

Original Research Article

Predictors of Mortality in Adult Postoperative Peritonitis in a Resource-Limited Setting: A Five-Year Multicenter Study from Douala, Cameroon

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Abstract: Postoperative peritonitis (POP) remains a severe complication of abdominal surgery, particularly in resource-limited settings, where delayed diagnosis and limited access to critical care contribute to poor outcomes. This study aimed to determine the prevalence, clinical characteristics, management modalities, and predictors of mortality among adults with postoperative peritonitis in Douala, Cameroon. We conducted a retrospective multicenter analytical study in two tertiary hospitals from January 2020 to December 2024. Adult patients diagnosed with postoperative peritonitis after abdominal or abdominopelvic surgery were included. Data were extracted from medical records and analyzed using univariate logistic regression. Among 4,763 laparotomies performed during the study period, 68 cases of postoperative peritonitis were identified, yielding a prevalence of 1.4%. After exclusion of incomplete records, 51 patients were included in the final analysis. The mean age was 35.4 ± 13.9 years, and women accounted for 82.4% of cases. Overall in-hospital mortality was 51.0%. The most frequent clinical features were abdominal pain (92.2%), abdominal guarding (86.3%), tachycardia (82.4%), and fever (76.5%). Deep suppuration (35.3%) and intestinal perforation (23.5%) were the most common intraoperative findings. Mortality was significantly associated with postoperative sepsis (OR 40.25, $p < 0.001$), multiorgan failure (OR 37.84, $p < 0.001$), vasopressor use (OR 17.60, $p = 0.002$), prothrombin time $< 50\%$ (OR 8.84, $p = 0.050$), intensive care monitoring (OR 6.98, $p = 0.002$), and blood transfusion (OR 4.55, $p = 0.020$). Postoperative peritonitis remains an uncommon but highly lethal complication in our setting. Early diagnosis, prompt surgical source control, and optimized critical care support are essential to improve patient outcomes.

Keywords: Postoperative peritonitis, abdominal sepsis, mortality, risk factors, relaparotomy, intensive care, postoperative complications, Cameroon.

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INTRODUCTION

Postoperative peritonitis (POP) is one of the most severe forms of secondary intra-abdominal infection occurring after abdominal surgery. Despite advances in surgical techniques, antimicrobial therapy, perioperative monitoring and critical care, POP remains associated with considerable morbidity and mortality worldwide [1, 2]. It represents a life-threatening complication requiring prompt diagnosis, aggressive resuscitation and effective surgical source control to prevent progression toward sepsis, septic shock and multiple organ dysfunction syndrome [3].

The incidence of postoperative peritonitis ranges from 1% to 4% of abdominal surgical procedures, depending on the type of surgery, patient characteristics and institutional practices [4, 5]. Although relatively uncommon, POP accounts for a disproportionate share of postoperative deaths because of delayed diagnosis, persistent intra-abdominal contamination and severe systemic inflammatory responses [6]. International series have reported mortality rates varying from 20% to over 60%, particularly among critically ill patients admitted to intensive care units [7, 8].

Early diagnosis remains challenging because postoperative physiological changes may mask the

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classical manifestations of peritonitis. Clinical findings such as fever, abdominal pain, ileus, wound infection and altered general condition are often non-specific during the postoperative period [9]. Consequently, diagnosis relies on a combination of clinical assessment, laboratory abnormalities and imaging studies, particularly contrast-enhanced computed tomography, which remains the diagnostic modality of choice in most patients [10, 11].

The management of POP is multidisciplinary and combines prompt hemodynamic stabilization, broad-spectrum antimicrobial therapy, organ support and timely surgical source control [3-12]. Current recommendations from the World Society of Emergency Surgery emphasize the importance of rapid reintervention, adequate peritoneal lavage and drainage, and early recognition of organ dysfunction to improve outcomes [3]. Nevertheless, mortality remains substantial, especially in low- and middle-income countries where access to intensive care, advanced imaging and microbiological investigations may be limited [13].

Several predictors of mortality have been identified in previous studies. Advanced age, delayed diagnosis, septic shock, coagulopathy, organ failure, need for vasopressor support, intensive care admission, postoperative sepsis and inadequate source control have consistently been associated with poor prognosis [7–16]. However, most available evidence originates from Europe, North America and Asia, whereas data from sub-Saharan Africa remain scarce.

In Africa, published studies have mainly focused on generalized peritonitis, surgical site infections and emergency abdominal surgery, with relatively few reports specifically addressing postoperative peritonitis [17–19]. In Cameroon, available data suggest that postoperative peritonitis constitutes an important cause of postoperative

morbidity and mortality, yet determinants of mortality remain insufficiently characterized [20]. Identification of these factors is essential for improving perioperative surveillance, optimizing surgical decision-making and strengthening critical care strategies in resource-limited settings.

The present study therefore aimed to determine the prevalence, clinical characteristics, therapeutic modalities and factors associated with mortality among adults managed for postoperative peritonitis in two tertiary hospitals in Douala, Cameroon.

MATERIALS AND METHODS

Study Design

We conducted a retrospective multicenter analytical study over a five-year period, from January 1, 2020 to December 31, 2024.

Study Setting

The study was carried out in two tertiary hospitals in Douala, Cameroon: the Douala General Hospital and the Douala Laquintinie Hospital. These institutions are major referral centers for emergency surgery, digestive surgery, gynecologic and obstetric surgery, anesthesia, intensive care and postoperative management.

Study Population

The target population consisted of adult patients who underwent abdominal or abdominopelvic surgery during the study period. The study population included all patients aged 18 years or older who were diagnosed with postoperative peritonitis during the study period. A total of 68 cases of postoperative peritonitis were identified among 4,763 laparotomies performed. Seventeen medical records were excluded from the analytical phase because of incomplete data, leaving 51 patients available for final analysis.

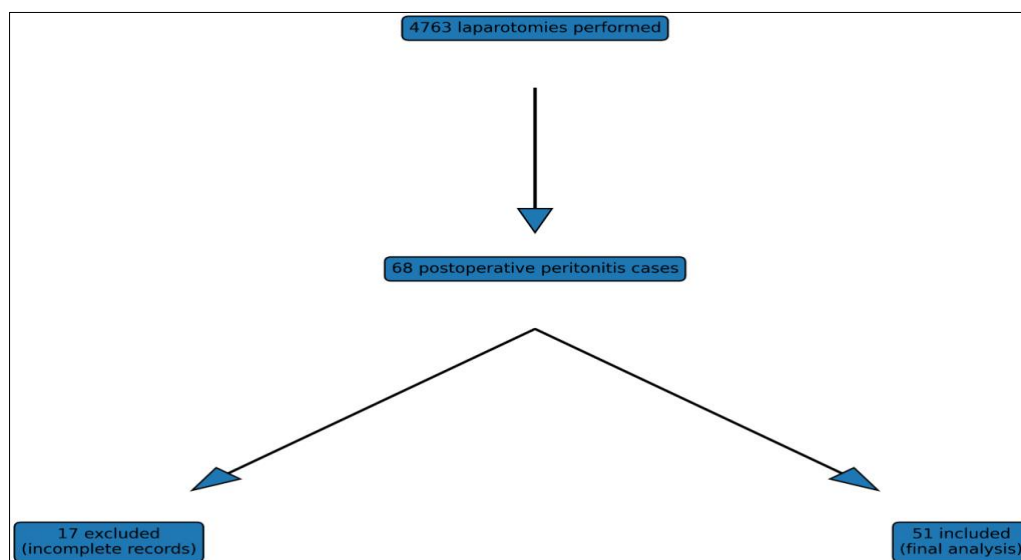


Figure 1: STROBE Flow Diagram of patient selection

Inclusion Criteria

Patients were included if they met all of the following criteria:

1. Age 18 years or older.
2. History of abdominal or abdominopelvic surgery.
3. Diagnosis of postoperative peritonitis based on clinical, biological, radiological and/or intraoperative findings.
4. Complete medical record containing outcome data.

Exclusion Criteria

Patients were excluded if they had primary peritonitis, traumatic peritonitis unrelated to a previous surgical procedure, incomplete outcome data, or missing essential clinical information.

Definition of Postoperative Peritonitis

Postoperative peritonitis was defined as an intra-abdominal infection occurring after abdominal or abdominopelvic surgery, suspected clinically and confirmed by biological, radiological or intraoperative findings. Clinical suspicion included postoperative abdominal pain, fever, altered general condition, peritoneal signs, ileus, purulent wound discharge, septic syndrome or organ dysfunction.

Study Variables

The dependent variable was in-hospital mortality.

Independent variables included:

- Sociodemographic variables: age, sex.
- Clinical variables: general condition, fever, abdominal pain, peritoneal signs, sepsis, shock.
- Biological variables: hemoglobin level, white blood cell count, platelet count, prothrombin time, renal function.
- Initial surgical variables: indication for initial surgery, type of initial procedure, emergency or elective setting.
- Diagnostic variables: clinical diagnosis, biological findings, imaging findings.
- Therapeutic variables: relaparotomy, drainage, peritoneal lavage, antibiotic therapy, blood transfusion, vasopressor use, intensive care admission.

- Postoperative outcome variables: surgical site infection, multiorgan failure, postoperative sepsis, length of hospital stay and death.

Data Collection

Data were collected retrospectively from medical records, operative reports, anesthesia records, intensive care files, laboratory results and hospitalization registers using a standardized data extraction form.

Statistical Analysis

Data were analyzed using R software. Quantitative variables were summarized using means and standard deviations or medians and interquartile ranges, depending on distribution. Qualitative variables were summarized as frequencies and percentages.

Comparisons between survivors and non-survivors were performed using the Chi-square test or Fisher’s exact test for categorical variables and Student’s t-test or Mann–Whitney U test for continuous variables, as appropriate.

Univariate logistic regression analyses were performed to identify factors associated with mortality. Owing to the limited sample size and the low number of outcome events, multivariable modelling was not considered sufficiently robust.

Ethical Considerations

The study was conducted using anonymized retrospective data. Patient confidentiality was strictly preserved. Administrative and ethical approvals were obtained according to institutional requirements.

RESULTS

Study Population

During the study period, 4,763 laparotomies were performed in the participating hospitals. Sixty-eight patients developed postoperative peritonitis, yielding an overall prevalence of 1.4%. Seventeen records were incomplete and excluded from the analytical phase. Consequently, 51 patients were included in the final analysis. The mean age was 35.4 ± 13.9 years, with a range from 18 to 71 years. The 18–30-year age group was the most represented. Females predominated, accounting for 82.4% of cases. Overall in-hospital mortality was 51.0%.

Table 1: Sociodemographic characteristics of patients with postoperative peritonitis

Variable	n	%
Total population	51	100
Age, mean ± SD, years	35.4 ± 13.9	—
Age group		
18–30 years	23	45.1
31–40 years	13	25.5
41–50 years	7	13.7
51–60 years	5	9.8
>60 years	3	5.9

Variable	n	%
Sex		
Female	42	82.4
Male	9	17.6
Marital status		
Single	37	72.5
Married	13	25.5
Widowed	1	2.0
Residence		
Urban area	49	96.1
Rural area	2	3.9

Medical Background

The most frequent medical history was HIV infection, found in 11.8% of patients. Hypertension was present in 7.8%, neoplasia in 5.9%, and diabetes in 2.0%.

Table 2: Medical history and comorbidities

Variable	n	%
HIV infection	6	11.8
Hypertension	4	7.8
Neoplasia	3	5.9
Alcohol use	3	5.9
Diabetes mellitus	1	2.0
Corticosteroid therapy	1	2.0
Renal disease	0	0.0
Cardiac disease	0	0.0
Smoking	0	0.0

Initial Surgical Characteristics

Most patients had undergone their initial operation in another hospital. Gynecologic and obstetric surgery was the predominant initial surgical category.

Table 3: Initial surgical characteristics

Variable	n	%
Place of initial surgery		
Other hospital	40	78.4
Same hospital	11	21.6
Emergency initial surgery		
Yes	35	68.6
No	15	29.4
Missing	1	2.0
Type of initial surgery		
Gynecologic/obstetric surgery	37	72.5
Digestive surgery	12	23.5
Other visceral surgery	2	3.9

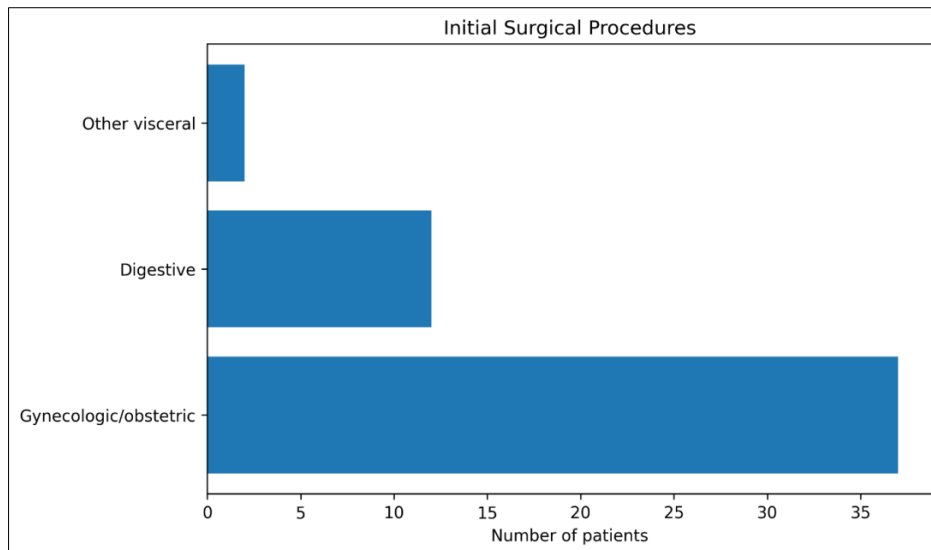


Figure 2: Distribution of Initial Surgical Procedures

Clinical Presentation: Abdominal pain, abdominal guarding, tachycardia and fever were the most frequent clinical features.

Table 4: Clinical presentation at diagnosis

Clinical sign	n	%
Abdominal pain	47	92.2
Abdominal guarding	44	86.3
Tachycardia	42	82.4
Fever	39	76.5
Pelvic tenderness	34	66.7
Vomiting	11	21.6
Dyspnea	6	11.8
Hypotension	5	9.8
Oliguria	3	5.9
Contracture	2	3.9
Meteorism	2	3.9
Jaundice	1	2.0

Operative Findings and Surgical Management

Deep suppuration was the most common intraoperative finding, followed by intestinal perforation

and intestinal necrosis. The most frequently performed procedure was abdominal lavage, followed by stoma creation and bowel resection with anastomosis.

Table 5: Intraoperative findings at reoperation

Finding	n	%
Deep suppuration	18	35.3
Intestinal perforation	12	23.5
Intestinal necrosis	7	13.7
Uterine perforation	4	7.8
Caecal perforation	3	5.9
Suture breakdown	3	5.9
Uterine necrosis	2	3.9
Digestive fistula	1	2.0
Intraoperative effusion	1	2.0

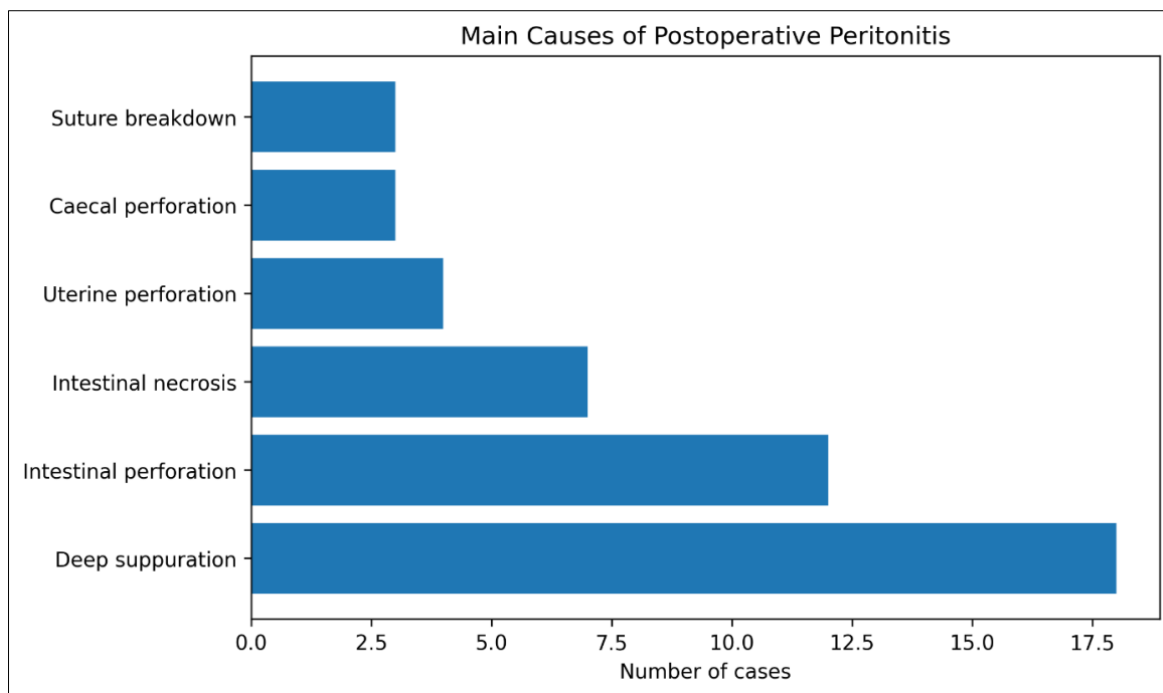


Figure 3: Main Intraoperative Findings at Reoperation

Table 6: Surgical procedures performed

Procedure	n	%
Abdominal lavage	19	37.3
Stoma creation	9	17.6
Bowel resection with anastomosis	8	15.7
Suture	7	13.7
Bowel resection with stoma	6	11.8
Hysterectomy	1	2.0
Necrosectomy	1	2.0

Biological Findings

Anemia was frequent, with a mean hemoglobin level of 9.1 ± 1.9 g/dL. Hyperleukocytosis was common.

Prothrombin time was available in 25 patients, with PT <50% observed in 8 cases.

Table 7: Main biological findings

Parameter	Available data	Mean ± SD / n (%)
Hemoglobin, g/dL	46	9.1 ± 1.9
Hemoglobin <8 g/dL	46	14 (30.4)
Leukocytes, /mm ³	46	19,927 ± 31,768
Leukocytes >12,000/mm ³	46	27 (58.7)
Platelets, /mm ³	46	320,722 ± 195,192
Platelets <150,000/mm ³	46	9 (19.6)
Prothrombin time, %	25	57.9 ± 15.9
PT <50%	25	8 (32.0)
Creatinine, mg/L	35	12.8 ± 7.8
Creatinine >12 mg/L	35	14 (40.0)

Postoperative Course and Mortality

Twenty-six patients died, corresponding to an in-hospital mortality rate of 51.0%. Postoperative sepsis

occurred in 52.9% of patients. Intensive care monitoring was required in 51.0% of cases. Vasopressors were used in 23.5% of patients.

Table 8: Postoperative management and outcome

Variable	n	%
ICU postoperative monitoring	26	51.0
Standard ward monitoring	25	49.0
Any blood transfusion	33	64.7
Vasopressor use	12	23.5
Postoperative sepsis	27	52.9
Other organ infection	22	43.1
Any postoperative complication	30	58.8
Multiorgan failure	11	21.6
Surgical site infection	5	9.8
Enterocutaneous fistula	5	9.8
Death	26	51.0

Factors Associated with Mortality

In univariate analysis, mortality was significantly associated with postoperative sepsis, other organ infection, multiorgan failure, ICU postoperative

monitoring, vasopressor use, any postoperative complication, blood transfusion and PT <50%. Effective antibiotic therapy was strongly associated with survival.

Table 9: Univariate analysis of factors associated with mortality

Variable	Survivors n (%)	Deaths n (%)	COR (95% CI)	p-value
Other organ infection	1 (4.5)	21 (95.5)	100.80 (10.89–933.23)	<0.001
Postoperative sepsis	4 (14.8)	23 (85.2)	40.25 (8.05–201.29)	<0.001
Multiorgan failure	0 (0.0)	11 (100.0)	37.84 (2.08–688.37)	<0.001
Vasopressor use	1 (8.3)	11 (91.7)	17.60 (2.06–150.55)	0.002
PT <50%	1 (12.5)	7 (87.5)	8.84 (1.00–78.22)	0.050
ICU monitoring	7 (26.9)	19 (73.1)	6.98 (2.04–23.88)	0.002
Any postoperative complication	10 (33.3)	20 (66.7)	5.00 (1.49–16.83)	0.011
Blood transfusion	12 (36.4)	21 (63.6)	4.55 (1.30–15.91)	0.020
Severe general condition (S4)	2 (20.0)	8 (80.0)	5.11 (0.96–27.09)	0.075
Diagnosis-to-surgery delay >24 h	7 (33.3)	14 (66.7)	3.00 (0.94–9.62)	0.089
Creatinine >12 mg/L	4 (28.6)	10 (71.4)	3.28 (0.87–12.40)	0.116
Hemoglobin <8 g/dL	4 (28.6)	10 (71.4)	3.28 (0.87–12.40)	0.116

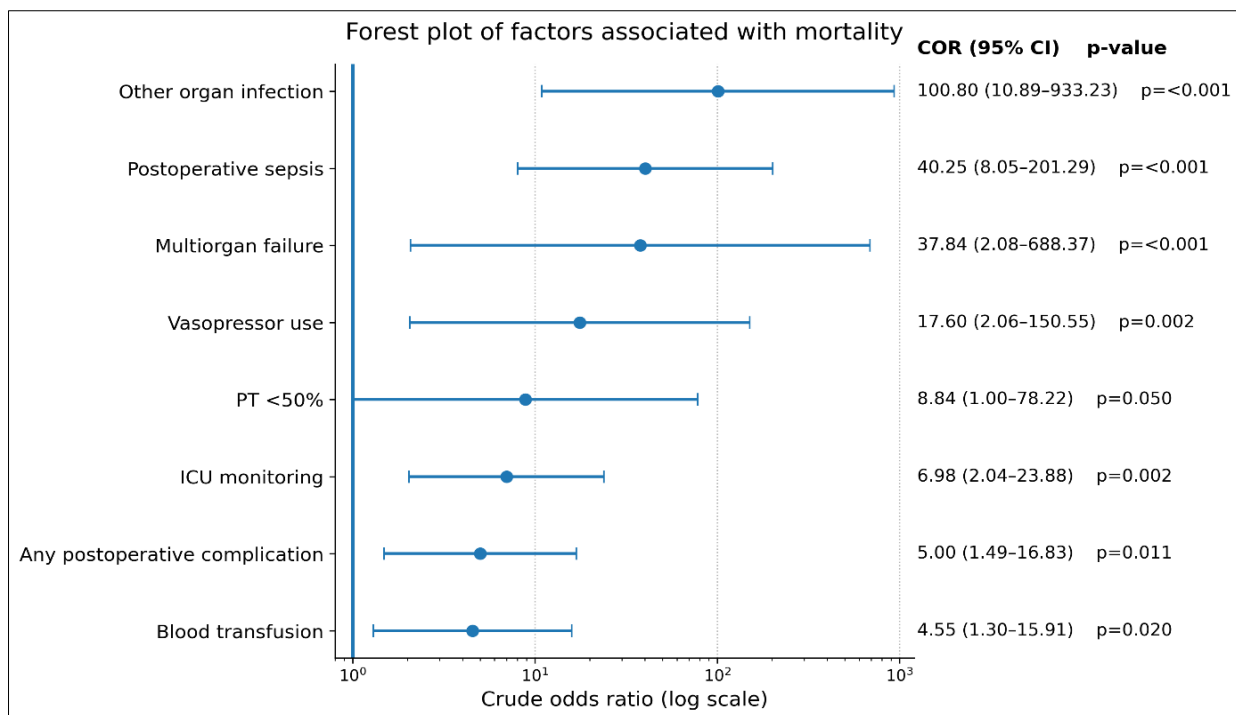


Figure 4: Forest Plot of Predictors of Mortality

Because of the small sample size and sparse data for several variables, these results should be interpreted as exploratory. Variables such as vasopressor use, ICU monitoring and transfusion are best interpreted as markers of severe illness rather than direct causal factors of death.

DISCUSSION

Postoperative peritonitis remains one of the most severe complications of abdominal surgery and continues to be associated with substantial mortality worldwide. The present study provides one of the few analyses from Cameroon focusing specifically on predictors of mortality among adults with postoperative peritonitis.

Epidemiological Profile

The prevalence of postoperative peritonitis in our study was 1.4%, which is consistent with the rates reported internationally. Previous studies have reported incidences ranging from 1% to 4% of abdominal surgical procedures [2-4]. Similar prevalences were reported by Velychko *et al.*, in Ukraine (2.3%) and Bengaly *et al.*, in Mali (1.3%) [3-11]. These findings confirm that postoperative peritonitis remains relatively uncommon but constitutes a major surgical complication because of its severe clinical consequences.

The mean age of our patients was 35 years, which is younger than that reported in most European and North African series. Ait Jaad *et al.*, reported a mean age of 47.9 years in Morocco, whereas Tirizite *et al.*, reported 53.3 years [5, 6]. This difference may reflect the demographic structure of sub-Saharan African populations, characterized by a younger age distribution and a high proportion of obstetric and gynecological surgical procedures performed in women of reproductive age.

The marked female predominance observed in our study can be explained by the high proportion of gynecological and obstetric procedures, which represented more than two-thirds of the initial interventions. Similar observations have been reported in several African studies where obstetric emergencies contribute substantially to postoperative infectious complications [7-13].

Mortality of Postoperative Peritonitis

The overall mortality rate observed in the analytical cohort was 51.0%, highlighting the extreme severity of postoperative peritonitis in our setting. Although the overall prevalence of postoperative peritonitis was calculated from the 68 identified cases, mortality analyses were performed on the 51 patients with complete records available for review. This rate is considerably higher than the 16.7% reported by Bengaly *et al.*, in Mali [11], but remains comparable to the mortality rates reported by Benlamkaddem *et al.*, in Morocco (60%) and several intensive care series from

Europe where mortality ranges between 30% and 60% [10-16].

The persistently high mortality associated with postoperative peritonitis reflects the combined impact of delayed diagnosis, severe intra-abdominal sepsis, organ dysfunction, and the need for repeated surgical interventions. In resource-limited environments, additional factors such as delayed referral, limited access to intensive care units, restricted microbiological support, and financial constraints may further worsen outcomes.

Influence of Coagulopathy on Mortality

One of the major findings of this study was the association between a prothrombin time below 50% and mortality. Coagulopathy is a well-recognized marker of severe sepsis and disseminated intravascular coagulation. During severe abdominal sepsis, inflammatory mediators activate coagulation pathways, leading to consumption of clotting factors, microvascular thrombosis and impaired tissue perfusion. Consequently, a low prothrombin time reflects advanced physiological deterioration and is often associated with multiorgan dysfunction and poor prognosis [14-16].

Similar observations have been reported in critically ill patients with abdominal sepsis, where coagulation abnormalities were independently associated with mortality and prolonged intensive care stay [15]. Therefore, routine coagulation monitoring should be integrated into the management of postoperative peritonitis patients.

Impact of Intensive Care Requirements

The need for postoperative intensive care monitoring, vasopressor support and blood transfusion was significantly associated with mortality in our study. These variables should not necessarily be interpreted as direct causes of death but rather as markers of disease severity.

Vasopressor use generally reflects the presence of septic shock, persistent hypotension and severe circulatory failure. Septic shock remains one of the strongest predictors of mortality in abdominal sepsis because it leads rapidly to tissue hypoperfusion, multiorgan failure and death despite adequate source control [3-15].

Similarly, admission to intensive care units identifies patients presenting with severe physiological derangements requiring organ support. Several studies have demonstrated that mortality increases substantially among postoperative peritonitis patients requiring mechanical ventilation, vasopressor therapy or renal replacement therapy [6-14].

Blood transfusion was also associated with mortality. Although transfusion itself is not necessarily

harmful, it often reflects major blood loss, severe anemia, repeated surgical interventions or profound systemic inflammation. Previous studies have similarly reported increased mortality among transfused patients with severe intra-abdominal infections [15].

Role of Postoperative Infectious Complications

Postoperative sepsis and other postoperative infectious complications were strongly associated with mortality in our study. These findings are biologically plausible because postoperative sepsis represents progression from localized intra-abdominal infection toward systemic inflammatory response syndrome, septic shock and multiorgan dysfunction.

The occurrence of postoperative sepsis increased the risk of death substantially, confirming observations from European and African cohorts [10-14]. Early identification and aggressive treatment of sepsis remain crucial components of postoperative peritonitis management. Current international guidelines emphasize rapid antimicrobial administration, adequate source control and hemodynamic resuscitation as key interventions capable of improving survival [1-3].

The association between surgical site infection and mortality may indicate inadequate infection control, delayed diagnosis or persistent intra-abdominal contamination. Surgical site infection should therefore be considered an early warning sign requiring prompt reassessment of source control adequacy.

Clinical Implications for Low-Resource Settings

The findings of this study have important implications for surgical practice in sub-Saharan Africa. First, early recognition of postoperative peritonitis should be emphasized through vigilant postoperative surveillance. Second, rapid surgical source control remains essential and should not be delayed once the diagnosis is suspected. Third, patients presenting with coagulopathy, septic complications or hemodynamic instability should be considered high-risk and managed aggressively, ideally in specialized intensive care units.

Strengthening critical care capacity, improving access to laboratory monitoring and promoting standardized sepsis management protocols may contribute significantly to reducing mortality associated with postoperative peritonitis in Cameroon and similar resource-limited settings.

Strengths and Limitations

The main strength of this study is that it provides one of the first multicenter analyses of mortality predictors in postoperative peritonitis from Cameroon. However, several limitations should be acknowledged. Seventeen eligible patients were excluded because of incomplete medical records, which may have introduced selection bias. The retrospective design exposed the

study to information bias and missing data. The relatively small sample size and limited number of deaths precluded reliable multivariable analyses. Furthermore, microbiological investigations and severity scores such as APACHE II and Mannheim Peritonitis Index were not consistently available.

Despite these limitations, the study provides valuable evidence regarding factors associated with mortality and offers practical guidance for improving patient management in low-resource environments.

CONCLUSION

Postoperative peritonitis remains an uncommon but highly lethal complication of abdominal and abdominopelvic surgery in our setting. In this multicenter study conducted in two tertiary hospitals in Douala, the prevalence of postoperative peritonitis was low, yet nearly one out of every two affected patients died, highlighting the considerable burden of this condition on surgical practice and patient survival.

The present study identified several factors significantly associated with mortality, including prothrombin time <50%, postoperative intensive care monitoring, blood transfusion, vasopressor use, postoperative sepsis, other organ infection, multiorgan failure and postoperative complications. These factors essentially reflect advanced disease severity, systemic inflammatory response and organ dysfunction occurring during the course of postoperative abdominal sepsis.

Our findings emphasize that the prognosis of postoperative peritonitis depends largely on early recognition, timely surgical source control and adequate perioperative critical care support. Delays in diagnosis and treatment may allow progression toward septic shock, multiorgan failure and death. Consequently, patients presenting with clinical deterioration, coagulation abnormalities or septic complications should be considered at particularly high risk and managed aggressively.

In resource-limited settings such as Cameroon, improving outcomes will require strengthening postoperative surveillance systems, facilitating early access to diagnostic investigations, optimizing resuscitation protocols, improving intensive care capacity and promoting standardized management pathways for abdominal sepsis.

Further prospective multicenter studies with larger sample sizes are needed to validate these predictors and develop locally adapted prognostic models capable of identifying high-risk patients at an early stage. Such strategies could contribute substantially to reducing mortality and improving the quality of surgical care in sub-Saharan Africa.

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