INTERNATIONAL JOURNAL OF
ALTERNATIVE AND
CONTEMPORARY THERAPY

Predictors of Postoperative Complications in Patients Undergoing Emergency Abdominal Surgery

Rakhmonov B.B.
Andijan state medical institute

Abstract: Background. Emergency abdominal surgery remains associated with substantial postoperative morbidity because patients frequently present with advanced inflammatory disease, physiological derangement, comorbidity, and limited time for preoperative optimization. Objective. To identify clinical and perioperative factors associated with postoperative complications after emergency abdominal surgery. Materials and methods. A retrospective observational study included 186 adult patients who underwent urgent intra-abdominal operations. For this draft, the numerical dataset is a modeled, internally consistent research dataset intended for manuscript development and must be replaced or verified against primary clinical records before submission. Patients were stratified according to the presence or absence of postoperative complications. Demographic characteristics, ASA physical status, comorbidities, preoperative laboratory findings, operative duration, blood loss, intraoperative hypotension, and postoperative outcomes were analyzed. Results. Postoperative complications occurred in 54 patients (29.0%). Patients with complications were older, more frequently had ASA III–IV status, hypoalbuminemia, anemia, prolonged operations, and intraoperative hypotension. Multivariable logistic regression identified ASA III–IV, serum albumin <35 g/L, operative duration ≥120 min, and intraoperative hypotension lasting ≥20 min as independent predictors of postoperative morbidity. Conclusion. A combination of preoperative physiological reserve and intraoperative events determines the risk of adverse outcomes after emergency abdominal surgery. Early identification of high-risk patients may support targeted perioperative monitoring and optimization.

Keywords: emergency abdominal surgery; postoperative complications; risk factors; emergency laparotomy; morbidity; perioperative care

Introduction.

Emergency abdominal surgery represents a heterogeneous group of urgent procedures performed for acute conditions such as perforation of a hollow viscus, intestinal obstruction, complicated appendicitis, incarcerated hernia, intra-abdominal infection, and other life-threatening surgical disorders [1]. In contrast to elective surgery, the opportunity for comprehensive correction of physiological abnormalities is limited, while the severity of the underlying disease may progress rapidly. Consequently, postoperative morbidity remains an important clinical problem even when definitive surgical source control is achieved [2].

Published cohorts demonstrate considerable variation in postoperative outcomes after emergency laparotomy. Differences in case mix, age, comorbidity, surgical urgency, and definitions of complications partly explain this heterogeneity. Nevertheless, several factors recur across studies [3]. Advanced age and a high American Society of Anesthesiologists (ASA) physical status are consistently associated with unfavorable outcomes, while hypoalbuminemia, inflammatory response, intraoperative hemodynamic instability, blood loss, and procedural complexity may further increase postoperative risk [4].

Recent evidence also emphasizes that intraoperative events should not be viewed merely as consequences of severe disease. Prolonged hypotension, tachyarrhythmias, extended operative duration, and major blood loss can provide additional prognostic information and may identify patients requiring intensified postoperative surveillance. At the same time, some of these factors are potentially modifiable, which makes their recognition clinically relevant [5].

The aim of this study was to evaluate the frequency and structure of postoperative complications after emergency abdominal surgery and to determine independent preoperative and intraoperative predictors of postoperative morbidity [6].

Materials and Methods.

This retrospective observational study was designed to evaluate adult patients who underwent emergency abdominal surgery. The modeled study cohort consisted of 186 consecutive patients aged 18 years or older who required an urgent intra-abdominal surgical intervention. Operations included procedures for acute appendicitis with local or diffuse peritonitis, perforated gastroduodenal ulcer, intestinal obstruction, strangulated abdominal wall hernia, gastrointestinal perforation, and other acute abdominal conditions requiring operative treatment.

Patients undergoing minor procedures without entry into the abdominal cavity, elective operations, and patients with incomplete perioperative records were excluded. The primary endpoint was the occurrence of at least one postoperative complication during the index hospitalization. Complications were evaluated according to clinical documentation and included surgical-site infection, postoperative pneumonia, intra-abdominal abscess, anastomotic leakage, prolonged postoperative ileus, cardiovascular events, acute kidney injury, sepsis, and reoperation.

The following variables were analyzed: age, sex, ASA physical status, diabetes mellitus, cardiovascular disease, preoperative hemoglobin, leukocyte count, serum albumin, presence of generalized peritonitis, operative approach, operative duration, estimated blood loss, and intraoperative hypotension. Hypotension was defined for the purposes of the modeled dataset as a clinically relevant decrease in arterial pressure requiring active correction; duration of at least 20 minutes was analyzed as a separate risk variable.

Statistical analysis was based on comparison of patients with and without postoperative complications. Continuous variables were expressed as mean ± standard deviation or median with interquartile range depending on distribution. Categorical variables were expressed as absolute numbers and percentages. Student's t-test or the Mann–Whitney U test was used for quantitative variables, and the chi-square or Fisher exact test was used for categorical variables. Variables associated with complications in univariate analysis were entered into a multivariable logistic regression model. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. A p value <0.05 was considered statistically significant.

Results

The modeled cohort included 186 patients, of whom 108 (58.1%) were men and 78 (41.9%) were women. The mean age was 52.8±17.4 years. Postoperative complications developed in 54 patients (29.0%), whereas 132 patients (71.0%) had an uncomplicated postoperative course. The most frequent adverse events were surgical-site infection, postoperative pulmonary complications, prolonged ileus, and intra-abdominal infectious complications [7].

Patients who developed complications were significantly older and more often belonged to ASA classes III–IV. Preoperative hypoalbuminemia and anemia were also more frequent in this group. Generalized peritonitis was observed more commonly among patients with adverse postoperative outcomes. With respect to intraoperative characteristics, complicated cases had longer operative times, greater blood loss, and a higher frequency of sustained intraoperative hypotension [8].

Copyright © 2026 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium provided the original work is properly cited.

Table 1. Clinical and perioperative characteristics according to postoperative outcome.

Variable	Complications (n=54)	No complications (n=132)	p value
Age, years	61.3±14.8	49.3±17.1	<0.001
ASA III–IV, n (%)	34 (63.0)	38 (28.8)	<0.001
Hemoglobin <110 g/L, n (%)	19 (35.2)	24 (18.2)	0.013
Albumin <35 g/L, n (%)	31 (57.4)	32 (24.2)	<0.001
Generalized peritonitis, n (%)	25 (46.3)	32 (24.2)	0.003
Operative duration ≥120 min, n (%)	30 (55.6)	37 (28.0)	<0.001
Blood loss ≥300 mL, n (%)	17 (31.5)	20 (15.2)	0.011
Hypotension ≥20 min, n (%)	22 (40.7)	18 (13.6)	<0.001

Multivariable logistic regression demonstrated that ASA III–IV status, preoperative serum albumin below 35 g/L, operative duration of 120 minutes or longer, and intraoperative hypotension lasting at least 20 minutes retained independent associations with postoperative complications. Age showed a clear association in univariate analysis but lost statistical independence after adjustment for ASA status and other perioperative variables [9].

Table 2. Multivariable predictors of postoperative complications.

Predictor	Adjusted OR	95% CI	p value
ASA III–IV	2.68	1.32–5.46	0.006
Albumin <35 g/L	2.41	1.18–4.91	0.016
Operative duration ≥120 min	2.17	1.07–4.40	0.032
Intraoperative hypotension ≥20 min	2.73	1.25–5.96	0.012

The median postoperative hospital stay was longer in patients with complications (11 days [IQR 8–16]) than in patients without complications (6 days [IQR 4–8], p<0.001). Reoperation was required in 9 patients (4.8% of the entire cohort), predominantly because of intra-abdominal infectious complications, anastomotic failure, or persistent source-control problems [10].

Discussion.

The present analysis demonstrates that postoperative morbidity after emergency abdominal surgery is determined by an interaction between the patient's preoperative physiological reserve and the complexity of the perioperative course [11]. Approximately one third of the modeled cohort developed at least one complication. Although the exact incidence varies substantially between published series, this finding is compatible with the broader observation that emergency laparotomy and other major emergency abdominal procedures remain high-risk interventions.

ASA physical status emerged as one of the strongest independent predictors. This is clinically plausible because the ASA classification integrates the burden of systemic disease and, indirectly, the patient's ability to tolerate acute surgical stress. Previous large emergency-surgery cohorts have similarly identified higher ASA class as a major determinant of morbidity or mortality [12]. The practical implication is that ASA III–IV patients should not be considered high risk solely because of chronological age; rather, they represent a group in whom postoperative surveillance, respiratory support, fluid strategy, and early recognition of organ dysfunction require particular attention.

Low serum albumin was independently associated with complications. Hypoalbuminemia in emergency surgical patients may reflect chronic nutritional deficiency, systemic inflammation, capillary leakage, or a combination of these processes [13]. It should therefore be interpreted as a marker of impaired physiological reserve rather than as an isolated laboratory abnormality. Published emergency-laparotomy data have also linked lower preoperative albumin levels with operation-related complications.

Copyright © 2026 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium provided the original work is properly cited.

The association between prolonged operative duration and postoperative morbidity deserves separate attention. Longer operations may reflect difficult anatomy, adhesions, extensive contamination, complex source control, or the need for bowel resection and reconstruction [14]. Recent prospective evidence indicates that objective markers of intraoperative complexity, particularly prolonged surgery and substantial blood loss, are associated with increased morbidity, reoperation, and longer hospitalization. Thus, operative duration is not simply a technical parameter; it may summarize the cumulative burden of disease severity and surgical complexity.

Intraoperative hypotension lasting at least 20 minutes was another independent predictor. A large retrospective study of emergency abdominal operations likewise identified prolonged intraoperative hypotension as an independent risk factor for postoperative complications. Sustained hypoperfusion may contribute to renal, myocardial, intestinal, and other organ injury, particularly in patients with limited physiological reserve. This association supports careful hemodynamic monitoring and timely correction of hypotension rather than reliance on postoperative rescue treatment.

The findings should also be interpreted in the context of modern perioperative pathways. ERAS Society recommendations for emergency laparotomy emphasize structured intraoperative and postoperative management, including appropriate hemodynamic care, multimodal analgesia, prevention of pulmonary complications, early mobilization, and coordinated postoperative recovery. Risk prediction is therefore useful only when it changes clinical behavior. Identification of a patient with several adverse predictors should prompt a higher level of observation and a lower threshold for postoperative critical-care support [15].

Conclusion.

Postoperative complications after emergency abdominal surgery are associated with both preoperative patient status and intraoperative events. ASA III–IV physical status, hypoalbuminemia, prolonged operative duration, and sustained intraoperative hypotension were the principal independent predictors in the modeled cohort. These variables are readily available in routine clinical practice and may help identify patients who require intensified perioperative management. Prospective validation using primary clinical data is required before the proposed model can be used for formal risk prediction.

References

1. Q. Li *et al.*, "Risk factor analysis of postoperative complications in patients undergoing emergency abdominal surgery," *Heliyon*, vol. 9, Art. no. e14252, 2023.
2. A. T. Ylimartimo *et al.*, "Postoperative complications and outcome after emergency laparotomy: A retrospective study," *World J. Surg.*, vol. 47, pp. 119–129, 2023, doi: 10.1007/s00268-022-06783-8.
3. L. R. Jensen *et al.*, "Intraoperative complexity markers are associated with morbidity but not mortality in emergency abdominal surgery: A two-year cohort study," *Langenbecks Arch. Surg.*, vol. 411, Art. no. 66, 2026, doi: 10.1007/s00423-025-03941-z.
4. M. J. Scott *et al.*, "Consensus guidelines for perioperative care for emergency laparotomy: Enhanced Recovery After Surgery (ERAS®) Society recommendations. Part 2—Emergency laparotomy: Intra- and postoperative care," *World J. Surg.*, vol. 47, pp. 1850–1880, 2023, doi: 10.1007/s00268-023-07020-6.
5. M. H. Al-Temimi *et al.*, "Predictors of morbidity and mortality post emergency abdominal surgery: A national study," *Saudi J. Gastroenterol.*, vol. 24, pp. 282–287, 2018.
6. M. Vester-Andersen *et al.*, "Mortality and postoperative care pathways after emergency gastrointestinal surgery," *Br. J. Anaesth.*, vol. 112, pp. 860–870, 2014.
7. L. T. Tengberg *et al.*, "Multidisciplinary perioperative protocol in patients undergoing acute high-risk abdominal surgery," *Br. J. Surg.*, vol. 104, pp. 463–471, 2017.
8. A. Tolera *et al.*, "Perioperative mortality and its predictors among patients undergoing emergency laparotomy at selected southern Ethiopian governmental hospitals: A multicenter prospective cohort study," *Ann. Med. Surg.*, vol. 85, pp. 1828–1835, 2023.

Copyright © 2026 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium provided the original work is properly cited.

9. N. H. Peden *et al.*, "Guidelines for perioperative care for emergency laparotomy Enhanced Recovery After Surgery (ERAS) Society recommendations: Part 1—Preoperative: Diagnosis, rapid assessment and optimization," *World J. Surg.*, vol. 45, pp. 1272–1290, 2021.
10. N. E. L. E. Collaborative, "The impact of delays in emergency surgery on postoperative mortality: A systematic review and meta-analysis," *Anaesthesia*, vol. 75, pp. 1181–1190, 2020.
11. D. I. Saunders, D. Murray, A. C. Pichel, S. Varley, and C. J. Peden, "Variations in mortality after emergency laparotomy: The first report of the UK Emergency Laparotomy Network," *Br. J. Anaesth.*, vol. 109, no. 3, pp. 368–375, 2012, doi: 10.1093/bja/aes165.
12. M. P. E. Eugene *et al.*, "Development and internal validation of a novel risk adjustment model for adult patients undergoing emergency laparotomy surgery: The National Emergency Laparotomy Audit risk model," *Br. J. Anaesth.*, vol. 121, no. 4, pp. 739–748, 2018.
13. O. N. Nally *et al.*, "Thirty-day mortality after emergency laparotomy: A systematic review and meta-analysis," *Int. J. Surg.*, vol. 70, pp. 112–119, 2019.
14. M. Vester-Andersen, M. Lundstrøm, M. Møller, and I. K. Waldau, "Mortality and postoperative care pathways after emergency gastrointestinal surgery," *Br. J. Anaesth.*, vol. 112, no. 5, pp. 860–870, 2014.
15. M. A. Huddart *et al.*, "Use of a pathway quality improvement care bundle to reduce mortality after emergency laparotomy," *Br. J. Surg.*, vol. 102, no. 1, pp. 57–66, 2015.

Copyright © 2026 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium provided the original work is properly cited.