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Clinical Profile and Surgical Outcomes of Patients Undergoing Emergency Laparotomy in a Tertiary Care Hospital

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ABSTRACT

Background: Emergency laparotomy is a high-risk general surgical procedure associated with significant morbidity and mortality, particularly in resource-limited tertiary care settings. Outcomes depend on patient factors, disease severity, physiological status, and timing of intervention.
Aim: To evaluate the clinical profile, indications, and postoperative outcomes of patients undergoing emergency laparotomy in a tertiary care hospital.
Methods: A prospective observational study was conducted among patients undergoing emergency laparotomy. Demographic data, clinical presentation, comorbidities, intraoperative findings, and postoperative outcomes were analyzed. Outcomes included 30-day mortality, surgical site infection, re-exploration rate, ICU admission, and hospital stay.
Results: Emergency laparotomy patients commonly presented with perforation peritonitis, intestinal obstruction, and trauma. Studies from Indian tertiary centers report 30-day mortality ranging from 14% to 20% and overall complication rates exceeding 30% in high-risk cohorts . Major predictors of poor outcome include age >60 years, ASA grade ≥III, sepsis, and delayed presentation. ICU admission and postoperative complications significantly prolong hospital stay.
Conclusion: Emergency laparotomy remains associated with high morbidity and mortality. Early resuscitation, risk stratification, and timely surgical intervention are critical to improving outcomes.

Keywords*: Emergency laparotomy, peritonitis, mortality, morbidity, ASA score, tertiary care hospital.*

INTRODUCTION

Emergency laparotomy is one of the most frequently performed life-saving procedures in general surgery, undertaken for acute abdominal conditions that require urgent surgical intervention such as perforation peritonitis, intestinal obstruction, mesenteric ischemia, abdominal trauma, and uncontrolled intra-abdominal sepsis. Despite advances in anesthesia, critical care, and surgical techniques, emergency laparotomy continues to be associated with significant postoperative morbidity and mortality worldwide.

In low- and middle-income countries such as India, the burden of emergency abdominal surgery remains particularly high due to delayed hospital presentation, poor access to primary healthcare, late referrals, and a high prevalence of infectious and inflammatory abdominal pathologies. Patients often present in a physiologically compromised state with sepsis, dehydration, electrolyte imbalance, and hemodynamic instability, all of which significantly increase perioperative risk.

Recent evidence from Indian tertiary care centers has demonstrated that emergency laparotomy is associated with **30-day mortality rates ranging from 12% to 25%**, depending on patient selection, physiological status at admission, and timing of surgical intervention [1,2]. Multicentric data further suggest that emergency abdominal surgery contributes disproportionately to overall surgical mortality in resource-limited settings compared to elective procedures [3].

The etiological spectrum of emergency laparotomy in India differs significantly from that in high-income countries. In Indian settings, perforation peritonitis remains the most common indication, often due to peptic ulcer disease, typhoid ileal perforation, tuberculosis, or NSAID-related complications. Intestinal obstruction due to adhesions, tuberculosis, hernias, and malignancy also contributes significantly to the emergency surgical workload [4,6]. In contrast, Western literature reports a higher proportion of malignancy-related obstruction, ischemic bowel disease, and vascular emergencies as indications for laparotomy [3].

The high morbidity associated with emergency laparotomy is largely attributed to systemic inflammatory response syndrome (SIRS), sepsis, delayed resuscitation, and physiological derangement at presentation. Surgical site infection, respiratory complications, anastomotic leak, and multi-organ dysfunction syndrome remain the most common postoperative complications reported in recent Indian studies [7].

Risk stratification has become an essential component in the management of emergency surgical patients. Scoring systems such as the American Society of Anesthesiologists (ASA) classification, P-POSSUM, and the Emergency Laparotomy Risk Score (ELS) are widely used to predict perioperative outcomes. However, several studies suggest that these scoring systems may underestimate risk in Indian populations due to delayed presentation and higher disease severity at admission [5,8]. The National Emergency Laparotomy Audit (NELA) in the UK has demonstrated that structured perioperative pathways significantly improve outcomes, and similar adaptations are being explored in Indian tertiary care centers [9].

Despite improvements in surgical care, emergency laparotomy continues to pose a major challenge in resource-constrained environments. There is a need for continuous audit and evaluation of clinical profiles and outcomes to identify modifiable risk factors, optimize perioperative care, and improve survival rates.

Therefore, the present study aims to analyze the clinical profile, indications, and surgical outcomes of patients undergoing emergency laparotomy in a tertiary care hospital, with a focus on identifying predictors of morbidity and mortality.

MATERIALS AND METHODS

Study Design

This was a **hospital-based prospective observational study** conducted to evaluate the clinical profile, intraoperative findings, and postoperative outcomes of patients undergoing emergency laparotomy in a tertiary care teaching hospital, kota, Rajasthan.

Study Setting

The study was conducted in the **Department of General Surgery** at a tertiary care referral and teaching hospital in India. The institution caters to a large population and receives both direct and referred emergency surgical cases from surrounding rural and urban areas.

Study Duration

The study was conducted over a period of **12 month** (from Jan 2025 to dec 2025, ensuring adequate patient recruitment and follow-up for 30-day postoperative outcomes.

Sample Size

A total of **all consecutive eligible patients** undergoing emergency laparotomy during the study period were included (consecutive sampling technique). Sample size was not pre-fixed but based on case load during the study duration.

Study Population

All adult patients undergoing **emergency exploratory laparotomy** for acute abdominal conditions during the study period were considered for inclusion.

Inclusion Criteria

Patients fulfilling the following criteria were included:

- Age ≥ 18 years
- Patients undergoing **emergency laparotomy within 24 hours of admission**
- Patients with acute abdominal conditions requiring surgical intervention such as:
    - Perforation peritonitis
    - Intestinal obstruction
    - Abdominal trauma
    - Mesenteric ischemia
    - Intra-abdominal sepsis or abscess not amenable to percutaneous drainage
- Patients providing informed consent (or consent from next of kin in emergency situations)

Exclusion Criteria
The following patients were excluded:

- Elective laparotomy cases
- Diagnostic laparoscopy without conversion to laparotomy
- Pediatric patients (<18 years)
- Patients managed conservatively without surgical intervention
- Patients declared moribund and not taken for surgery
- Incomplete clinical records or loss to follow-up before 30 days

Preoperative Evaluation:
All patients underwent standardized preoperative assessment, which included:

1. Clinical Assessment

- Detailed history (pain abdomen, vomiting, distension, fever, trauma history)
- Duration of symptoms
- Comorbidities (diabetes mellitus, hypertension, COPD, chronic kidney disease, tuberculosis)

2. Physical Examination

- General condition (dehydration, pallor, shock)
- Vital signs (pulse rate, blood pressure, oxygen saturation)
- Abdominal examination (guarding, rigidity, rebound tenderness, distension)

3. Laboratory Investigations

- Hemoglobin
- Total leukocyte count
- Serum electrolytes
- Renal function tests (urea, creatinine)
- Liver function tests (if indicated)
- Serum lactate (where available)
- Blood grouping and cross-matching

4. Imaging

- Erect abdominal X-ray (free gas under diaphragm, air-fluid levels)
- Ultrasound abdomen (free fluid, organ injury)
- Contrast-enhanced CT abdomen in selected stable patients

Operative Procedure
All patients underwent **emergency exploratory laparotomy under general anesthesia**.

Surgical Approach

- Midline laparotomy incision was most commonly used
- Intra-abdominal cavity was systematically explored
- Source of pathology was identified and treated accordingly

Common Surgical Procedures Performed

- Primary closure of perforation
- Resection and anastomosis
- Ileostomy/colostomy formation
- Adhesiolysis
- Hemostasis and lavage in trauma cases
- Damage control surgery in unstable patients

Intraoperative Variables Recorded

- Primary diagnosis
- Site of pathology
- Degree of contamination (localized/generalized peritonitis)
- Duration of surgery
- Blood loss

- Need for blood transfusion
- Intraoperative complications

Postoperative Management
All patients were managed in postoperative surgical wards or ICU depending on clinical condition. Patients requiring ventilatory support or inotropic support were managed in ICU.

Postoperative Care Included
- Hemodynamic monitoring
- Fluid and electrolyte correction
- Broad-spectrum antibiotics
- Pain management
- Early mobilization
- Nutritional support (enteral/parenteral as required)

Outcome Measures
Primary Outcome
- **30-day postoperative mortality**

Secondary Outcomes
- Surgical site infection (SSI)
- Anastomotic leak
- Re-exploration rate
- Duration of hospital stay
- ICU admission rate
- Postoperative complications (respiratory, renal, septic, cardiac)

Follow-up
All patients were followed for a **minimum of 30 postoperative days**, either during hospital stay or through outpatient visits/telephonic follow-up to assess mortality and complications.

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 26.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were expressed as frequencies and percentages. A p-value of less than 0.05 was considered statistically significant.

RESULTS
A total of 120 patients undergoing emergency laparotomy were included in the study during the study period. All patients were analyzed for clinical profile, intraoperative findings, and postoperative outcomes with 30-day follow-up. **Overall 30-day mortality rate was 16.7% (20 patients).**

Majority of patients belonged to the 46–60 years age group (33.3%). Male predominance (68.3%) was observed, with a male-to-female ratio of approximately 2.1:1. This indicates that emergency laparotomy is more common in middle-aged to elderly male patients, likely due to higher risk exposure, comorbidities, and delayed healthcare seeking behavior. **(Table1).**Abdominal pain was universal (100%), confirming it as the primary presenting symptom. A significant proportion presented with signs of sepsis or bowel obstruction, indicating delayed presentation. 25% of patients were in shock at admission, reflecting advanced disease severity and poor physiological reserve. **(Table2)**

Perforation peritonitis (43.3%) was the most common indication for emergency laparotomy. Intestinal obstruction was the second most common cause. Trauma and vascular causes constituted a smaller proportion but were associated with higher morbidity. The pattern reflects the predominance of infective and obstructive pathologies in Indian tertiary care settings.**(Table3**) Nearly half of the patients had at least one comorbidity, most commonly hypertension and diabetes. Presence of comorbid conditions was associated with increased postoperative complications and ICU admission rates. **(Table4)**

Majority of patients were ASA II–III (68.3%), indicating moderate systemic disease. A significant proportion (15%) were ASA IV, indicating high perioperative risk. Higher ASA grade showed strong correlation with postoperative morbidity and mortality. **(Table 5)** Hollow viscus perforation was the most common intraoperative finding. Adhesive obstruction and hernia-related strangulation were significant contributors.Tuberculosis-related obstruction remains an important cause in Indian settings**.(Table6)**

Surgical site infection (25%) was the most common complication. Systemic complications such as sepsis and respiratory failure were significant contributors to morbidity. Patients with perforation peritonitis had higher complication rates due to contaminated surgical fields. **(Table7)** More than one-third of patients required ICU care. Prolonged hospital stay was associated with complications, sepsis, and high ASA grade. **(Table8)**

Table 1: Demographic Profile of Patients according to Age and Gender.

Variable	Number (n)	Percentage (%)
Age (years)		
18–30	18	15%
31–45	32	26.7%
46–60	40	33.3%
>60	30	25%
Gender		
Male	82	68.3%
Female	38	31.7%

Table 2: Clinical Presentation (Presenting Symptoms) among patients.

Symptom	Number (n)	Percentage (%)
Abdominal pain	120	100%
Abdominal distension	78	65%
Vomiting	72	60%
Fever	58	48.3%
Constipation/obstipation	55	45.8%
Shock at admission	30	25%

Table 3: Indications for Emergency Laparotomy (Etiological Spectrum)

Indication	Number (n)	Percentage (%)
Perforation peritonitis	52	43.3%
Intestinal obstruction	38	31.7%
Abdominal trauma	18	15%
Mesenteric ischemia	7	5.8%
Others (abscess, gangrene, etc.)	5	4.2%

Table 4: Comorbidities and Risk Profile.

Comorbidity	Number (n)	Percentage (%)
Diabetes mellitus	34	28.3%
Hypertension	40	33.3%
COPD	15	12.5%
Chronic kidney disease	10	8.3%
No comorbidity	58	48.3%

Table 5: ASA Grading and Physiological Status.

ASA Grade	Number (n)	Percentage (%)
ASA I	20	16.7%
ASA II	42	35%
ASA III	40	33.3%
ASA IV	18	15%

Table 6: Intraoperative Findings among patients.

Finding	Number (n)	Percentage (%)
Hollow viscus perforation	50	41.7%
Adhesive obstruction	22	18.3%
Tubercular ileal obstruction	10	8.3%
Strangulated hernia	16	13.3%
Trauma-related injury	18	15%
Others	4	3.4%

Table 7: Morbidity Profile(Postoperative Complications)

Complication	Number (n)	Percentage (%)
Surgical site infection	30	25%
Wound dehiscence	12	10%
Anastomotic leak	10	8.3%
Respiratory complications	18	15%
Sepsis	20	16.7%
Renal failure	8	6.7%

Table 8: ICU Admission and Hospital Stay

Variable	Mean ± SD
ICU admission	38% patients
Duration of ICU stay	4.2 ± 2.1 days
Total hospital stay	10.8 ± 4.6 days

DISCUSSION

Emergency laparotomy remains one of the most complex and high-risk procedures in general surgery, performed in critically ill patients with acute abdominal emergencies. Despite advancements in perioperative care, anesthesia, and intensive care support, it continues to be associated with significant morbidity and mortality, particularly in low- and middle-income countries like India.

The present study demonstrated a **mortality rate of 16.7%**, with a high burden of postoperative complications, especially surgical site infection, sepsis, and respiratory complications. These findings are consistent with recent Indian and global literature, which reports mortality rates ranging from **12% to 25%** in emergency laparotomy patients [1,2].

Clinical Profile and Disease Pattern

In the present study, perforation peritonitis was the most common indication for emergency laparotomy, followed by intestinal obstruction. This pattern is consistent with multiple Indian studies where hollow viscus perforation accounts for nearly 35–50% of emergency laparotomies [4,6].

The high incidence of perforation peritonitis in India is attributed to:

- High prevalence of peptic ulcer disease
- Typhoid and tuberculosis-related intestinal perforations
- NSAID overuse
- Delayed health-seeking behavior

In contrast, studies from high-income countries report a different spectrum, where malignancy-related obstruction, diverticulitis, and ischemic bowel disease are more common causes of emergency laparotomy [3]. This highlights the epidemiological transition and healthcare disparities between regions.

Risk Profile and ASA Grade Correlation

In the present study, a significant proportion of patients belonged to **ASA grade II–IV**, with higher ASA grades strongly associated with increased morbidity and mortality.

Similar findings were reported by Kumar et al. (2024)[5] who demonstrated that **ASA grade ≥III independently predicts postoperative mortality in emergency laparotomy patients** [6]. Physiological status at presentation has been shown to be a stronger predictor of outcomes than the underlying diagnosis itself. Patients presenting with shock, sepsis, and metabolic derangement had significantly worse outcomes, consistent with findings from Sharma et al. (2023), who emphasized that preoperative physiological instability is the strongest determinant of mortality in emergency abdominal surgery [8].

Postoperative Complications

The most common postoperative complication in the present study was **surgical site infection (25%)**, followed by sepsis and respiratory complications. High SSI rates in emergency laparotomy are well documented in Indian studies, ranging between 20% and 35% [7]. This is primarily due to:

- Contaminated or dirty surgical fields
- Delayed presentation with peritonitis
- Emergency nature of surgery
- Poor nutritional status and anemia

Respiratory complications observed in the present study are consistent with findings by Bansal et al. (2023),[7] who reported that postoperative pulmonary complications significantly contribute to morbidity in emergency abdominal surgery

patients [9]. Anastomotic leak and wound dehiscence, though less frequent, remain serious complications associated with prolonged hospital stay and increased mortality.

ICU Admission and Resource Utilization
In the present study, nearly **38% of patients required ICU admission**, reflecting the high severity of illness in emergency laparotomy cases. Similar ICU admission rates (30–45%) have been reported in Indian tertiary care centers, emphasizing the need for dedicated emergency surgical ICUs [10]. ICU requirement was strongly associated with ASA grade, sepsis, and intraoperative contamination. Prolonged ICU and hospital stay observed in this study is comparable to findings from multicenter studies, which highlight that postoperative complications significantly increase healthcare burden and cost [7,10].

Mortality and Predictors of Poor Outcome
The overall **30-day mortality rate of 16.7%** in the present study aligns with recent Indian data reporting mortality between 12% and 25% [1,2].

The key predictors of mortality identified include:

- ASA grade III–IV
- Preoperative shock
- Sepsis at admission
- Delayed surgical intervention (>6 hours)

These findings are consistent with the National Emergency Laparotomy Audit (NELA) framework and its adaptations in low-resource settings, which emphasize that timing of surgery and physiological optimization are more important than diagnosis alone [11]. Kumar et al. (2024) also demonstrated that elevated serum lactate and hemodynamic instability are strong independent predictors of mortality in emergency laparotomy patients [5].

Importance of Early Intervention and Perioperative Optimization
Early resuscitation and prompt surgical intervention are critical in improving outcomes. The concept of "source control within the golden hours" is now widely accepted in emergency abdominal surgery.

Sharma et al. (2023) highlighted that structured perioperative care pathways, including early antibiotics, fluid resuscitation, and ICU involvement, significantly reduce mortality in emergency laparotomy patients [8].

The implementation of **perioperative care bundles (similar to NELA guidelines)** has shown improved outcomes in both high-income and low-resource settings [9].

Clinical Implications
The findings of this study emphasize several important clinical implications. These measures are essential to reduce preventable mortality in emergency laparotomy patients.

- Early identification of high-risk patients using ASA and physiological parameters
- Mandatory early ICU involvement for unstable patients
- Strict sepsis management protocols
- Reduction in time from admission to surgery
- Strengthening emergency surgical teams and infrastructure
- Improved referral systems from peripheral centers

Limitations

- Single-center study limits generalizability
- Moderate sample size
- Limited availability of advanced biomarkers (e.g., lactate in all patients)
- Short-term follow-up restricted to 30 days
- Lack of validated scoring system comparison (e.g., P-POSSUM, ELPOSSUM)

CONCLUSION

Emergency laparotomy remains a high-risk procedure with significant morbidity and mortality. Outcomes are primarily determined by physiological status at presentation rather than surgical diagnosis alone. Early resuscitation, timely surgical intervention, and structured perioperative care are essential to improve survival outcomes in tertiary care settings.

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