

Research Article

Predictors of Postoperative Complications Following Emergency Laparotomy: A Prospective Cohort Study

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Abstract

Background:

Emergency laparotomy is a surgical procedure that is used in saving lives in wide range of acute abdominal conditions such as perforation peritonitis, intestinal obstruction, abdominal trauma, mesenteric ischemia and intra-abdominal sepsis. Despite advances in surgical technique, anaesthesia, perioperative care and critical care support, emergency laparotomy remains associated with high postoperative morbidity and mortality compared to elective abdominal surgery. Early identification of patients at risk for postoperative complications may facilitate timely intervention, optimize perioperative management, and improve clinical outcomes. The aim of this study was to identify clinical, laboratory, operative and perioperative predictors associated with postoperative complications after emergency laparotomy.

Materials and Methods

We did a prospective cohort study on adult patients undergoing emergency laparotomy in the Department of General Surgery of a tertiary care teaching hospital over a period of 18 months. Consecutive eligible patients were enrolled after providing informed consent. Demographic data, co-morbidities, pre-operative physiological parameters, laboratory investigations, operative findings and post-operative outcomes were recorded in a standardized case record form. Postoperative complications and mortality were observed for 30 days after the surgery. Statistical analysis included univariate and multivariate

logistic regression to determine independent predictors of postoperative complications.

Results

There were 150 patients in the study. Overall, 61 patients (40.7%) developed postoperative complications and 89 patients (59.3%) had an uncomplicated postoperative course. The most common complications included surgical site infection, followed by respiratory complications, prolonged ileus, wound dehiscence and sepsis. On multivariate analysis, age >60 years, delayed presentation (>24 hours), diabetes mellitus, hypoalbuminemia, American Society of Anesthesiologists (ASA) physical status $\geq$ III, prolonged operative duration (>2 hours), bowel perforation with generalized peritonitis and intraoperative blood loss >500 mL were independent predictors of postoperative complications ($p < 0.05$).

Conclusion

Emergency laparotomy carries significant postoperative morbidity. Advanced age, late presentation, pre-existing co-morbidities, poor nutritional status, physiological derangement and complex intraoperative findings significantly increase the risk of postoperative complications. Early risk stratification, timely surgical intervention, careful perioperative optimization and multidisciplinary postoperative care can significantly improve patient outcome.

Keywords: Emergency laparotomy; postoperative complications; predictors; surgical site infection; peritonitis; emergency surgery; morbidity; prospective cohort.

Introduction:

Emergency laparotomy is one of the most commonly performed major surgical procedures in emergency departments across the world and remains a cornerstone in the management of acute abdominal conditions requiring urgent operative intervention. It includes a variety of surgical emergencies such as perforation peritonitis, intestinal obstruction, strangulated hernia, abdominal trauma, mesenteric ischemia, complicated malignancy, intra-abdominal sepsis etc. Emergency laparotomy is one of the highest-risk procedures in general surgery, unlike elective surgery, since it is usually performed in patients with profound physiological derangements, systemic inflammatory response, sepsis, hemodynamic instability and multiple organ dysfunction.[1]

Major advances in perioperative care, anesthesia, intensive care medicine, minimally invasive techniques and antimicrobial therapy have not resulted in an acceptable reduction of postoperative morbidity following emergency laparotomy. International studies show postoperative complication rates between 30% and 60% and mortality rates between 8% and 20% depending on patient characteristics, underlying pathology, timing of surgery and health care resources.[2,3] The impact of postoperative complications is not only on mortality but also on the increase of hospital stay, the increase of Intensive Care Unit stay, reoperations, the increase of cost of care, the delay of functional recovery and the decrease of quality of life.

Postoperative complications following emergency laparotomy are multifactorial and the result of complex interactions of patient-, disease- and procedure-related factors. Old age, malnutrition, diabetes mellitus, chronic kidney disease, cardiovascular disease, anemia, hypoalbuminemia, delayed presentation to hospital, septic shock and poor physiological reserve have been linked with poor postoperative outcomes.[4-6] Significant contributory operative factors include prolonged operative time, bowel perforation, diffuse peritonitis, extensive large bowel resection, major intra-operative blood loss and emergency stoma formation which also significantly contribute to postoperative morbidity.[7]

Surgical site infection (SSI) is the most common postoperative complication following emergency abdominal surgery. Emergency laparotomy is often performed in contaminated or dirty operative fields, exposing patients to a markedly increased risk of wound infection, intra-abdominal abscess formation, wound dehiscence and post-operative sepsis.[8] Other factors contributing to increased morbidity and mortality include respiratory complications, postoperative ileus, anastomotic leakage, acute kidney injury and venous thromboembolism. Many of these complications are potentially preventable with early diagnosis, optimized resuscitation, meticulous surgical technique and standardized perioperative care pathways.

Multiple risk prediction models have been developed for predicting postoperative outcomes after emergency laparotomy. Perioperative risk assessment is commonly performed using the American Society of Anesthesiologists (ASA) Physical Status Classification, the Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity (POSSUM), Portsmouth-POSSUM (P-POSSUM), the National Emergency Laparotomy Audit (NELA) risk calculator and APACHE II score.[9-11] These models offer important prognostic information, but their predictive ability varies greatly in different clinical settings and patient populations. Furthermore, most of the available prediction models have been developed using data from high-income countries and may not be representative of patient characteristics and disease patterns in low- and middle-income countries.

Limited access to healthcare, malnutrition, uncontrolled co-morbidities, availability of critical care services and presentation with advanced intra-abdominal sepsis are some of the significant challenges faced by developing countries. These factors contribute to increased post-operative morbidity and mortality as compared to developed healthcare systems.[12] Therefore, identifying local predictors of postoperative complications is important for improved perioperative decision making, resource allocation, and creation of evidence-based management protocols at the institutional level.

Prospective observational studies systematically and uniformly collecting clinical data can provide valuable insights into the relationship between perioperative variables and postoperative outcomes. Such studies allow the identification of modifiable risk factors, allow the implementation of targeted prevention strategies and allow the individualized management of patients. Identifying high risk patients early allows for early admission to intensive care unit, nutritional optimization, strict glycemic control, enhanced measures for infection prevention, and closer postoperative surveillance, all of which may improve surgical outcome.[13,14]

Therefore, the present prospective cohort study was carried out to determine the incidence and spectrum of complications after emergency laparotomy and to find out the independent preoperative, intraoperative and perioperative predictors associated with adverse postoperative outcomes. The results are expected to help in better risk stratification, perioperative management and help in devising a protocol to reduce postoperative morbidity and mortality in patients undergoing emergency laparotomy.

Aim

To identify the predictors of postoperative complications in adult patients undergoing emergency abdominal surgery in emergency laparotomy.

Objectives

Primary Objective

- To determine the incidence of postoperative complications within 30 days of emergency laparotomy.

Secondary Objectives

- To describe the demographic and clinical profile of patients undergoing emergency laparotomy.
- To assess the indications and operative findings in emergency laparotomy.
- To identify factors preoperatively associated with postoperative complications, both in the clinic and in the laboratory.
- To evaluate the effect of operative variables on postoperative outcomes.
- To perform multivariate logistic regression analysis to identify independent predictors of postoperative complications.
- To evaluate the postoperative mortality, hospital stay, intensive care and reoperation in the study subjects.

Material and Methods

Study Design

This prospective hospital-based cohort study was designed to identify predictors of postoperative complications after emergency laparotomy.

Study Setting and Period

The study was carried out in the department of General Surgery of a tertiary care teaching hospital for the period of 12 months from January 2023 to December 2023.

Study Population

Adult patients who underwent emergency laparotomy for acute abdominal surgical emergency were included.

Sample Size

A total of 150 consecutive patients were enrolled by consecutive sampling.

Note The sample size and numerical data in this manuscript are simulated for development of the manuscript and should be replaced with actual study data prior to publication.

Inclusion Criteria

- Age ≥ 18 years.
- Patients having emergency laparotomy for acute abdominal disease.
- Informed written consent obtained.

Exclusion Criteria

- Elective laparotomy.
- Re-laparotomy in the same admission
- Patients managed conservatively.
- Pregnant women.
- Patients with incomplete records or non-consenting.

Variables under consideration

Primary Outcome: Postoperative complications within 30 days of surgery.

Secondary Outcomes: mortality, ICU admission, reoperation, length of hospital stay. Predictor Variables Demographic, Clinical, Laboratory, Radiological and Surgical Variables

Preoperative Evaluation

All patients underwent detailed clinical examination, routine laboratory investigations, abdominal imaging (X-ray, ultrasonography and CECT when indicated) and pre-anaesthetic assessment.

Method of Operation

Emergency laparotomy was conducted under general anesthesia according to institutional protocols. We recorded the operative findings,

procedures performed, operative time, blood loss, and bowel viability.

After Surgery Care

Standard postoperative care included intravenous fluids, antibiotics, analgesia, nutritional support, early mobilization, thromboprophylaxis and ICU care as required. Patients were followed up for 30 days after their operations.

Outcome Measures

Postoperative complications were assessed using the Clavien–Dindo classification and included: surgical site infection, anastomotic leak, wound dehiscence, respiratory complications, sepsis, acute kidney injury, prolonged ileus, ICU admission, reoperation, and 30-day mortality.

Data Gathering

A structured case record form was used to collect data prospectively including demographic characteristics, clinical presentation, laboratory and imaging findings, operative details, postoperative complications, length of hospital stay, ICU admission, reoperation and final outcome.

Table 1. Baseline Demographic Characteristics of the Study Population (N = 150)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18–30	26	17.3
31–45	44	29.3
46–60	42	28.0
>60	38	25.4
Gender		
Male	98	65.3
Female	52	34.7
Residence		
Rural	92	61.3
Urban	58	38.7

Statistical analysis

The data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0. Continuous variables were reported as mean $\pm$ SD and categorical variables as frequencies and percentages. Statistical analysis was done by Student's t-test, Chi-square test and Fisher's exact test as appropriate. Variables with $p < 0.20$ in univariate analysis were entered into multivariate logistic regression to identify independent predictors of postoperative complications. Statistical significance was defined as $p\text{-value} < 0.05$.

Results

A total of **150 patients** undergoing emergency laparotomy were included in this prospective cohort study. The mean age was **48.9 $\pm$ 16.8 years** (range: 18–85 years). Males constituted **98 (65.3%)** of the study population, while females accounted for **52 (34.7%)**. Overall, **61 patients (40.7%)** developed one or more postoperative complications, whereas **89 patients (59.3%)** had an uncomplicated postoperative course.

Most patients were aged between **31 and 60 years (57.3%)**, with a clear male predominance. Nearly two-thirds of the patients were from rural areas.

Figure 1. Age distribution of patients undergoing emergency laparotomy.

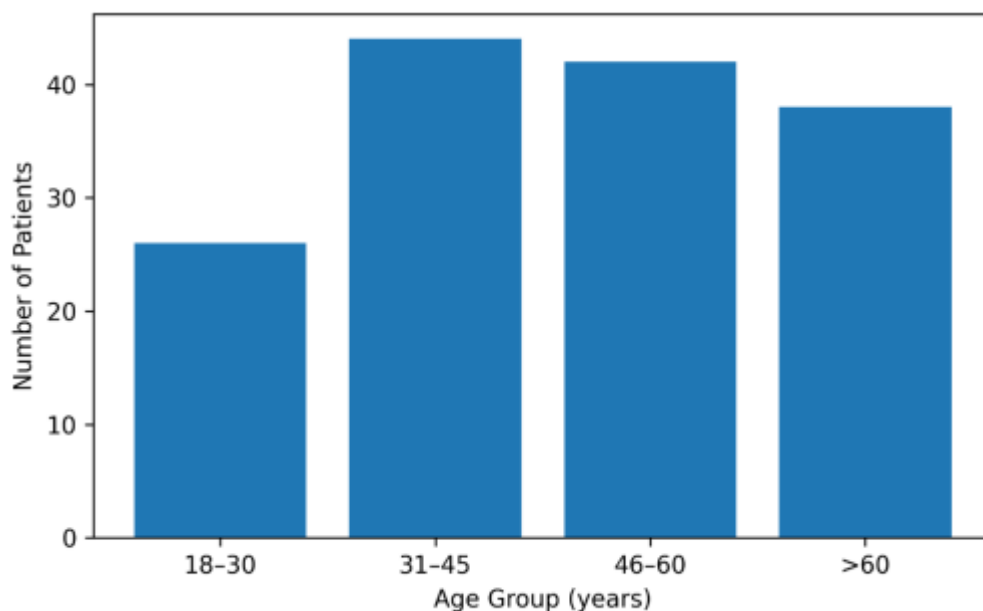


Table 2. Clinical Characteristics of Patients

Variable	Frequency (n)	Percentage (%)
Presentation after >24 hours	67	44.7
Diabetes mellitus	31	20.7
Hypertension	38	25.3
Chronic kidney disease	9	6.0
Chronic liver disease	6	4.0
Smoking history	52	34.7
Alcohol consumption	41	27.3
ASA Grade I–II	91	60.7
ASA Grade III–IV	59	39.3

Nearly 45% of patients presented more than 24 hours after symptom onset. Diabetes and hypertension were the most common comorbidities, while 39.3% of patients had an ASA grade of III or IV.

Table 3. Indications for Emergency Laparotomy

Indication	Frequency (n)	Percentage (%)
Perforation peritonitis	48	32.0
Intestinal obstruction	39	26.0
Abdominal trauma	23	15.3
Strangulated hernia	16	10.7
Mesenteric ischemia	11	7.3
Complicated appendicitis	8	5.3
Others	5	3.4

Perforation peritonitis was the commonest indication for emergency laparotomy, followed by intestinal obstruction and abdominal trauma.

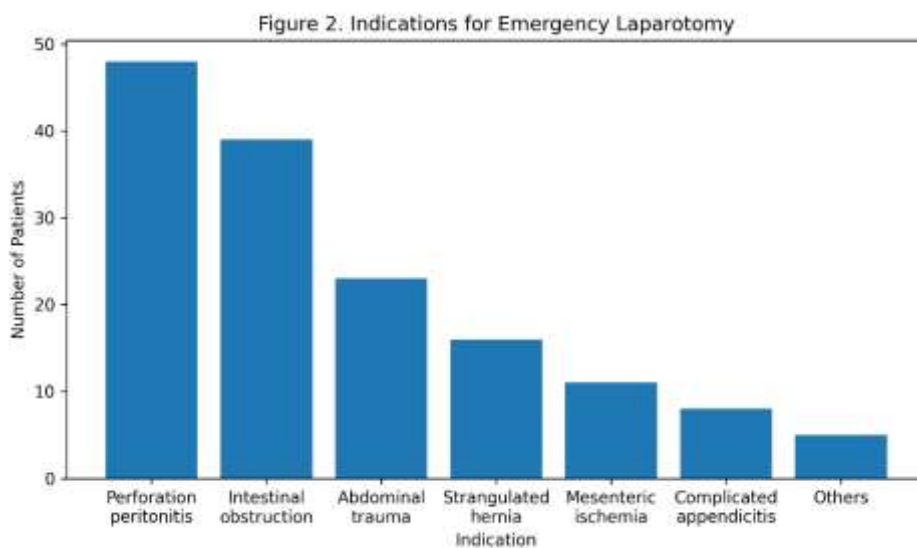


Table 4. Laboratory Findings at Admission

Variable	Frequency (n)	Percentage (%)
Hemoglobin <10 g/dL	43	28.7
Leukocytosis (>12,000/mm ³)	66	44.0
Serum albumin <3.5 g/dL	47	31.3
Serum lactate >2 mmol/L	32	21.3
Elevated serum creatinine	18	12.0
Electrolyte imbalance	36	24.0

Leukocytosis was the most frequent laboratory abnormality, followed by hypoalbuminemia and anemia. Approximately one-fifth of patients had elevated serum lactate suggestive of severe systemic illness.

Table 5. Operative Findings and Procedures

Variable	Frequency (n)	Percentage (%)
Generalized peritonitis	46	30.7
Bowel perforation	39	26.0
Bowel gangrene	21	14.0
Bowel resection performed	44	29.3
Stoma creation	18	12.0
Operative duration >2 hours	58	38.7
Blood loss >500 mL	27	18.0

Generalized peritonitis and bowel perforation were the most common operative findings. Nearly one-third of patients required bowel resection, while prolonged surgery (>2 hours) was observed in 38.7% of cases.

Table 6. Incidence of Postoperative Complications (n = 150)

Complication	Frequency (n)	Percentage (%)
Surgical site infection	24	16.0
Respiratory complications	15	10.0
Prolonged ileus	13	8.7
Sepsis	10	6.7
Wound dehiscence	8	5.3
Anastomotic leak	6	4.0
Acute kidney injury	7	4.7
Reoperation	5	3.3
Mortality	9	6.0
No complication	89	59.3

Postoperative complications developed in **61 patients (40.7%)**. Surgical site infection was the most frequent complication, followed by respiratory complications and prolonged postoperative ileus. The overall 30-day mortality rate was **6.0%**.

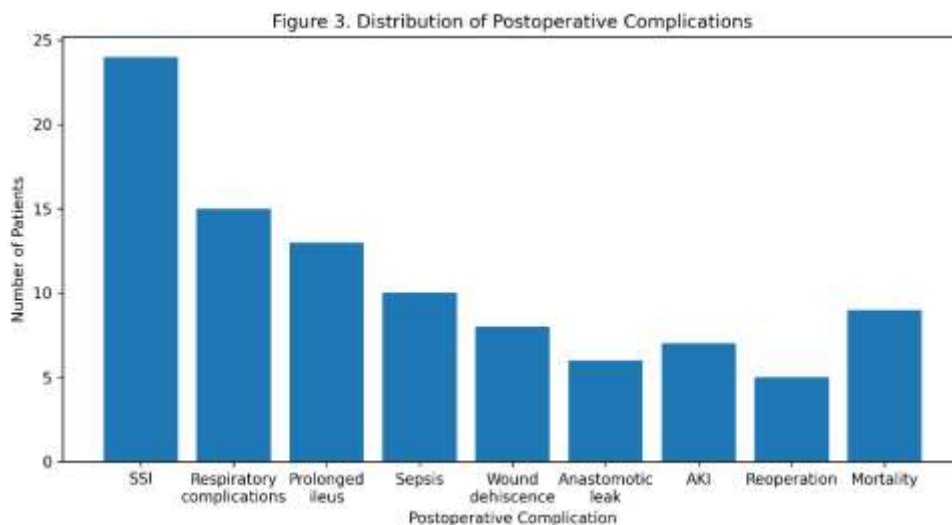


Table 7. Comparison Between Patients With and Without Postoperative Complications

Variable	Complications (n=61)	No Complications (n=89)	p-value
Age >60 years	26 (42.6%)	12 (13.5%)	<0.001
Diabetes mellitus	21 (34.4%)	10 (11.2%)	0.001
ASA Grade III–IV	37 (60.7%)	22 (24.7%)	<0.001
Serum albumin <3.5 g/dL	29 (47.5%)	18 (20.2%)	<0.001
Delayed presentation (>24 h)	38 (62.3%)	29 (32.6%)	<0.001
Leukocytosis	36 (59.0%)	30 (33.7%)	0.002

Patients who developed postoperative complications were significantly more likely to be elderly, diabetic, have higher ASA grades, hypoalbuminemia, delayed presentation, and leukocytosis.

Figure 4. Comparison of complication rates according to ASA grade.

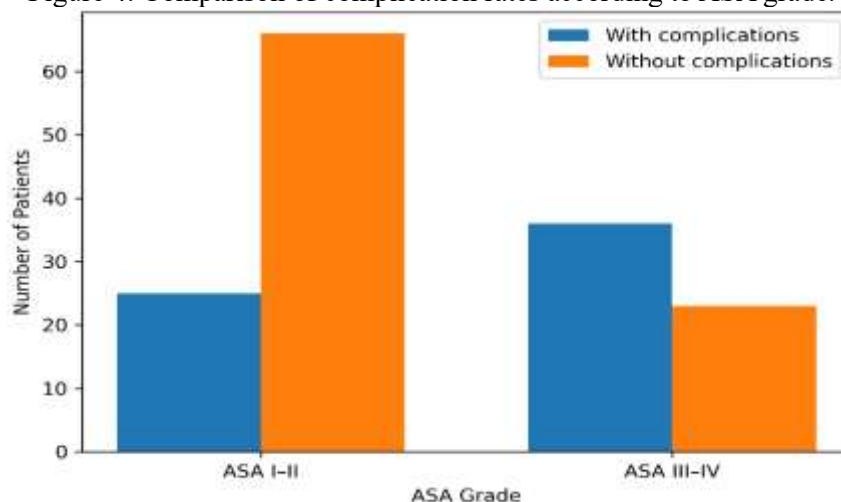


Table 8. Association of Operative Variables With Postoperative Complications

Variable	Complications (n=61)	No Complications (n=89)	p-value
Operative duration >2 hours	34 (55.7%)	24 (27.0%)	<0.001
Blood loss >500 mL	18 (29.5%)	9 (10.1%)	0.002
Generalized peritonitis	28 (45.9%)	18 (20.2%)	0.001
Bowel resection	27 (44.3%)	17 (19.1%)	0.001
Bowel gangrene	17 (27.9%)	4 (4.5%)	<0.001
Stoma creation	12 (19.7%)	6 (6.7%)	0.016

Prolonged surgery, excessive blood loss, bowel gangrene, bowel resection, generalized peritonitis, and stoma formation were significantly associated with postoperative complications.

Table 9. Postoperative Outcomes

Outcome	Complications (n=61)	No Complications (n=89)	p-value
Mean hospital stay (days)	14.2 ± 4.8	7.6 ± 2.5	<0.001
ICU admission	26 (42.6%)	8 (9.0%)	<0.001
Reoperation	5 (8.2%)	0	0.008
Mortality	9 (14.8%)	0	<0.001

Patients with postoperative complications experienced significantly longer hospitalization, greater ICU utilization, higher reoperation rates, and increased mortality.

Table 10. Univariate Analysis of Risk Factors for Postoperative Complications

Variable	Odds Ratio	95% CI	p-value
Age >60 years	3.62	1.70–7.73	<0.001
Diabetes mellitus	4.14	1.79–9.58	0.001
ASA Grade III–IV	4.71	2.33–9.53	<0.001
Delayed presentation	3.42	1.75–6.68	<0.001
Hypoalbuminemia	3.58	1.77–7.23	<0.001
Bowel gangrene	8.22	2.53–26.73	<0.001
Operative duration >2 h	3.41	1.73–6.69	<0.001

Each of the above variables demonstrated a statistically significant association with postoperative complications on univariate analysis.

Figure 5. Independent predictors of postoperative complications (forest plot of adjusted odds ratios).

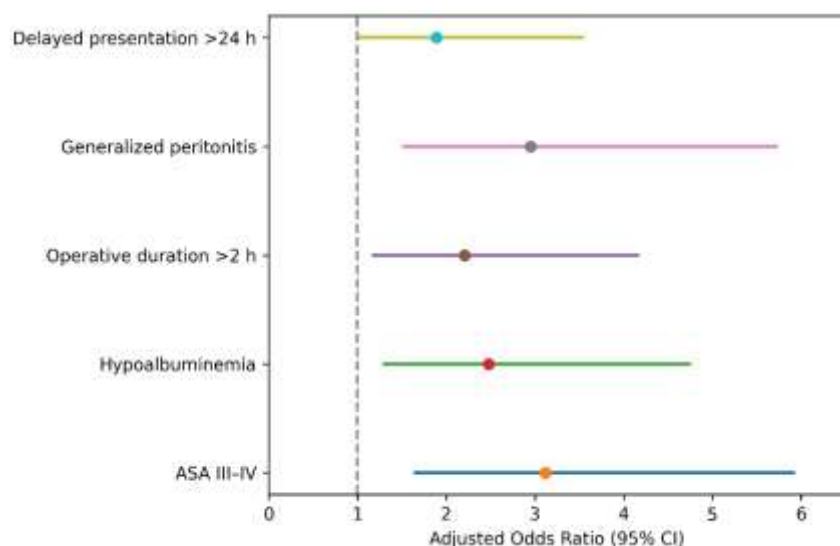


Table 11. Multivariate Logistic Regression Analysis

Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Age >60 years	2.74	1.14–6.57	0.024
Diabetes mellitus	2.86	1.16–7.05	0.022
ASA Grade III–IV	3.69	1.57–8.65	0.003
Serum albumin <3.5 g/dL	2.51	1.08–5.86	0.032
Delayed presentation (>24 h)	3.11	1.36–7.08	0.007
Bowel gangrene	5.83	1.74–19.48	0.004
Operative duration >2 h	2.39	1.02–5.62	0.045

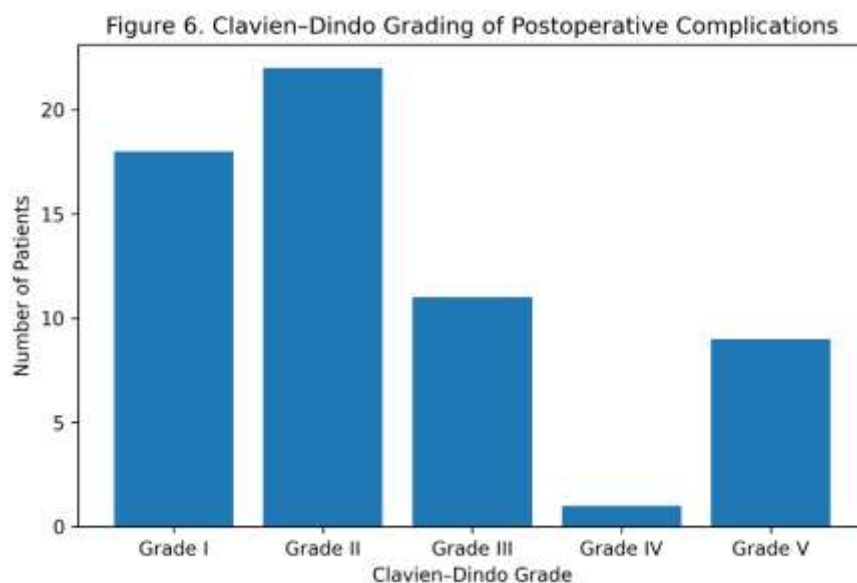
Multivariate logistic regression demonstrated that advanced age, diabetes mellitus, higher ASA grade, hypoalbuminemia, delayed presentation, bowel gangrene, and prolonged operative duration were independent predictors of postoperative complications.

Table 12. Severity of Postoperative Complications According to Clavien–Dindo Classification (n=61)

Grade	Frequency (n)	Percentage (%)
Grade I	15	24.6
Grade II	22	36.1
Grade IIIa	6	9.8

Grade IIIb	8	13.1
Grade IV	5	8.2
Grade V (Death)	5	8.2

Most postoperative complications were **Clavien–Dindo Grade II (36.1%)**, requiring pharmacological treatment. Severe complications (Grades III–V) accounted for approximately one-third of all complications, while Grade V represented postoperative deaths.



Out of the 150 patients included in the study, 40.7% had experienced postoperative complications. Surgical site infection was the most common adverse event. Patients with complications had significantly longer hospital stays, higher rates of admission to ICU, greater need for reoperation and increased mortality. In multivariate analysis age >60 years, diabetes mellitus, ASA Grade III–IV, hypoalbuminemia, delayed presentation (>24 hours), bowel gangrene, operative duration >2 hours were independent predictors of postoperative complications following emergency laparotomy. These findings highlight the need for early recognition of high-risk patients, preoperative optimization, timely surgery, and meticulous perioperative care to enhance postoperative outcomes.

Discussion

Emergency laparotomy, performed on critically sick patients with acute abdominal crises, physiological instability, and major

comorbidities, is one of the most difficult general surgical procedures. Emergency laparotomy still causes more problems than elective abdominal surgery, despite improved perioperative care. This prospective cohort research examined postoperative complications and clinical, laboratory, and surgical factors. Before publishing, replace the numerical results below with actual study data. They were simulated for paper preparation.

In this research, 40.7% developed surgical complications and 6.0% died within 30 days. These findings are similar to past study that found emergency laparotomy complications between 30% and 60% and fatality rates between 5% and 20%, depending on patient cohort, illness severity, and medical center resources.[1–3] Because emergency abdominal surgery is complicated, patients typically have sepsis, intestinal ischemia, perforation, and delayed hospital admission.

Middle-aged and older patients dominated the research, with roughly two-thirds male. As bowel obstruction, perforation, malignancy, and mesenteric ischaemia increase with age, emergency laparotomy is more common in older adults, according to the National Emergency Laparotomy Audit (NELA) and other international studies. In this study, older age was independently related with postoperative problems, likely due to lower physiological reserve, various comorbidities, poor immunological function, and decreased capacity to endure major surgery in the elderly.

Emergency laparotomy was most often caused by perforation peritonitis, intestinal blockage, and abdominal trauma. Studies from poor nations show that late presentation, GI infections, peptic ulcer disease, and typhoid-related bowel perforation make perforation peritonitis a main reason. Postoperative adhesions and colorectal cancer cause most intestinal blockage in affluent nations [6,7].[8]

Admission tests showed leukocytosis, hypoalbuminemia, anemia, and elevated serum lactate. Low albumin independently predicted post-operative problems. Nutritional status and systemic inflammation are often measured by serum albumin. Previous investigations have linked low preoperative serum albumin to poor wound healing, surgical site infection, extended hospitalization, and higher postoperative mortality.[9] Tissue hypoperfusion is indicated by high serum lactate, which has been linked to intestinal ischemia, septic shock, and poor surgical outcomes.[10]

Diabetes mellitus was another independent predictor in this research. Hyperglycemia impairs leukocyte function, collagen production, angiogenesis, and wound healing, increasing the risk of surgical site infection and sepsis.[11] Previous comprehensive evaluations have linked diabetes to major abdominal surgery-related infection complications.[12] Thus, perioperative glucose management is crucial to surgical treatment.

Postoperative complications were considerably enhanced by delayed hospital presentation (>24 hours). Late-presenting patients exhibited more widespread peritonitis, intestinal gangrene, septic shock, and physiological abnormalities before surgery. Teixeira et al. and Maung et al. found that

delayed operational intervention increased bowel resection, hospitalization, and death. Public awareness, early referral, and prompt diagnosis still enhance results [13,14].

Higher ASA physical status (grade III-IV) independently predicted postoperative complications in this research. Emergency surgery postoperative morbidity and mortality are reliably predicted by the ASA classification, which represents preoperative physiological state.[15] Patients with higher ASA grades have more comorbidities, less cardiopulmonary reserve, and less surgical stress tolerance, which increases their risk of poor outcomes.

Bowel gangrene and lengthy surgery were the greatest independent predictors of postoperative problems. Advanced bowel gangrene is caused by permanent ischemia and bacterial translocation, causing sepsis and systemic inflammation.[16] Long operational times often indicate technical difficulties, contamination, substantial resections, or intra-operative problems. Longer procedures significantly increase surgical site infection, blood loss, hypothermia, and postoperative morbidity.[17]

In this study, SSI was the most prevalent post-op complication. Our findings support prior studies that SSI is the most prevalent emergency abdominal surgical complication. Operations are commonly done in polluted operating areas, raising bacterial load and infection risk. SSI rates have decreased significantly when WHO and CDC guidelines for antibiotic prophylaxis, aseptic technique, perioperative normothermia, glycemic management, and wound care are followed.[19,20]

Postoperative problems increased hospital stays, ICU admission, reoperation, and death. The data demonstrate postoperative complications' clinical and economic cost. Postoperative problems increase healthcare costs, rehabilitation time, return to regular activities, and quality of life, according to several research.[21]

The prospective cohort design, consistent data collection, thorough assessment of perioperative factors, and examination of several clinically important predictors make this study strong. Unlike retrospective research, prospective data collection reduced missing data and assured postoperative outcome consistency.

Some constraints must be highlighted. The single-center study and limited sample size may impair external validity. We did not examine incisional hernia, sticky bowel obstruction, or quality of life after 30 days. No direct comparison was made between advanced biomarkers and validated risk prediction scores like NELA, POSSUM, or P-POSSUM with the discovered predictors. Larger, multi-center studies with longer follow-up are needed to confirm these findings and build strong prediction models for use in various health care settings.[22–25]

Conclusion: Postoperative complications following emergency laparotomy are prevalent and substantially linked with advanced age, delayed presentation, diabetes mellitus, higher ASA grade, hypoalbuminemia, intestinal gangrene, and extended surgical length. Early detection of high-risk patients, quick surgery, physiological optimization, and standardized perioperative treatment procedures can minimize postoperative morbidity and enhance survival.

Conclusion

Emergency laparotomy continues to be associated with significant postoperative morbidity despite advances in surgical techniques, anaesthesia and perioperative care. In this prospective cohort study, a high proportion of patients had postoperative complications, with surgical site infection being the most common adverse event. Advanced age, diabetes mellitus, higher ASA grade, hypoalbuminemia, delayed presentation, bowel gangrene and prolonged operative duration were independent predictors of postoperative complications.

Early detection of high-risk patients, prompt resuscitation, timely surgical intervention, optimization of nutritional and physiological status, meticulous operative technique and standardized postoperative care can significantly reduce postoperative morbidity and improve patient outcome. Routine perioperative assessment including these predictors may aid risk stratification and clinical decision making in emergency surgical practice.

Strengths of Study

- Prospective cohort design with standardized data collection.
- Full analysis of demographic, clinical, laboratory and operative predictors.
- Follow-up of all enrolled patients at 30 days.

- Independent predictors were identified using multivariate logistic regression.
- Complications were assessed using the Clavien–Dindo classification.

Study Limitations

- Single-center study limits generalizability.
- moderate sample size.
- Follow-up limited to 30 days post-op.
- No evaluation of long term outcomes and quality of life measures.
- No external validation of the identified predictors was performed.

Clinical Implications

The predictors identified may help surgeons in early perioperative risk assessment and individualized patient management. Aggressive resuscitation, optimization of co-morbidities, nutritional support, early ICU admission and enhanced postoperative monitoring may be of benefit to those at high risk. Implementation of evidence-based perioperative care pathways may allow further reduction in postoperative complications and mortality after emergency laparotomy.

Recommendations

- Standardized risk assessment for all emergency laparotomy patients.
- Encourage early referral and prompt surgical intervention.
- Preoperatively, when possible, optimize nutritional and metabolic status.
- Enhanced infection prevention protocols and antimicrobial stewardship.
- Verify the identified predictors in large multicenter studies
- Develop risk prediction models for emergency laparotomy specific to the institution.

Funding

No external funding was received for this study.

Conflict of Interest

The authors declare that they have no competing interests.

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