East African Scholars Journal of Medicine and Surgery
Abbreviated Key Title: EAS J Med Surg
ISSN: 2663-1857 (Print) & ISSN: 2663-7332 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-8 | Issue-6 | Jun-2026 | DOI: https://doi.org/10.36349/easjms.2026.v08i06.011

Original Research Article

Predictors of Mortality in Malignant Bowel Obstruction: A Six-Year Multicenter Study from Cameroon

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Article History
Received: 06.05.2026
Accepted: 17.06.2026
Published: 19.06.2026

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Background*:** Malignant bowel obstruction is a severe complication of advanced intra-abdominal and extra-abdominal cancers. In resource-limited settings, delayed presentation, limited access to endoscopic palliation, and reliance on emergency surgery may worsen outcomes. This study aimed to identify factors associated with mortality among patients managed for malignant bowel obstruction in two tertiary hospitals in Douala, Cameroon. ***Methods*:** We conducted a retrospective multicenter analytical study in the visceral surgery departments of Douala General Hospital and Laquintinie Hospital of Douala from January 1, 2019, to December 31, 2024. All patients managed for confirmed malignant bowel obstruction were included. Patients with benign obstruction or unusable medical records were excluded. Sociodemographic, clinical, paraclinical, tumor-related, therapeutic, and outcome variables were analyzed. The primary outcome was postoperative mortality. Logistic regression analysis was used to identify factors associated with mortality, and statistical significance was set at $p < 0.05$. ***Results*:** Among 287 cases of intestinal obstruction, 50 were of malignant origin, corresponding to 17.4% of intestinal obstructions. Malignant bowel obstruction represented 3.7% of acute abdominal emergencies during the study period. The mean age was 53.0 ± 15.0 years, with a male predominance of 68% and a sex ratio of 2.1. The colon was the most frequent tumor site, particularly the rectosigmoid junction. Computed tomography was performed in 64.0% of cases. Laparotomy was performed in 44 patients (88.0%). The most common surgical procedures were resection with stoma formation and resection with anastomosis. The postoperative mortality rate was 22%. Factors associated with mortality included previous abdominal surgery, vomiting, preoperative dehydration, poor performance status, complete bowel obstruction, immediate emergency surgery, and resection with stoma formation. ***Conclusion*:** Malignant bowel obstruction remains associated with high postoperative mortality in Cameroon. Previous abdominal surgery, vomiting, preoperative dehydration, poor performance status, complete bowel obstruction, immediate emergency surgery, and resection with stoma formation were associated with postoperative mortality. After adjustment, resection with stoma formation remained the only independent predictor of postoperative death. Early diagnosis, preoperative optimization, and improved access to multidisciplinary and palliative strategies may improve outcomes.

Keywords: Malignant Bowel Obstruction, Intestinal Obstruction, Cancer, Mortality, Surgery, Cameroon.

INTRODUCTION

Malignant bowel obstruction (MBO) is a common and life-threatening complication of advanced malignancies. It is defined as a partial or complete interruption of intestinal transit caused by primary or secondary malignant involvement of the gastrointestinal tract or by extrinsic compression from metastatic disease or peritoneal carcinomatosis [1, 2]. MBO frequently occurs in patients with advanced colorectal, gastric,

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ovarian, pancreatic, and peritoneal malignancies and is associated with substantial morbidity, impaired quality of life, prolonged hospitalization, and high mortality rates [3, 4].

Globally, MBO affects approximately 3% to 15% of patients with cancer, with considerable variations according to tumor type and disease stage [3, 5]. Colorectal cancer remains the leading cause of MBO worldwide, accounting for up to 60% of cases, while ovarian cancer is the predominant etiology among women [6, 7]. Despite advances in diagnostic imaging, endoscopic stenting, nutritional support, and systemic therapies, MBO continues to represent a major therapeutic challenge because of its heterogeneous presentation and poor prognosis [8, 9].

In high-income countries, the management of MBO has evolved toward multidisciplinary approaches integrating surgery, self-expanding metallic stents, chemotherapy, nutritional support, and palliative care [8, 10]. Treatment decisions are individualized according to the patient's performance status, tumor burden, expected survival, and treatment goals [11]. However, in low- and middle-income countries, access to minimally invasive procedures, interventional endoscopy, and specialized palliative care remains limited. Consequently, emergency surgery often constitutes the only available therapeutic option despite its association with high postoperative morbidity and mortality [12, 13].

Sub-Saharan Africa faces a dual burden of increasing cancer incidence and persistent delays in diagnosis. Most patients present with advanced-stage disease because of limited screening programs, poor access to healthcare facilities, financial constraints, and sociocultural barriers [14, 15]. Consequently, MBO frequently represents either the initial manifestation of an underlying malignancy or a late complication of advanced cancer [16].

Data regarding MBO in Africa remain scarce, and evidence concerning prognostic factors is particularly limited. Previous studies conducted in Cameroon have primarily focused on the epidemiological and histopathological characteristics of malignant bowel obstruction, reporting postoperative mortality rates ranging from 16.8% to 22% and morbidity rates approaching 30% [17, 18]. However, factors associated with mortality have not been adequately investigated in this setting.

Identifying predictors of mortality is essential to improve patient selection for surgery, optimize preoperative management, and develop context-adapted treatment strategies in resource-constrained settings. Therefore, this study aimed to describe the epidemiological, clinical, paraclinical, therapeutic, and outcome characteristics of patients managed for malignant bowel obstruction in two tertiary hospitals in Douala, Cameroon, and to identify independent predictors of postoperative mortality.

METHODS

Study Design and Reporting Standards

This study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for observational studies.

Study Setting

We conducted a retrospective multicenter analytical study in the visceral surgery departments of two tertiary referral hospitals in Douala, Cameroon: the Hôpital Général de Douala and the Hôpital Laquintinie de Douala.

These hospitals serve as major referral centers for digestive surgical emergencies in the Littoral Region and receive patients from across Cameroon.

Study Period

The study included patients managed between January 1, 2019, and December 31, 2024.

Study Population

All adult patients admitted with malignant bowel obstruction during the study period were screened for eligibility.

Inclusion Criteria

Patients were included if they met all the following criteria:

- age ≥18 years;
- clinical features suggestive of bowel obstruction;
- radiological confirmation of bowel obstruction;
- malignant etiology confirmed by histopathological examination, imaging findings, endoscopy, or intraoperative findings;
- surgical management performed in one of the participating centers;
- complete and exploitable medical records.

Exclusion Criteria

Patients were excluded if they had:

- bowel obstruction of benign origin;
- postoperative paralytic ileus without evidence of malignancy;
- incomplete or missing medical records;
- unavailable outcome data.

Sample Size and Sampling Procedure

A consecutive sampling method was used. All eligible patients identified during the study period were included.

Among 1,351 patients admitted for acute abdominal emergencies, 287 presented with intestinal

obstruction. Fifty patients fulfilled the eligibility criteria and constituted the final study population.

Data Sources and Data Collection

Data were extracted retrospectively from multiple sources, including:

- emergency department registers;
- hospitalization records;
- operative reports;
- anesthesia records;
- pathology reports;
- imaging reports;
- discharge summaries.

Data were collected using a standardized case report form and subsequently entered into an electronic database developed in Microsoft Excel.

Variables

Primary Outcome

The primary outcome was postoperative mortality, defined as any death occurring during the index hospitalization or within 30 days after surgery.

Explanatory Variables

The following variables were collected:

Sociodemographic Variables

- age;
- sex;
- marital status;
- occupation;
- place of residence.

Clinical Variables

- duration of symptoms before admission;
- abdominal pain;
- abdominal distension;
- vomiting;
- cessation of stool and flatus;
- dehydration status;
- Eastern Cooperative Oncology Group (ECOG) performance status;
- American Society of Anesthesiologists (ASA) classification;
- comorbidities;
- smoking status;
- alcohol consumption.

Tumor-Related Variables

- known history of cancer;
- primary tumor site;
- anatomical location;
- TNM classification;
- tumor stage;
- presence of metastatic disease.

Diagnostic Variables

- plain abdominal radiography findings;
- abdominal computed tomography findings;
- endoscopic findings.

Surgical Variables

- timing of surgery;
- surgical approach;
- operative procedure;
- bowel resection;
- stoma creation;
- anastomosis;
- perioperative transfusion.

Postoperative Variables

- postoperative complications;
- length of hospital stay;
- cause of death.

Definitions

Malignant bowel obstruction was defined as a partial or complete mechanical interruption of intestinal transit secondary to a primary gastrointestinal malignancy, peritoneal carcinomatosis, or metastatic cancer.

Complete bowel obstruction was defined as the absence of stool and flatus passage associated with radiological evidence of intestinal obstruction.

Preoperative dehydration was defined clinically by signs of hypovolemia requiring intravenous fluid resuscitation.

Poor performance status was defined as an ECOG score of 3 or 4.

Immediate emergency surgery was defined as surgery performed within 24 hours after admission.

Statistical Analysis

Data analysis was performed using R software version 4.5.0 (R Foundation for Statistical Computing, Vienna, Austria).

Continuous variables were summarized as means ± standard deviations (SD) or medians with interquartile ranges (IQR), depending on their distribution.

Categorical variables were expressed as frequencies and percentages.

Univariate analyses were performed using the chi-square test or Fisher's exact test, as appropriate.

Crude odds ratios (ORs) with 95% confidence intervals (95% CIs) were calculated to assess associations between explanatory variables and postoperative mortality.

Variables with a p-value <0.20 in univariate analysis or considered clinically relevant were entered into a multivariable logistic regression model.

Given the limited number of events (11 deaths), the final multivariable model was restricted to a maximum of five variables to avoid model overfitting.

Adjusted odds ratios (aORs) with 95% confidence intervals were reported.

A two-sided p-value <0.05 was considered statistically significant.

Missing Data

Variables with substantial missing data, particularly tumor stage and TNM classification, were excluded from multivariable analyses.

No imputation procedure was performed.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of the Faculty of Medicine and Pharmaceutical Sciences of the University of Douala.

Administrative authorizations were obtained from the management of both participating hospitals.

Patient confidentiality was ensured by anonymizing all records before analysis and restricting database access to study investigators only.

RESULTS

Study Population

During the six-year study period, 1,351 patients were admitted for acute abdominal emergencies. Among them, 287 presented with intestinal obstruction. Fifty patients met the inclusion criteria for malignant bowel obstruction, corresponding to 17.4% of all intestinal obstructions and 3.7% of acute abdominal emergencies.

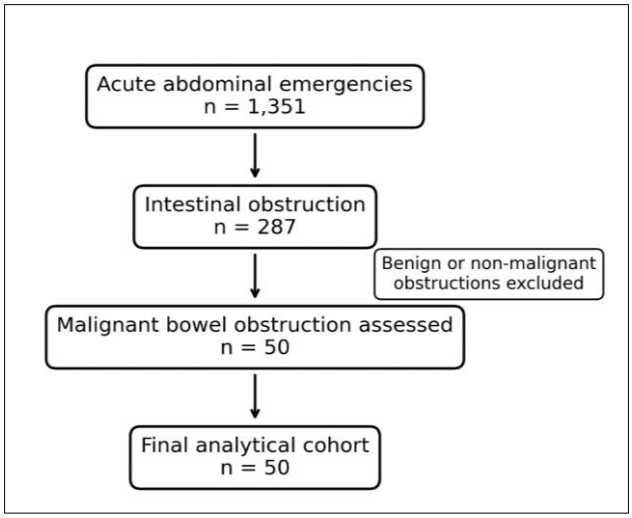

Figure 1: STROBE flow diagram showing patient selection and inclusion process

Sociodemographic and Clinical Characteristics

The mean age of the patients was 53.0 ± 15.0 years, and 22 patients (44.0%) were older than 55 years. There were 34 men (68.0%) and 16 women (32.0%), resulting in a male-to-female ratio of 2.1. Thirty-nine patients (78.0%) were married.

Nineteen patients (38.0%) had a previously known cancer diagnosis, whereas five patients (10.0%) reported a history of abdominal surgery. Comorbidities were present in 14 patients (28.0%). Smoking and alcohol consumption were reported in 12 (24.0%) and 20 (40.0%) patients, respectively.

The most frequent presenting symptoms were abdominal pain (76.0%), abdominal distension (58.0%), vomiting (46.0%), and cessation of stool and flatus (22.0%). Preoperative dehydration was observed in 10 patients (20.0%). Seventeen patients (34.0%) had an ECOG performance status of 3–4, and 11 patients (22.0%) were classified as ASA III–IV.

Table 1: Baseline demographic and clinical characteristics of patients with malignant bowel obstruction

Characteristic	Overall cohort (n = 50)
Age, years, mean ± SD	53.0 ± 15.0
Age >55 years	22 (44.0%)
Male sex	34 (68.0%)
Married	39 (78.0%)
Known cancer before admission	19 (38.0%)
Previous abdominal surgery	5 (10.0%)

Comorbidity	14 (28.0%)
Smoking	12 (24.0%)
Alcohol consumption	20 (40.0%)
Abdominal pain	38 (76.0%)
Abdominal distension	29 (58.0%)
Vomiting	23 (46.0%)
Cessation of stool and flatus	11 (22.0%)
Preoperative dehydration	10 (20.0%)
ECOG performance status 3–4	17 (34.0%)
ASA class III–IV	11 (22.0%)

Tumor and Obstruction Characteristics

Plain abdominal radiography was performed in 30 patients (60.0%), while computed tomography was performed in 32 patients (64.0%).

Complete bowel obstruction was documented in 15 patients (30.0%).

Colorectal tumors accounted for the majority of cases (80.0%), followed by small bowel tumors or involvement (8.0%) and ovarian or pelvic tumors (4.0%). The most common anatomical locations were the rectosigmoid junction (14.0%), left colon (14.0%), middle rectum (10.0%), sigmoid colon (8.0%), and right colic angle (8.0%).

Table 2: Tumor and obstruction characteristics

Characteristic	Overall cohort (n = 50)
Plain abdominal radiography performed	30 (60.0%)
Computed tomography performed	32 (64.0%)
Complete bowel obstruction	15 (30.0%)
Colorectal primary tumor	40 (80.0%)
Small bowel tumor/involvement	4 (8.0%)
Ovarian or pelvic origin	2 (4.0%)
Other or unknown primary site	4 (8.0%)
Rectosigmoid junction	7 (14.0%)
Left colon	7 (14.0%)
Middle rectum	5 (10.0%)
Sigmoid colon	4 (8.0%)
Right colic angle	4 (8.0%)

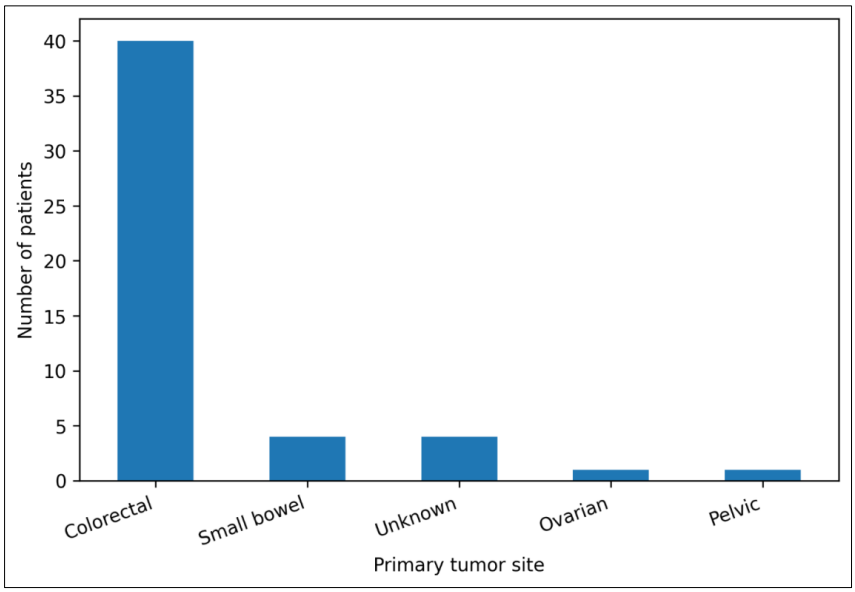

Figure 2: Distribution of primary tumor sites among patients with malignant bowel obstruction

Surgical Management and Postoperative Outcomes

Immediate emergency surgery was performed in 19 patients (38.0%), whereas 27 patients (54.0%) underwent deferred emergency surgery.

Laparotomy was the predominant surgical approach and was performed in 44 patients (88.0%). Stoma creation was required in 29 patients (58.0%), bowel resection was performed in 29 patients (58.0%),

and primary anastomosis was feasible in 21 patients (42.0%). Resection with stoma formation was performed in 13 patients (26.0%).

Preoperative, intraoperative, and postoperative complications occurred in 20.0%, 4.0%, and 24.0% of patients, respectively.

The overall postoperative mortality rate was 22.0% (11/50).

The main causes of death were acute respiratory distress syndrome (45.5%), sepsis (18.2%), severe sepsis (9.1%), sepsis associated with dehydration (9.1%), hemorrhagic shock (9.1%), and severe hypoglycemia (9.1%).

The median time from surgery to death was 4 days (interquartile range: 3–7 days).

Table 3: Surgical management and postoperative outcomes

Characteristic	Overall cohort (n = 50)
Immediate emergency surgery	19 (38.0%)
Deferred emergency surgery	27 (54.0%)
Laparotomy	44 (88.0%)
Stoma creation	29 (58.0%)
Bowel resection	29 (58.0%)
Primary anastomosis	21 (42.0%)
Resection with stoma formation	13 (26.0%)
Perioperative transfusion	5 (10.0%)
Preoperative complications	10 (20.0%)
Intraoperative complications	2 (4.0%)
Postoperative complications	12 (24.0%)
Postoperative mortality	11 (22.0%)
Time from surgery to death, median (IQR), days	4 (3–7)

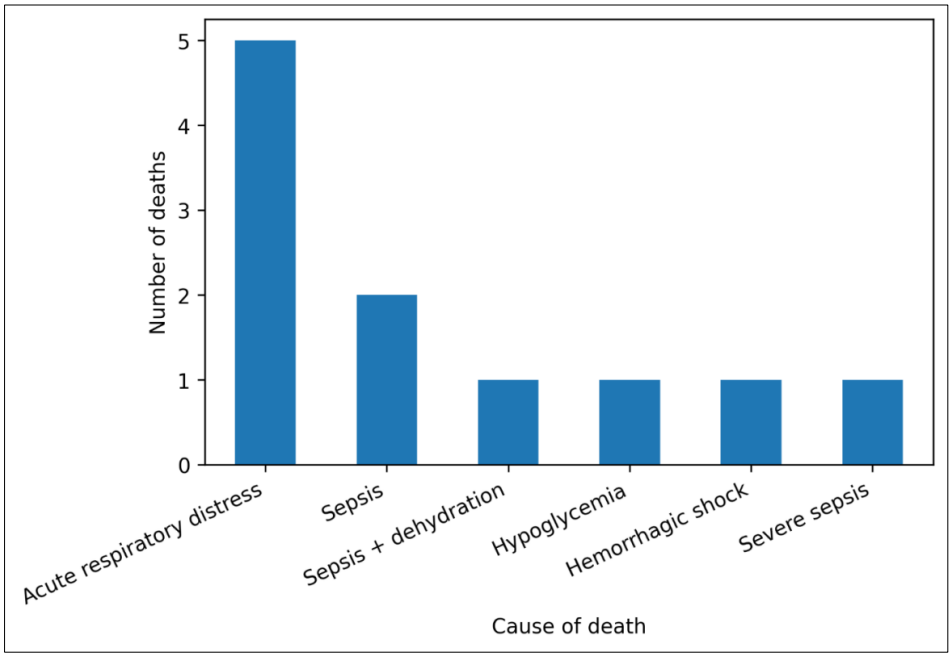

Figure 3: Causes of postoperative mortality

Factors Associated with Postoperative Mortality

In univariate analysis, previous abdominal surgery (OR = 15.40; 95% CI: 2.07–114.55; p = 0.006), vomiting (OR = 6.68; 95% CI: 1.44–31.02; p = 0.014), preoperative dehydration (OR = 5.31; 95% CI: 1.25–22.60; p = 0.030), ECOG performance status 3–4 (OR = 4.68; 95% CI: 1.20–18.33; p = 0.030), ASA class III–IV (OR = 7.41; 95% CI: 1.74–31.57; p = 0.008), complete bowel obstruction (OR = 10.52; 95% CI: 2.40–46.07; p = 0.001), immediate emergency surgery (OR = 6.02; 95% CI: 1.45–24.92; p = 0.013), resection with stoma formation (OR = 8.59; 95% CI: 2.04–36.23; p = 0.003), and postoperative complications (OR = 105.00; 95% CI: 12.39–889.61; p < 0.001) were significantly associated with postoperative mortality.

Table 4: Univariate analysis of factors associated with postoperative mortality

Variable	OR	95% CI	p-value
Age >55 years	1.09	0.30–3.98	1.000
Male sex	0.48	0.13–1.80	0.297
Previous abdominal surgery	15.40	2.07–114.55	0.006
Comorbidity	1.69	0.43–6.60	0.476
Vomiting	6.68	1.44–31.02	0.014
Preoperative dehydration	5.31	1.25–22.60	0.030
ECOG 3–4	4.68	1.20–18.33	0.030
ASA III–IV	7.41	1.74–31.57	0.008
Complete bowel obstruction	10.52	2.40–46.07	0.001
Immediate emergency surgery	6.02	1.45–24.92	0.013
Any stoma	3.61	0.79–16.61	0.092
Resection with stoma formation	8.59	2.04–36.23	0.003
Postoperative complications	105.00	12.39–889.61	<0.001

Variables with p-values <0.20 in univariate analysis and those considered clinically relevant were entered into a multivariable logistic regression model.

In the adjusted analysis, resection with stoma formation remained independently associated with postoperative mortality (adjusted OR = 24.63; 95% CI: 2.13–284.48; p = 0.010).

Vomiting (adjusted OR = 7.24; 95% CI: 0.71–73.48; p = 0.094), immediate emergency surgery (adjusted OR = 5.87; 95% CI: 0.70–49.03; p = 0.102), poor ECOG performance status (adjusted OR = 2.78; 95% CI: 0.20–37.80; p = 0.442), and preoperative dehydration (adjusted OR = 1.61; 95% CI: 0.19–13.93; p = 0.666) showed clinically relevant associations but did not retain statistical significance after adjustment.

The limited number of events (11 deaths) and sparse data may have reduced the statistical power of the multivariable model.

Table 5: Multivariable logistic regression analysis of factors associated with postoperative mortality

Variable	Adjusted OR	95% CI	p-value
Vomiting	7.24	0.71–73.48	0.094
Preoperative dehydration	1.61	0.19–13.93	0.666
ECOG 3–4	2.78	0.20–37.80	0.442
Immediate emergency surgery	5.87	0.70–49.03	0.102
Resection with stoma formation	24.63	2.13–284.48	0.010

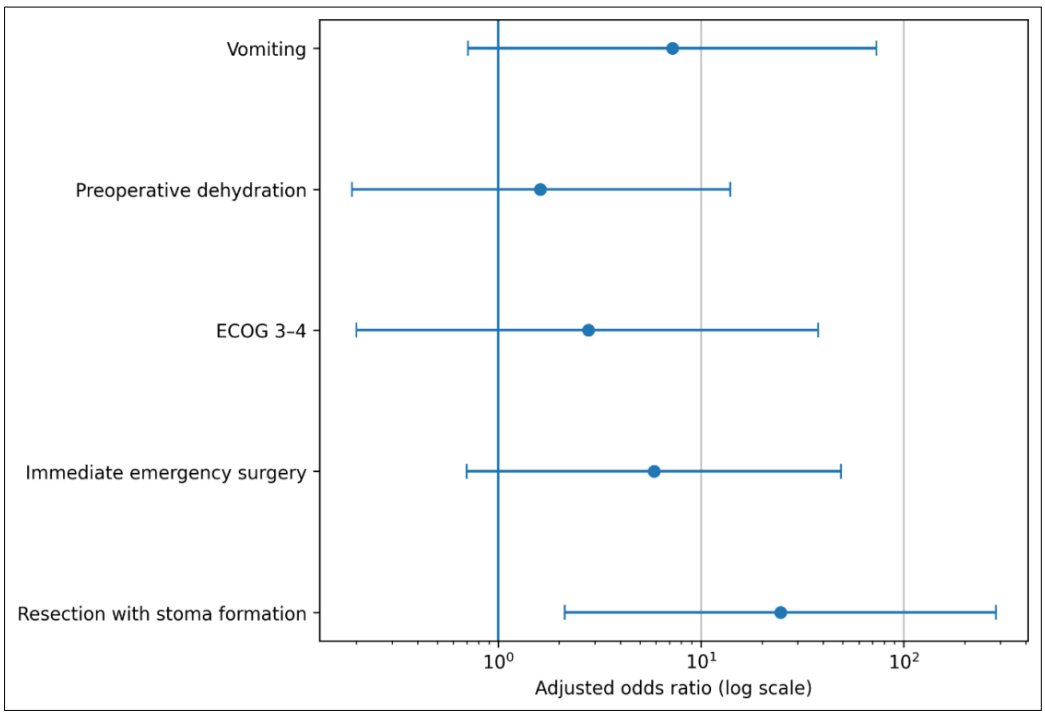

Figure 4: Forest plot of independent predictors of postoperative mortality in the multivariable logistic regression model

DISCUSSION

This multicenter study provides one of the first analyses of malignant bowel obstruction (MBO) in Cameroon and contributes to the limited body of evidence from sub-Saharan Africa. We found that MBO accounted for 17.4% of all intestinal obstructions and 3.7% of acute abdominal emergencies. Colorectal cancer was the predominant underlying malignancy, and the postoperative mortality rate reached 22.0%. Factors associated with mortality included previous abdominal surgery, vomiting, preoperative dehydration, poor performance status, complete bowel obstruction, immediate emergency surgery, resection with stoma formation, and postoperative complications. In the multivariable analysis, resection with stoma formation remained the only independent predictor of postoperative mortality.

The postoperative mortality rate observed in our study is consistent with previous reports from low- and middle-income countries, where mortality rates ranging from 16% to 30% have been described [17, 18]. Similar findings have been reported in studies from Nigeria, Côte d'Ivoire, and Morocco, where delayed presentation, advanced disease stage, and limited access to multidisciplinary cancer care substantially increased mortality [19–21]. In contrast, studies from high-income settings generally report lower mortality rates, ranging from 6% to 15%, owing to earlier diagnosis, improved perioperative care, and wider access to minimally invasive palliative strategies, including self-expanding metallic stents and specialized palliative care teams [8-22].

The predominance of colorectal tumors in our cohort is in agreement with previous international studies identifying colorectal cancer as the leading cause of MBO [6-23]. The rectosigmoid junction and left colon were the most frequently involved sites, reflecting the high propensity of distal colorectal tumors to present with obstructive symptoms. The relatively small proportion of ovarian and small bowel malignancies in our study may reflect differences in local cancer epidemiology and referral patterns.

Nearly two-thirds of patients underwent computed tomography, while laparotomy remained the predominant surgical approach. This finding highlights the persistent gap in access to minimally invasive and endoscopic therapeutic options in resource-limited settings. Current international guidelines recommend considering endoscopic stenting as a bridge to surgery or as definitive palliation in selected patients with malignant large bowel obstruction [10, 11]. However, such interventions remain largely unavailable in many sub-Saharan African countries, making emergency surgery the only feasible option for most patients [12, 13].

Several clinical variables were associated with postoperative mortality in univariate analysis. Vomiting and preoperative dehydration significantly increased the risk of death, likely reflecting prolonged obstruction, severe fluid losses, electrolyte disturbances, and delayed presentation. Similar associations have been reported in previous studies demonstrating that preoperative physiological derangements are major determinants of postoperative outcomes in emergency digestive surgery [24, 25].

Poor functional status, as reflected by ECOG scores of 3–4 and ASA classes III–IV, was also associated with increased mortality. These findings underscore the importance of patient frailty and reduced physiological reserve in determining postoperative outcomes. Performance status has consistently been identified as a key prognostic factor in patients with advanced malignancies and MBO [26, 27].

Complete bowel obstruction and immediate emergency surgery were strongly associated with mortality. Patients requiring urgent intervention often present with bowel ischemia, perforation, severe malnutrition, or sepsis, all of which contribute to poorer outcomes [28]. These findings emphasize the need for earlier diagnosis and referral to specialized centers before the onset of life-threatening complications.

Resection with stoma formation was the only factor independently associated with mortality in the multivariable analysis. This procedure is generally reserved for patients with extensive disease, compromised bowel viability, or poor physiological status, suggesting that it may represent a surrogate marker of disease severity rather than a direct cause of mortality. Similar observations have been reported in previous studies evaluating surgical outcomes in MBO [29, 30].

Postoperative complications demonstrated the strongest association with mortality in univariate analysis. Although this variable was not included in the multivariable model because of its temporal relationship with the outcome, its impact highlights the importance of perioperative optimization, enhanced recovery protocols, and close postoperative monitoring.

Our findings have important implications for clinical practice in resource-constrained settings. Early recognition of high-risk patients based on simple clinical variables such as dehydration, performance status, and severity of obstruction may facilitate risk stratification and improve perioperative management. Expanding access to cross-sectional imaging, multidisciplinary tumor boards, nutritional support, and palliative interventions could further improve outcomes.

This study has several limitations. First, its retrospective design exposed it to potential information

and selection biases. Second, the relatively small sample size and limited number of deaths reduced the statistical power of the multivariable analysis and may have contributed to wide confidence intervals. Third, substantial missing data prevented the inclusion of important prognostic variables, particularly tumor stage and TNM classification. Finally, the absence of endoscopic stenting and other minimally invasive palliative options limits the generalizability of our findings to settings with greater therapeutic resources.

Despite these limitations, this study has several strengths. It is, to our knowledge, one of the first multicenter studies specifically investigating predictors of mortality in MBO in Cameroon. The inclusion of patients from two tertiary referral centers enhances the external validity of our findings and provides valuable evidence to guide management strategies in similar low-resource settings.

CONCLUSION

Malignant bowel obstruction remains a frequent and severe surgical emergency in Cameroon, accounting for a substantial proportion of intestinal obstructions and carrying a high postoperative mortality rate.

Colorectal cancer was the leading underlying malignancy, and emergency surgery remained the primary treatment modality because of limited access to alternative palliative interventions.

Previous abdominal surgery, vomiting, preoperative dehydration, poor performance status, complete bowel obstruction, immediate emergency surgery, and resection with stoma formation were associated with postoperative mortality. After adjustment, resection with stoma formation remained the only independent predictor of death.

Early diagnosis, prompt referral, aggressive preoperative optimization, and the development of multidisciplinary management pathways, including access to endoscopic and palliative care services, are essential to improve outcomes in resource-limited settings.

Prospective multicenter studies with larger sample sizes are warranted to validate these findings and develop context-specific prognostic models for malignant bowel obstruction in sub-Saharan Africa.

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Cite This Article: Jean Paul Engbang, Fred Dikongue, Valery Onana Mvondo, Basile Essola, Patrick Stephane Koufanet, Achille Many Essomba (2026). Predictors of Mortality in Malignant Bowel Obstruction: A Six-Year Multicenter Study from Cameroon. *East African Scholars J Med Surg, 8*(6), 311-320.