was observed that, increasing age of the patient, contaminated wound, malnutrition, are associated with increased incidence of SSI. Elucidation of risk factors such as the nature of surgery performed, old age, presence of remote infections allow for appropriate patient stratification and treatment of risk factors. This study also demonstrates the most common pathogen isolated in SSI. This allows for alteration of antibiotic protocols for prevention of SSI. In conclusion, the effective management of SSIs relies on a two pronged approach, consisting of risk factor management for prevention and appropriate therapy for established infection.

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