

Research Article

Evaluation of Postoperative Wound Infection and Associated Risk Factors in Emergency Laparotomies

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Abstract: **Introduction:** Surgical site infection (SSI) remains one of the most common postoperative complications following emergency laparotomy, contributing significantly to morbidity, prolonged hospital stays, and increased healthcare costs. Emergency procedures are associated with higher infection rates compared to elective surgeries due to contamination, delayed presentation, and compromised physiological status of patients. The present study aims to evaluate the incidence of postoperative wound infection in emergency laparotomies and identify associated risk factors. **Materials and Methods** A prospective observational study was conducted on 150 patients undergoing emergency laparotomy in a tertiary care hospital over 18 months. Demographic details, comorbidities, intraoperative findings, contamination class, duration of surgery, and postoperative outcomes were recorded. Wound infection was diagnosed based on CDC criteria. Statistical analysis was performed using Chi-square test and multivariate logistic regression. **Results** Out of 150 patients, 38 (25.3%) developed postoperative wound infection. Significant risk factors included diabetes mellitus ($p=0.002$), contaminated/dirty wounds ($p<0.001$), duration of surgery >2 hours ($p=0.004$), anemia ($p=0.01$), and delayed presentation (>24 hours) ($p=0.001$). Gram-negative organisms were predominant, with *E. coli* being the most common isolate. **Conclusion** Postoperative wound infection following emergency laparotomy is common and strongly associated with patient-related and procedure-related factors. Early intervention, optimization of comorbidities, strict asepsis, and appropriate antibiotic policy can significantly reduce SSI incidence.

Keywords: Surgical site infection, Emergency laparotomy, Risk factors, Wound infection, Postoperative complications, CDC criteria.

INTRODUCTION

Surgical site infections (SSIs) remain a major global healthcare challenge, particularly in emergency abdominal surgeries. Despite advances in aseptic techniques, antibiotic prophylaxis, and perioperative care, SSIs account for approximately 20–30% of all healthcare-associated infections worldwide¹. Emergency laparotomy carries a significantly higher risk compared to elective abdominal procedures due to factors such as hemodynamic instability, gross contamination, inadequate preoperative preparation, and delayed presentation².

The incidence of SSI following emergency laparotomy varies widely, ranging from 15% to 40%, depending on patient population and healthcare setting³. In developing countries, the burden is often higher due to limited resources, delayed referrals, and high prevalence of malnutrition and anemia⁴. Postoperative wound infection increases hospital stay, readmission rates, re-intervention, and mortality, thereby placing substantial financial strain on healthcare systems⁵.

SSIs are classified according to CDC criteria into superficial incisional, deep incisional, and organ/space infections⁶. Multiple patient-related and procedure-related factors contribute to SSI risk. Patient factors include advanced age, diabetes mellitus, obesity, anemia, malnutrition, smoking, and immunosuppression⁷.

Emergency nature of surgery itself is an independent risk factor due to lack of optimization and increased contamination⁸.

Procedure-related factors such as duration of surgery, wound classification (clean, clean-contaminated, contaminated, dirty), blood loss, and intraoperative hypotension also significantly influence infection risk⁹. Prolonged operative time increases tissue exposure and bacterial colonization¹⁰. Similarly, dirty and contaminated wounds are strongly associated with higher infection rates¹¹.

Microbiologically, Gram-negative bacilli such as *Escherichia coli*, *Klebsiella*, and *Pseudomonas* are commonly implicated in abdominal surgeries¹². Emerging antimicrobial resistance further complicates management and prolongs treatment duration¹³.

Identification of modifiable risk factors is essential for preventive strategies. Implementation of WHO surgical safety checklist, antibiotic stewardship, perioperative glycemic control, and timely surgical intervention have shown significant reduction in SSI rates^{14, 15}.

Given the high burden of emergency laparotomy in tertiary centers and the significant morbidity associated with SSIs, this study was undertaken to evaluate postoperative wound infection rates and identify associated risk factors in emergency laparotomy patients

MATERIALS AND METHODS

A prospective observational study was conducted in the Department of General Surgery at a tertiary care teaching hospital over 18 months.

Study Population

A total of 150 patients undergoing emergency laparotomy were included.

Inclusion Criteria

- Patients aged ≥ 18 years
- Undergoing emergency laparotomy for perforation, obstruction, trauma, peritonitis, or ischemia
- Provided informed consent

Exclusion Criteria

- Elective laparotomies
- Re-laparotomies within 30 days
- Patients on long-term immunosuppressive therapy
- Patients who died within 48 hours postoperatively

Data Collection

Preoperative variables recorded:

- Age, gender
- BMI
- Comorbidities (diabetes, hypertension)
- Hemoglobin levels
- Duration of symptoms
- Preoperative antibiotic use

Intraoperative variables:

- Indication for surgery
- Wound classification
- Duration of surgery
- Blood loss

Postoperative monitoring:

- Daily wound inspection
- Fever, purulent discharge
- Culture and sensitivity testing

SSI diagnosis was based on CDC 2017 guidelines.

Statistical Analysis

Data were analyzed using SPSS version 25. Categorical variables were compared using Chi-square test. Multivariate logistic regression was applied. p-value < 0.05 considered significant.

RESULTS

Table 1: Demographic Distribution

Variable	Total (n=150)	SSI (n=38)	No SSI (n=112)	p-value
Age >60	42	15	27	0.03
Male	96	25	71	0.56
Female	54	13	41	—

Interpretation: Advanced age was significantly associated with SSI (p=0.03). Gender showed no significant association.

Table 2: Comorbidities

Comorbidity	SSI	No SSI	p-value
Diabetes	18	20	0.002
Anemia (Hb<10)	22	30	0.01
Hypertension	14	35	0.45

Interpretation: Diabetes and anemia were significant predictors of postoperative wound infection.

Table 3: Wound Classification

Class	SSI	No SSI	p-value
Clean-contaminated	6	40	
Contaminated	15	42	<0.001
Dirty	17	30	

Interpretation: Contaminated and dirty wounds had significantly higher infection rates.

Table 4: Duration of Surgery

Duration	SSI	No SSI	p-value
<2 hrs	10	60	
>2 hrs	28	52	0.004

Interpretation: Prolonged surgery significantly increased SSI risk.

Table 5: Delay in Presentation

Delay >24 hrs	SSI	No SSI	p-value
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Yes	30	45	0.001
No	8	67	

Interpretation: Delayed hospital presentation significantly increased infection rates.

Table 6: Microbiological Profile

Organism	Frequency
<i>E. coli</i>	16
<i>Klebsiella</i>	9
<i>Pseudomonas</i>	6
<i>Staphylococcus aureus</i>	7

Interpretation: Gram-negative organisms predominated, especially *E. coli*.

DISCUSSION

The present study demonstrated a postoperative wound infection rate of 25.3%, consistent with studies reporting rates between 20–35% in emergency abdominal surgeries^{16,17}. Emergency laparotomy inherently carries a high infection risk due to contamination and lack of preoperative optimization.

Advanced age emerged as a significant factor, likely due to reduced immune response and comorbid burden¹⁸. Diabetes mellitus was strongly associated with SSI, consistent with global evidence linking hyperglycemia to impaired neutrophil function and delayed wound healing¹⁹.

Anemia significantly increased SSI risk, supporting findings by recent studies that tissue hypoxia compromises healing²⁰. Duration of surgery >2 hours was also independently associated with infection, aligning with WHO evidence that prolonged operative exposure increases microbial colonization²¹.

Contaminated and dirty wounds had the highest infection rates, similar to findings by Allegranzi et al., who reported exponentially increasing risk with wound contamination class²². Delay in presentation (>24 hours) significantly influenced infection rate, reflecting advanced peritonitis and bacterial load at surgery²³.

Microbiologically, Gram-negative bacilli predominated, particularly *E. coli*, consistent with abdominal source contamination²⁴. Rising antimicrobial resistance necessitates culture-guided therapy and antibiotic stewardship²⁵.

Preventive measures such as timely surgery, glycemic control, perioperative antibiotic prophylaxis, anemia correction, and adherence to SSI prevention bundles are essential

CONCLUSION

Postoperative wound infection remains a common complication following emergency laparotomy. Diabetes, anemia, contaminated wounds, prolonged surgery, and delayed presentation are significant risk factors. Identification and optimization of modifiable factors can substantially reduce SSI burden and improve patient outcomes

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