Original Research

MICROBIOLOGICAL PROFILE OF SURGICAL SITE INFECTION FOLLOWING EMERGENCY LAPAROTOMY IN A TRIBAL TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Surgical site infection (SSI) is one of the most common postoperative complications following abdominal surgery and contributes significantly to postoperative morbidity, prolonged hospital stay, and increased healthcare costs. Emergency laparotomy procedures carry a particularly high risk of infection because of contamination from gastrointestinal flora and the urgent nature of the surgery.[12]

Aim: To evaluate the microbiological profile of organisms isolated from surgical site infections following emergency laparotomy in a tertiary care teaching hospital.

Methods: A prospective observational study was conducted on 150 patients undergoing emergency laparotomy at a tertiary care teaching hospital. Patients who developed clinical features of surgical site infection underwent wound swab culture and sensitivity testing to identify the causative organisms. Data were analyzed using descriptive statistical methods.

Results: Out of 150 patients, 40 patients (26.7%) developed surgical site infections. The most frequently isolated organism was Escherichia coli (35%), followed by Klebsiella pneumoniae (20%), methicillin-resistant Staphylococcus aureus (MRSA) (15%), Pseudomonas aeruginosa (12.5%), Enterococcus faecalis (10%), and coagulase-negative Staphylococci (7.5%). Gram-negative organisms constituted 67.5% of isolates, whereas gram-positive organisms accounted for 32.5%.

Conclusion: Gram-negative organisms, particularly Escherichia coli, were the most common pathogens responsible for surgical site infections following emergency laparotomy. Understanding the microbiological spectrum of SSI is essential for guiding empirical antibiotic therapy and improving postoperative outcomes.

Keywords: Surgical Site Infection, Emergency Laparotomy, Wound Infection, Microbiological Profile, Escherichia Coli.

INTRODUCTION

Surgical site infections (SSI) represent a major postoperative complication and are responsible for significant patient morbidity and increased healthcare expenditure worldwide.[1] These infections may result in delayed wound healing, prolonged hospitalization, and increased use of antimicrobial therapy.

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According to the Centers for Disease Control and Prevention (CDC), surgical site infection is defined as an infection occurring at or near the surgical incision within 30 days after a surgical procedure or within one year if prosthetic material is implanted.[3] SSIs account for approximately 14–16% of hospital-acquired infections and nearly 38% of infections among surgical patients.[4]

The burden of SSI is particularly high in developing countries where limited resources, delayed patient presentation, and contaminated surgical procedures contribute to increased infection rates.[5] Studies have reported that the incidence of SSI following abdominal surgery ranges between 10% and 30%,

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with higher rates observed in emergency surgical procedures.[6]

Emergency laparotomy is commonly performed for conditions such as intestinal perforation, bowel obstruction, abdominal trauma, and generalized peritonitis. These conditions frequently involve contamination of the operative field with gastrointestinal flora, thereby increasing the risk of postoperative wound infection.[7,8]

Several factors influence the development of surgical site infection, including the degree of bacterial contamination, duration of surgery, tissue ischemia, hematoma formation, seroma accumulation, and the presence of subcutaneous dead space.[9] Accumulation of fluid within this dead space provides an ideal environment for bacterial proliferation and subsequent wound infection.[10]

The microorganisms responsible for SSI vary depending on the type of surgical procedure performed. In abdominal surgeries involving the gastrointestinal tract, gram-negative organisms such as *Escherichia coli*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa* are frequently isolated because of contamination from intestinal flora.[11,12]

Identification of the microbial spectrum responsible for surgical site infections is essential for selecting appropriate empirical antibiotic therapy and implementing effective infection control measures.[13] Moreover, knowledge of local microbiological patterns helps clinicians monitor changes in bacterial prevalence and antimicrobial resistance trends.[14]

Therefore, the present study was undertaken to evaluate the microbiological profile of organisms isolated from surgical site infections following emergency laparotomy in a tertiary care teaching hospital.

MATERIALS AND METHODS

Study Design: Prospective observational study.

Study Setting: Department of General Surgery,, SMBT Institute of Medical Sciences and Research Centre, Nashik, Maharashtra, India.

Study Duration: Two years.

Study Population: A total of 150 patients undergoing emergency laparotomy were included.

Inclusion Criteria

- Patients aged 20–60 years
- Patients undergoing emergency laparotomy

Exclusion Criteria

- Immunocompromised patients
- Patients with malignancy
- Patients receiving steroid therapy
- Pregnant women
- Patients with previous abdominal surgery

Data Collection: Patients were monitored postoperatively for clinical signs of surgical site infection including:

- Fever
- Wound discharge
- Redness around incision site
- Wound dehiscence

When infection was suspected, wound swabs were obtained under aseptic precautions and sent for microbiological culture and sensitivity testing.

Microbiological Analysis: Samples were cultured on standard bacteriological media and incubated under appropriate conditions. Identification of microorganisms was carried out using conventional microbiological techniques. Antibiotic susceptibility testing was performed according to standard laboratory guidelines.

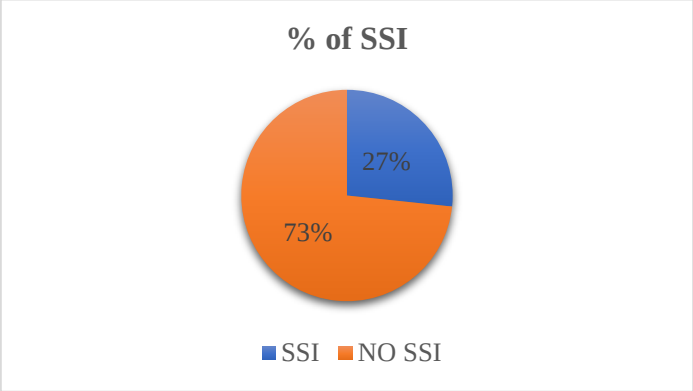
Statistical Analysis: Data were analyzed using descriptive statistical methods and expressed as frequencies and percentages.

RESULTS

Table 1. Percentage of SSI in Emergency Laparotomies

Total Laparotomies	**150**
SSI cases	40(26.7%):
No SSI	110(73.3%)

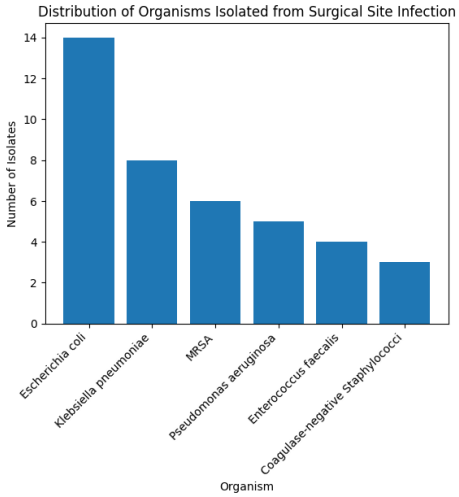
Incidence of Surgical Site Infection: Out of 150 patients undergoing emergency laparotomy, 40 patients developed surgical site infection, giving an overall SSI incidence of 26.7 %



Organisms Isolated from Surgical Site Infection

Table 2. % of Isolated Organisms from SSI

Organism	Number	Percentage
Escherichia coli	14	35%
Klebsiella pneumoniae	8	20%
MRSA	6	15%
Pseudomonas aeruginosa	5	12.5%
Enterococcus faecalis	4	10%
Coagulase-negative Staphylococci	3	7.5%
Total	**40**	**100%**



Gram Stain Distribution

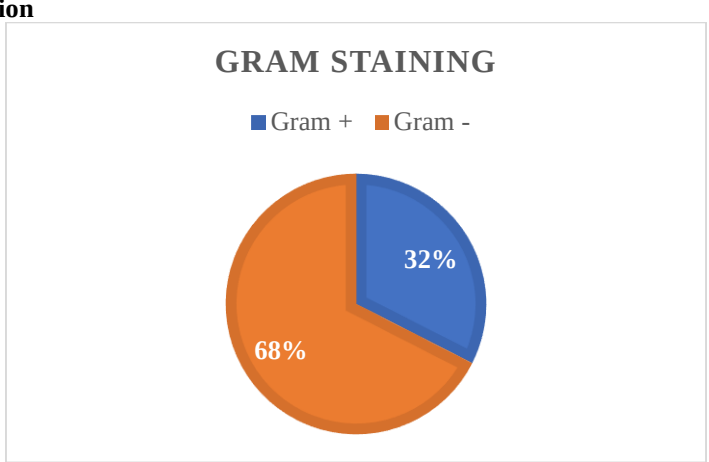


Table 3. Gram Staining Distribution

Gram-negative organisms	27 (67.5%)
Gram-positive organisms	13 (32.5%)

DISCUSSION

Surgical site infection remains one of the most important postoperative complications in abdominal surgery and contributes significantly to patient morbidity and healthcare costs.[15]

In the present study, the overall incidence of SSI was 26.7%, which is comparable with previous studies reporting infection rates ranging from 20% to 30% following emergency abdominal surgery.[16][17] Emergency laparotomy procedures frequently involve contamination of the surgical field due to intestinal perforation, bowel obstruction, or generalized peritonitis, which increases bacterial load within the wound and predisposes patients to postoperative infection.[18]

The microbiological profile observed in the present study demonstrated that Escherichia coli was the most frequently isolated organism, accounting for 35% of infections. This finding is consistent with previous studies where *E. coli* has been reported as the predominant pathogen in abdominal surgical site infections.[19]

Klebsiella pneumoniae was the second most commonly isolated organism followed by MRSA. The predominance of gram-negative enteric bacteria reflects contamination from gastrointestinal flora during emergency abdominal surgery.[20]

Overall, gram-negative organisms accounted for 67.5% of isolates in the present study. Similar observations have been reported by Kakati et al. and Khairy et al., where gram-negative organisms were the most common pathogens isolated from surgical site infections following abdominal surgery.[21][22]

Comparison with Other Studies: Several studies have reported similar findings regarding the predominance of gram-negative organisms in abdominal surgical site infections.

Study	Most Common Organism	SSI Rate
Kakati et al.	E. coli	24%
Khairy et al.	E. coli	22%
Shrestha et al.	E. coli	29%
Present study	E. coli	26.7%

This comparison highlights the consistency of *E. coli* as the leading pathogen in abdominal surgical site infections across different geographic regions.

The presence of MRSA in 15% of infections highlights the increasing importance of antibiotic-resistant organisms in hospital-acquired infections. Such infections are associated with increased treatment difficulty and prolonged hospital stay.[23]

Other organisms identified in the present study included *Pseudomonas aeruginosa*, *Enterococcus faecalis*, and coagulase-negative *Staphylococci*. These pathogens are often associated with hospital environments and may reflect postoperative wound care practices or prolonged hospitalization.[24]

The findings of the present study emphasize the importance of local microbiological surveillance in surgical patients. Knowledge of the prevailing bacterial pathogens assists clinicians in selecting appropriate empirical antibiotics and implementing effective infection control strategies.

CONCLUSION

Surgical site infection remains a common complication following emergency laparotomy. The present study demonstrated that gram-negative organisms, particularly *Escherichia coli*, were the predominant pathogens responsible for postoperative wound infections.

Understanding the microbiological spectrum of surgical site infections is essential for guiding empirical antimicrobial therapy and improving postoperative patient outcomes.

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