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Original Research

Assessment of surgical site infection and associated pathogens following emergency laparotomy

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ABSTRACT:
Background: Infections that harm the incision or deep tissue at the operation site are known as surgical site infections. The present study was conducted to assess surgical site infection and associated pathogens following emergency laparotomy. **Materials & Methods:** 130 patients who underwent emergency laparotomies of both genders were selected. Parameters such as wound class: clean, clean-contaminated, contaminated and dirty/infected; and ASA index classified into ASA II, III and IV/V, duration of operation, length of hospital stay etc. were recorded. **Results:** Out out of 130 patients, 76 were males and 54 were females. SSI was present in 56 and absent in 74 patients. Type of SSI was superficial in 32 and deep in 24. Surgical wound was clean in 74, clean- contaminated in 6, contaminated in 22 and dirty in 28 cases. Operative time was <2 hours in 84 and >2 hours in 46 patients. Hospital stay was <4 days in 90 and >4days in 40 patients. The difference was significant (P< 0.05). Pathogenic bacteria isolated were S. aureus in 1, ConS in 6, Streptococci in 1, Enterococcus in 5, Klebsiella in 12, E. Coli in 30 and Pseudomonas spp. in 2 patients.The difference was significant (P< 0.05). **Conclusion:** Open surgical technique, contaminated wound class, and emergency surgery are potentially modifiable independent risk factors for SSI following abdominal surgery. Main causative organism was E. Coli, Klebsiella and Enterococcus.
Key words: Surgical site infections,emergency laparotomy, Klebsiella

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INTRODUCTION

Infections that harm the incision or deep tissue at the operation site are known as surgical site infections (SSIs), and they can appear up to 30 days after surgery (or up to a year after surgery in patients receiving implants).[1] SSIs are the most common nosocomial infection among surgical patients, and studies have shown that they are the primary cause of operation-related adverse outcomes. According to studies, patients with SSI need longer hospital stays and pay more for similar surgical treatments than patients without the infection.[2,3] Despite improvements in prevention, SSIs remain a significant clinical problem due to their high rates of morbidity and mortality and significant demand on hospital resources.[4]

Depending on the surgical technique, the surveillance criteria employed, and the caliber of data collection, the incidence of SSIs may reach 20%. The infections that cause many SSIs come from the patient's natural vegetation.[5] Three main determinants of SSI—bacterial variables, local wound factors, and patient factors—comprise the various risk factors for SSI that have been identified. Bacterial variables include the surgical site's bacterial burden and pathogenicity.[6] In addition to patient-related factors like age, immune suppression, steroids, cancer, obesity, perioperative transfusions, cigarette smoking, diabetes, other pre-existing illnesses, and malnourishment, local wound factors include the invasiveness of an operation, the surgical technique, and the surgeon's practices.[7]The present study was conducted to assess surgical site infection and associated pathogens following emergency laparotomy.

MATERIALS & METHODS

The present study consisted of 130 patients who underwent emergency laparotomies of both genders.

All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Parameters such as wound class: clean, clean-contaminated, contaminated and dirty/infected; and ASA index classified into ASA II, III and IV/V, duration of operation, length of hospital stay etc. were recorded. Direct microscopic examination was done via Gram staining technique to look for pus cells and the bacteria.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 130		
Gender	**Male**	**Female**
Number	76	54

Table I shows that out of 130 patients, 76 were males and 54 were females.

Table II Assessment of parameters

Parameters	Variables	Number	P value
SSI	Present	56	0.05
	Absent	74	
Type of SSI	Superficial	32	0.73
	Deep	24	
Surgical wound	Clean	74	0.05
	Clean- contaminated	6	
	Contaminated	22	
	Dirty	28	
Operative time (hours)	<2	84	0.02
	>2	46	
Hospital stay (Days)	<4	90	0.04
	>4	40	

Table II, graph I show that SSI was present in 56 and absent in 74 patients. Type of SSI was superficial in 32 and deep in 24. Surgical wound was clean in 74, clean- contaminated in 6, contaminated in 22 and dirty in 28 cases. Operative time was <2 hours in 84 and >2 hours in 46 patients. Hospital stay was <4 days in 90 and >4 days in 40 patients. The difference was significant (P< 0.05).

Graph I Assessment of parameters

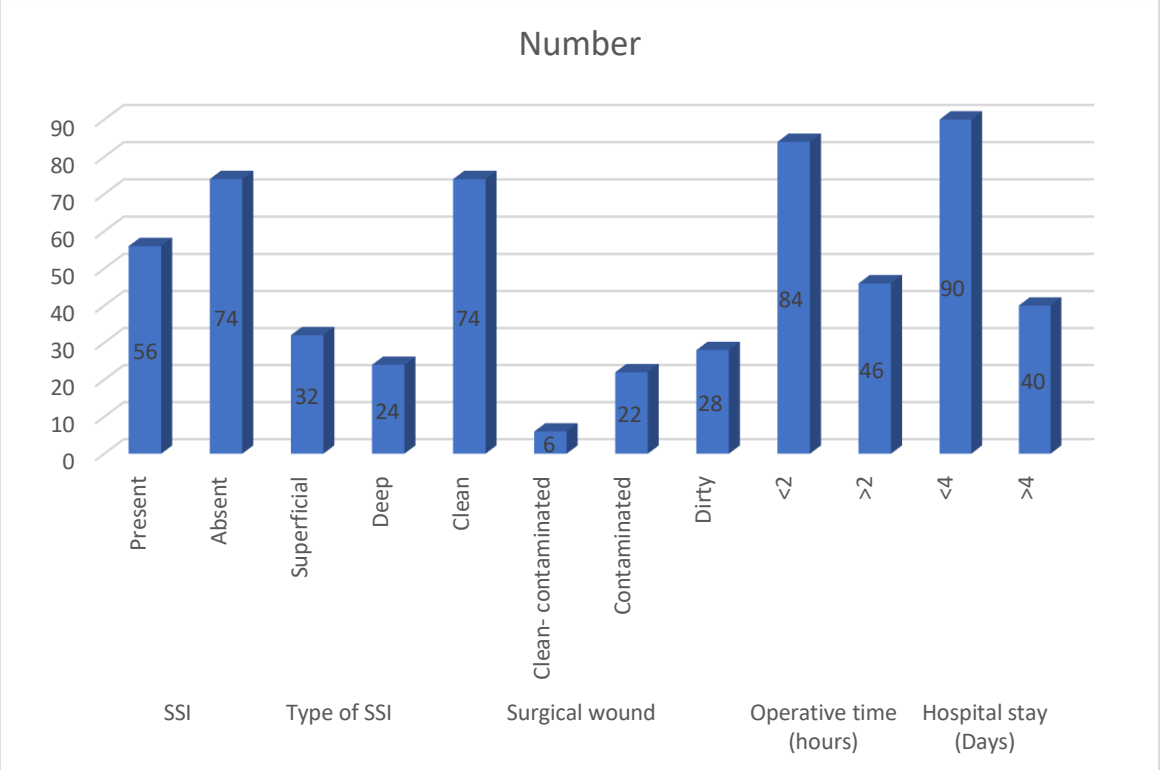

Table III Distribution of pathogenic bacteria

Pathogenic bacteria	Number	P value
S. aureus	1	0.01
ConS	6	
Streptococci	1	
Enterococcus	5	
Klebsiella	12	
E. Coli	30	
Pseudomonas spp.	2	

Table III shows that pathogenic bacteria isolated were S. aureus in 1, ConS in 6, Streptococci in 1, Enterococcus in 5, Klebsiella in 12, E. Coli in 30 and Pseudomonas spp. in 2 patients. The difference was significant (P< 0.05).

DISCUSSION

One crucial step in preventing SSI is surgical site preparation.[8] Chlorhexidine showers, aseptic practice, careful attention to surgical technique, and good patient preparation have all been advised, especially for patients who have been hospitalized for a few days and for those for whom an SSI will result in significant morbidity (cardiac, vascular, and prosthetic procedures).[9,10] A germicidal antiseptic, such as tincture of iodine, povidone-iodine, or chlorhexidine, is used to prepare the surgical site's skin.[11,12]The present study was conducted to assess surgical site infection and associated pathogens following emergency laparotomy.

We found that out of 130 patients, 76 were males and 54 were females. Over the course of 18 months, Satyanarayana V. et al[13] calculated the incidence of SSI in abdominal procedures and identified risk factors linked to the development of SSI. 13.7% of surgical wounds were infected overall. Emergency surgery had a higher infection rate (25.2%) than elective surgery (7.6%). As the risk index score rose from 0 to 3, the rate of surgical site infections rose as well. Early surgical and postoperative prophylaxis was associated with higher SSI. The rate of wound infection and the prophylactic timing were clearly correlated. They came to the conclusion that wound infection is substantially predisposed by a pre-existing medical condition, extended operating time, wound class, emergency surgeries, and wound contamination. We observed that SSI was present in 56 and absent in 74 patients. Type of SSI was superficial in 32 and deep in 24. Surgical wound was clean in 74, clean-contaminated in 6, contaminated in 22 and dirty in 28 cases. Operative time was <2 hours in 84 and >2 hours in 46 patients. Hospital stay was <4 days in 90 and >4days in 40 patients. Mulu W et al[14]identified post operative bacterial infections and determined their current antimicrobial resistance to commonly prescribed drugs.Out of 294 patients who had clean and clean-contaminated operation, 10.9% were confirmed of bacterial nosocomial infections. The rate of nosocomial infections among clean and clean-contaminated operations was 3.3% and 12.8% respectively. Nosocomial surgical site and blood stream infection rate was 10.2% and 2.4% correspondingly. A total of 42 bacterial pathogens were identified of which S. aureus was the leading isolates accounting 26.2% followed by E. coli and Coagulase negative Staphylococcus species each 21.4%. Nearly 100% of Gram positive and 95.5% of Gram- negative bacterial isolates showed resistance against two or more antimicrobial drugs.

We observed that pathogenic bacteria isolated were S. aureus in 1, ConS in 6, Streptococci in 1, Enterococcus in 5, Klebsiella in 12, E. Coli in 30 and Pseudomonas spp. in 2 patients.Demilie T et al[15] in their study, a total of 367 pregnant women with and without symptoms of urinary tract infection were enrolled. Out of 367 pregnant women, 37 were symptomatic and the rest 330 asymptomatic. Bacteriological screening of urine samples revealed growth of bacteria in 8.5% (7/37) and 18.9% (28/330) for symptomatic and asymptomatic pregnant women respectively with overall prevalence of 9.5%. The most common isolates detected were E.coli (45.7%) followed by coagulase negative Staphylococcus (17.1%) and S.aureus (8.6%). Gram-negative bacteria showed resistance rates in the range of 56.5% -82.6 % against trimethoprim/sulfamethoxazole, tetracycline, amoxicillin & ampicillin. Gram positive isolates showed resistant rate ranging from 50-100% against tetracycline, trimethoprim-sulphamethoxazole, amoxicillin and penicillin-G. Both Gram positive and gram- negative bacteria showed high sensitivity against Nitrofurantoin with a rate of 82.3% and 87%, respectively. All isolated Gram positive bacterial uropathogens were sensitive for Amoxicillin-clauvlanic acid.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that open surgical technique, contaminated wound class, and emergency surgery are potentially modifiable independent risk factors for SSI following abdominal surgery. Main causative organism was E. Coli, Klebsiella and Enterococcus.

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