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.v08i06.010

Original Research Article

Surgical Biliary Bypass for Advanced Pancreatic Cancer in Cameroon: Postoperative Morbidity and Survival in a 10-Year Bicentric Cohort

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Article History
Received: 02.05.2026
Accepted: 17.06.2026
Published: 19.06.2026

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

Quick Response Code

Abstract: ***Background*:** Surgical biliary bypass remains an important palliative option for patients with advanced pancreatic cancer in settings where endoscopic biliary drainage and interventional oncology are not consistently available. However, data on postoperative outcomes and survival after biliodigestive bypass in sub-Saharan Africa remain scarce. This study aimed to evaluate surgical procedures, postoperative morbidity, and survival after biliodigestive bypass for pancreatic cancer in two tertiary hospitals in Douala, Cameroon. ***Methods*:** We conducted a retrospective bicentric cohort study including patients who underwent surgical biliodigestive bypass for pancreatic cancer at Douala General Hospital and Laquintinie Hospital of Douala between January 2013 and December 2022. Sociodemographic, clinical, biological, radiological, operative, postoperative, and survival data were collected from medical records. Postoperative complications and survival outcomes were analyzed. Overall survival was estimated from the date of surgery to death or last follow-up. ***Results*:** Forty patients were included. The mean age was 60.1 ± 12.9 years, and 24 patients (60.0%) were male. All patients presented with stage IV disease. The most frequently performed biliary procedures were choledochoduodenostomy in 18 patients (45.0%) and choledochojejunostomy in 16 patients (40.0%). Gastroenterostomy was associated in all cases. Roux-en-Y double bypass was performed in 17 patients (42.5%), while an omega-loop configuration was used in 2 patients (5.0%). Overall postoperative morbidity within 30 days was 57.5%. The most common complications were surgical site infection in 5 patients (12.5%), biliary fistula in 3 patients (7.5%), and digestive fistula in 3 patients (7.5%). The median overall survival was 2.6 months (78 days). The estimated 1-month and 6-month survival rates were 87.5% and 12.5%, respectively. In multivariable analysis, diabetes mellitus (adjusted HR: 2.65, 95% CI: 1.10–6.38; p = 0.030) and smoking (adjusted HR: 2.36, 95% CI: 1.05–5.31; p = 0.039) were independently associated with poorer overall survival. ***Conclusion*:** In this bicentric Cameroonian cohort, surgical biliodigestive bypass for advanced pancreatic cancer was mainly performed as double bypass, most often combining biliary drainage with gastroenterostomy. Although postoperative morbidity was acceptable, survival remained poor, reflecting late-stage presentation and limited access to multimodal oncologic care. These findings highlight the need for earlier diagnosis, improved access to endoscopic palliation, and strengthened pancreatic cancer care pathways in low-resource settings.

Keywords: Pancreatic Cancer, Biliary Bypass, Biliodigestive Bypass, Palliative Surgery, Postoperative Morbidity, Survival, Cameroon.

INTRODUCTION

Pancreatic cancer is one of the most lethal malignancies worldwide and remains a major public health challenge due to its aggressive biological behavior and late diagnosis [1]. According to GLOBOCAN 2022 estimates, pancreatic cancer accounted for approximately 510,992 new cases and 467,409 deaths globally, ranking as the twelfth most common cancer and the seventh leading cause of cancer-related mortality worldwide [2]. Despite advances in oncology and surgery, the overall 5-year survival rate remains below 10% in most countries [3].

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The poor prognosis of pancreatic cancer is largely explained by its insidious onset, lack of specific early symptoms, and rapid progression. Consequently, nearly 80% of patients present with either locally advanced unresectable disease or distant metastases at the time of diagnosis [4, 5]. Curative-intent surgical resection remains the only potentially curative treatment; however, fewer than 20% of patients are eligible for upfront resection [6].

Obstructive jaundice and gastric outlet obstruction are common manifestations of advanced tumors involving the pancreatic head and significantly impair quality of life [7]. Palliative management aims to alleviate symptoms, improve functional status, and facilitate systemic therapy whenever feasible [8]. Endoscopic biliary stenting has become the preferred first-line approach in high-income settings because of its minimally invasive nature and shorter hospital stay [9]. Nevertheless, stent dysfunction, recurrent cholangitis, and limited access to endoscopic expertise remain important challenges, particularly in low- and middle-income countries [10].

In many sub-Saharan African settings, the availability of therapeutic endoscopy, endoscopic ultrasound, and interventional radiology remains limited. Consequently, surgical biliary bypass continues to play a crucial role in the palliation of unresectable pancreatic cancer [11]. Common surgical procedures include choledochoduodenostomy, choledochojejunostomy, hepaticojejunostomy, and double bypass procedures combining biliary and gastric diversion [12, 13]. Although these procedures provide durable relief of biliary and duodenal obstruction, they may be associated with postoperative morbidity and limited long-term survival [14].

Available evidence from Africa suggests that pancreatic cancer predominantly affects men in their sixth decade of life and is frequently diagnosed at advanced stages [15–17]. In Cameroon, pancreatic cancer represents approximately 1.2% of all cancers and is among the leading digestive malignancies requiring surgical intervention [18]. A multicenter study conducted in six referral hospitals reported that palliative surgery was frequently performed because of the advanced stage at presentation [19]. Furthermore, a previous Cameroonian study found that nearly four out of five patients with pancreatic cancer required palliative surgical management, including biliary bypass procedures [20].

Despite the persistent role of surgical palliation in resource-constrained settings, data specifically addressing the techniques, postoperative outcomes, and survival following biliodigestive bypass for pancreatic cancer in sub-Saharan Africa remain scarce. To our knowledge, no study has specifically evaluated the outcomes of biliodigestive bypass for pancreatic cancer in Cameroon.

Therefore, this study aimed to describe the surgical techniques used for biliodigestive bypass, assess postoperative complications, and evaluate survival outcomes among patients with advanced pancreatic cancer managed in two tertiary hospitals in Douala, Cameroon.

METHODS

Study Design and Setting

We conducted a retrospective bicentric cohort study in the departments of general surgery and oncology of two tertiary referral hospitals in Douala, Cameroon: Douala General Hospital and Laquintinie Hospital of Douala.

These two institutions are major referral centers for hepatopancreatobiliary surgery and cancer care in the country, serving patients from Douala and surrounding regions.

The study covered a 10-year period from January 1, 2013, to December 31, 2022. Data collection was performed between January and August 2023.

Study Population

We included all consecutive adult patients (≥18 years) with histologically, cytologically, or radiologically confirmed pancreatic cancer who underwent palliative surgical biliodigestive bypass during the study period.

Inclusion Criteria

Patients were eligible if they met all the following criteria:

- Age ≥18 years;
- Diagnosis of pancreatic cancer based on histopathological findings or characteristic imaging features when tissue confirmation was unavailable;
- Unresectable locally advanced or metastatic disease;
- Performance of a palliative biliodigestive bypass procedure;
- Availability of complete medical records, including operative and follow-up data.

Exclusion Criteria

We excluded patients with:

- Biliodigestive bypass performed for benign biliary diseases or non-pancreatic malignancies;
- Incomplete medical records regarding the indication for surgery, type of procedure, or survival outcomes;
- Missing evidence supporting the diagnosis of pancreatic cancer.

Sampling Procedure

A consecutive exhaustive sampling method was used. All eligible patients identified from surgical registers, operating room logs, oncology databases, and medical records during the study period were included.

Variables and Data Collection

Data were extracted using a standardized case report form designed for the study.

The following variables were collected:

Sociodemographic characteristics

- age at diagnosis;
- sex;
- hospital of treatment;
- occupation.

Clinical characteristics

- comorbidities (hypertension, diabetes mellitus);
- smoking status;
- alcohol consumption;
- Eastern Cooperative Oncology Group (ECOG) performance status, when available;
- American Society of Anesthesiologists (ASA) score;
- presenting symptoms;
- consultation delay;
- Tumor stage according to the TNM classification.

Biological and Radiological Findings

- serum bilirubin levels;
- liver function tests;
- CA 19-9 and carcinoembryonic antigen (CEA) levels;
- computed tomography findings;
- presence of distant metastases.

Surgical Variables

- interval between diagnosis and surgery;
- type of biliodigestive bypass procedure (choledochoduodenostomy, choledochojejunostomy, cholecystojejunostomy, cholecystoduodenostomy);
- type of double bypass (Roux-en-Y or omega loop);
- associated procedures (gastroenterostomy, cholecystectomy, splanchnicectomy);
- type of anesthesia.

Postoperative Outcomes

Postoperative complications occurring within 30 days after surgery were recorded and classified according to the Clavien-Dindo classification.

Complications of interest included:

- biliary fistula;
- digestive fistula;
- delayed gastric emptying;
- surgical site infection;
- postoperative bleeding;
- acute kidney injury.

Postoperative mortality was defined as any death occurring within 30 days after surgery or during the index hospitalization.

Follow-Up and Survival Assessment

Patients were followed from the date of surgery until death or the date of last contact.

Overall survival was defined as the time interval between the date of biliodigestive bypass and death from any cause or last follow-up.

Survival status was determined from hospital records, outpatient clinic visits, and telephone interviews with patients or relatives when necessary.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics version 20.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were expressed as means ± standard deviations or medians with interquartile ranges, depending on their distribution. Categorical variables were summarized as frequencies and percentages.

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

Overall survival was estimated using the Kaplan-Meier method and compared using the log-rank test.

Variables associated with survival at a significance level of $p < 0.20$ in univariate analyses were entered into a multivariable Cox proportional hazards regression model to identify independent prognostic factors.

Hazard ratios (HRs) with their 95% confidence intervals (95% CIs) were reported.

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

Ethical Considerations

The study protocol was approved by the Institutional Review Board of the Faculty of Medicine and Pharmaceutical Sciences of the University of Douala and by the administrative authorities of both participating hospitals.

Patient confidentiality was strictly maintained by anonymizing all collected data before analysis. Given

the retrospective nature of the study, the requirement for informed consent was waived.

RESULTS

Patient Selection

During the study period, all medical records of patients who underwent surgery for pancreatic cancer at Douala General Hospital and Laquintinie Hospital of Douala were screened. After applying the eligibility criteria, 40 patients who underwent palliative surgical biliodigestive bypass for unresectable pancreatic cancer were included in the final analysis.

The patient selection process is illustrated in Figure 1.

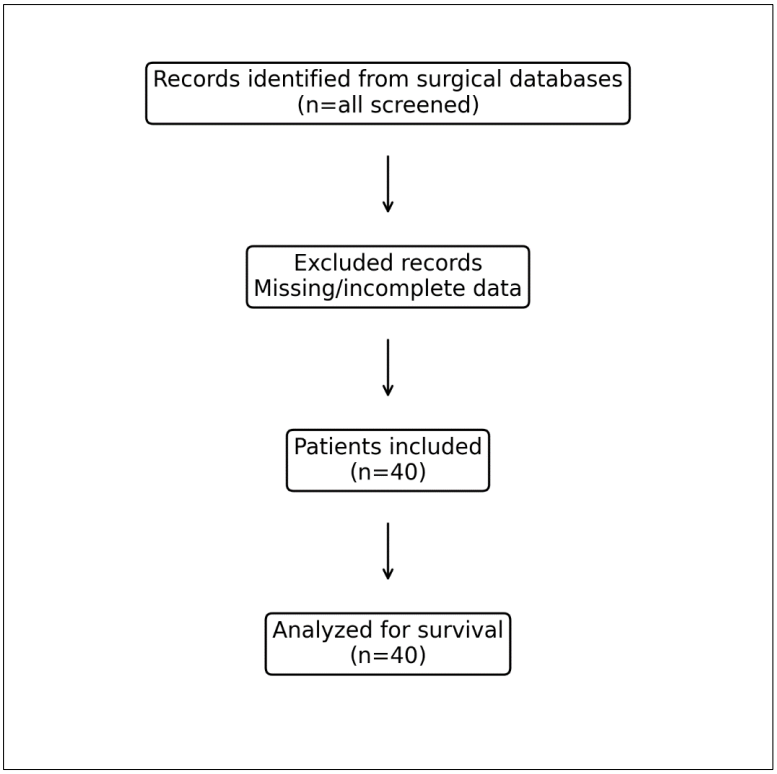

Figure 1: STROBE flow diagram of patient selection.

Baseline Characteristics

Among the 40 included patients, 31 (77.5%) were managed at Douala General Hospital and 9 (22.5%) at Laquintinie Hospital of Douala.

The mean age at diagnosis was 60.1 ± 12.9 years. Patients aged 60 years and above represented the largest age group. There was a male predominance, with 24 men (60.0%) and 16 women (40.0%), corresponding to a male-to-female ratio of 1.5:1.

Hypertension was present in 17 patients (42.5%), while diabetes mellitus was found in 10 patients (25.0%). Alcohol consumption and smoking were reported in 16 (40.0%) and 11 (27.5%) patients, respectively.

The mean consultation delay was 4.2 ± 3.0 months.

Detailed baseline characteristics are presented in Table 1.

Table 1: Baseline characteristics of the study population

Variable	n (%) or Mean ± SD
Age (years)	60.1 ± 12.9
Male sex	24 (60.0)
Female sex	16 (40.0)
Douala General Hospital	31 (77.5)
Laquintinie Hospital	9 (22.5)
Hypertension	17 (42.5)
Diabetes mellitus	10 (25.0)
Alcohol consumption	16 (40.0)
Smoking	11 (27.5)
Mean consultation delay (months)	4.2 ± 3.0

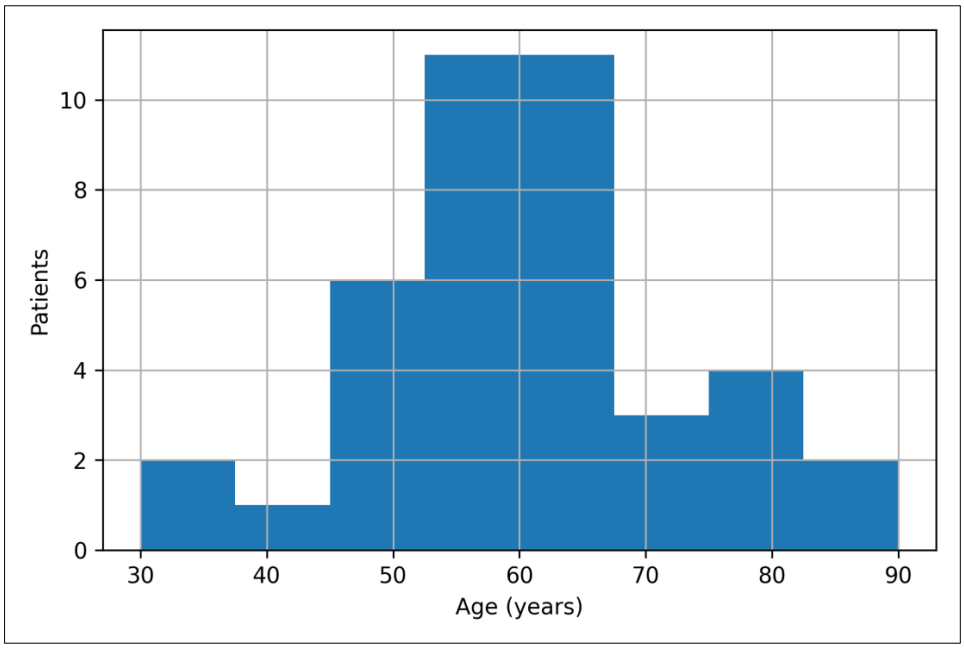

Figure 2: Age distribution of patients undergoing surgical biliodigestive bypass

Clinical, Biological, and Radiological Findings

The most frequent presenting symptoms were abdominal pain and obstructive jaundice. Other commonly reported symptoms included asthenia, pruritus, vomiting, anorexia, and weight loss.

Most patients presented with poor preoperative status, with 37 patients (92.5%) classified as ASA III or IV. All patients had stage IV disease. Hepatic metastases and pulmonary metastases were observed in 29 (72.5%) and 20 (50.0%) patients, respectively. Vascular invasion was documented in all cases.

Serum bilirubin levels, liver enzymes, and tumor markers were frequently elevated. CA 19-9 and carcinoembryonic antigen (CEA) were increased in most tested patients.

Computed tomography was the main imaging modality used for staging. All patients had advanced disease, and all tumors were classified as stage IV according to the TNM classification.

Clinical presentation and preoperative findings are summarized in Tables 2 and 3.

Table 2: Clinical presentation at admission

Clinical variable	n (%)
Asthenia	40 (100.0)
Weight loss	40 (100.0)
Abdominal pain	38 (95.0)
Obstructive jaundice	28 (70.0)
Pruritus	24 (60.0)
Vomiting	4 (10.0)

Table 3: Preoperative clinical and tumor characteristics

Variable	n (%)
ASA II	3 (7.5)
ASA III	26 (65.0)
ASA IV	11 (27.5)
ASA III–IV (combined)	37 (92.5)
TNM stage IV	40 (100.0)
Hepatic metastases	29 (72.5)
Pulmonary metastases	20 (50.0)
Vascular invasion	40 (100.0)
Elevated CA 19-9	Not consistently available
Elevated CEA	Not consistently available

CA 19-9 and CEA levels were not consistently available and were therefore not included in quantitative analyses.

Surgical Procedures

The mean interval between diagnosis and surgery was 56.0 ± 64.1 days.

Biliary bypass procedures were not mutually exclusive. Choledochoduodenostomy associated with gastroenterostomy was the most frequent procedure, performed in 18 patients (45.0%), followed by choledochojejunostomy associated with gastroenterostomy in 16 patients (40.0%). One patient underwent more than one biliary bypass anastomosis.

Cholecystojejunostomy and cholecystoduodenostomy were performed in 4 (10.0%) and 3 (7.5%) patients, respectively.

Gastroenterostomy was associated with all biliary bypass procedures.

Double bypass using a Roux-en-Y configuration was performed in 17 patients (42.5%), whereas an omega-loop configuration was used in 2 patients (5.0%).

Cholecystectomy was performed systematically in all patients, while splanchnicectomy was associated in 9 patients (22.5%).

The distribution of surgical procedures is detailed in Table 4 and illustrated in Figure 3.

Table 4: Surgical procedures performed

Procedure	n (%)
Choledochoduodenostomy + gastroenterostomy	18 (45.0)
Choledochojejunostomy + gastroenterostomy	16 (40.0)
Cholecystojejunostomy + gastroenterostomy	4 (10.0)
Cholecystoduodenostomy + gastroenterostomy	3 (7.5)
Roux-en-Y double bypass	17 (42.5)
Omega-loop double bypass	2 (5.0)
Cholecystectomy	40 (100.0)
Splanchnicectomy	9 (22.5)

Values are expressed as number and percentage of patients. Biliary bypass procedures were not mutually exclusive; one patient underwent more than one biliary bypass anastomosis.

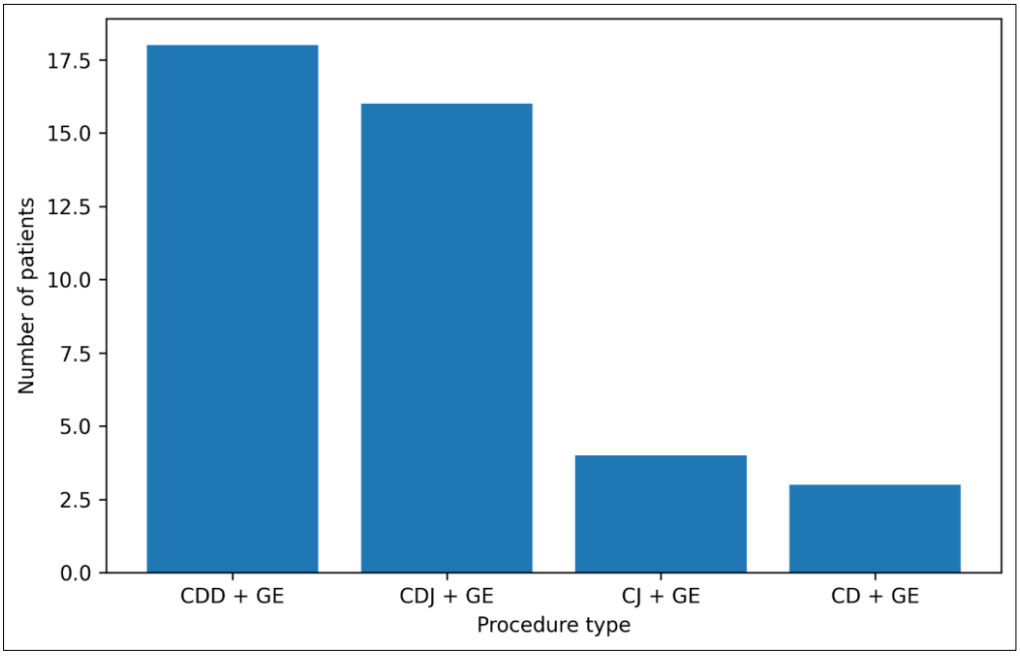

Figure 3: Distribution of surgical biliodigestive bypass procedures performed for advanced pancreatic cancer. CDD: choledochoduodenostomy; CDJ: choledochojejunostomy; CJ: cholecystojejunostomy; CD: cholecystoduodenostomy; GE: gastroenterostomy

Temporal Trends

The annual number of surgical biliodigestive bypass procedures increased progressively over the study period, with a peak observed in 2020, accounting for 25.0% of all procedures.

This trend is illustrated in Figure 4.

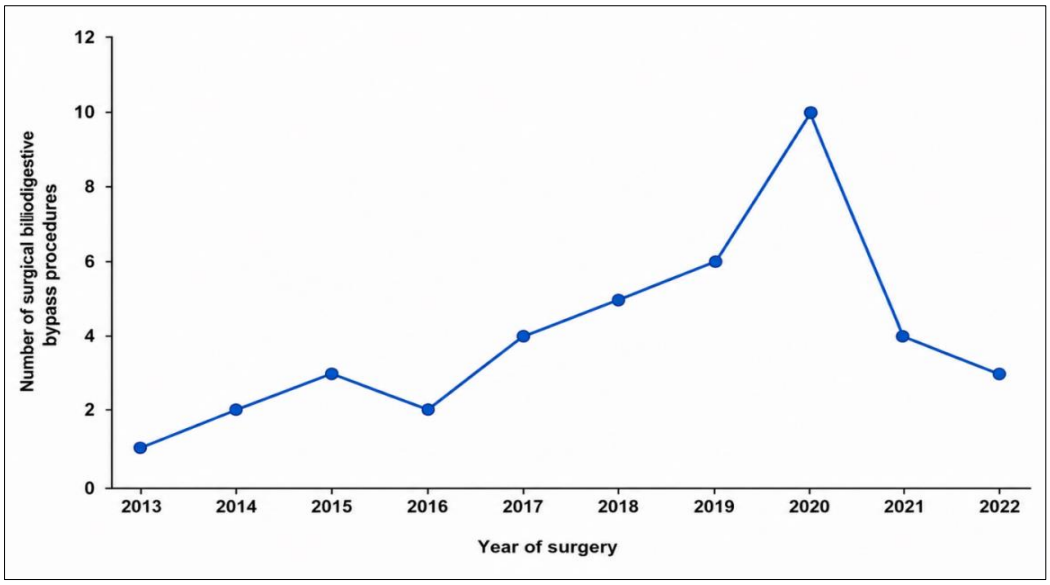

Figure 4: Annual trend in the number of surgical biliodigestive bypass procedures performed for advanced pancreatic cancer in two tertiary hospitals in Douala, Cameroon, between 2013 and 2022.

Postoperative Outcomes

Postoperative hospital stay was 0–10 days in 18 patients (45.0%), 11–20 days in 18 patients (45.0%), and longer than 20 days in 4 patients (10.0%).

Overall postoperative morbidity within 30 days was 57.5%. The most common complications were surgical site infection (12.5%), biliary fistula (7.5%), and digestive fistula (7.5%). Gastrointestinal bleeding occurred in 2 patients (5.0%), while acute kidney injury and delayed gastric emptying were each observed in 1 patient (2.5%).

The distribution of postoperative complications is presented in Table 5 and Figure 5.

Table 5: Thirty-day postoperative complications according to the Clavien–Dindo classification

Complication	Clavien–Dindo grade	n (%)
Surgical site infection	II	5 (12.5)
Biliary fistula	IIIa	3 (7.5)
Digestive fistula	IIIb	3 (7.5)
Gastrointestinal bleeding	IIIb	2 (5.0)
Acute kidney injury	II	1 (2.5)
Delayed gastric emptying	II	1 (2.5)
Overall morbidity	—	23 (57.5)

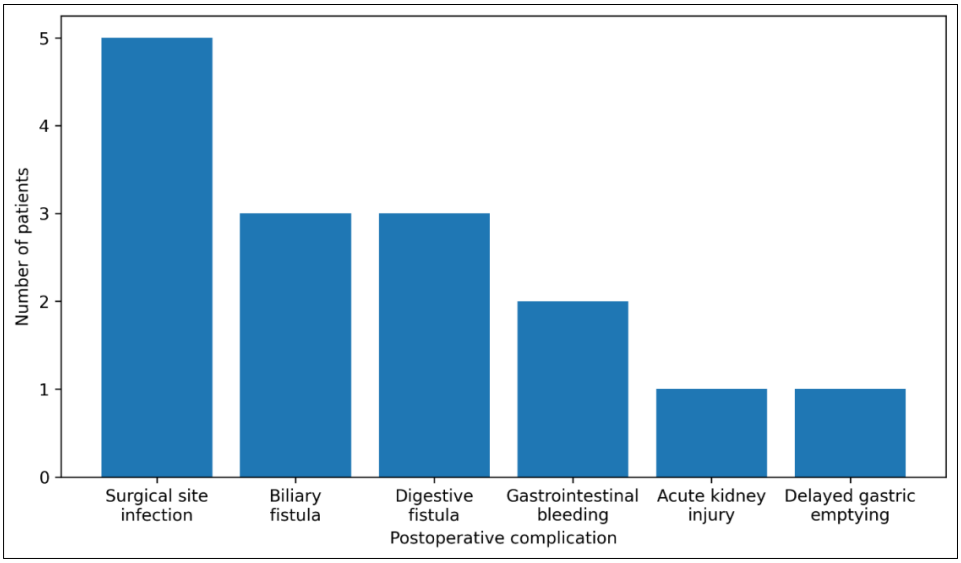

Figure 5: Frequency of thirty-day postoperative complications following surgical biliodigestive bypass for advanced pancreatic cancer

Survival Analysis

After a median follow-up of 2.6 months, 35 patients had died. The median overall survival after surgical biliodigestive bypass was 2.6 months (78 days). The estimated 1-month and 6-month survival rates were 87.5% and 12.5%, respectively.

The Kaplan–Meier overall survival curve is presented in Figure 6.

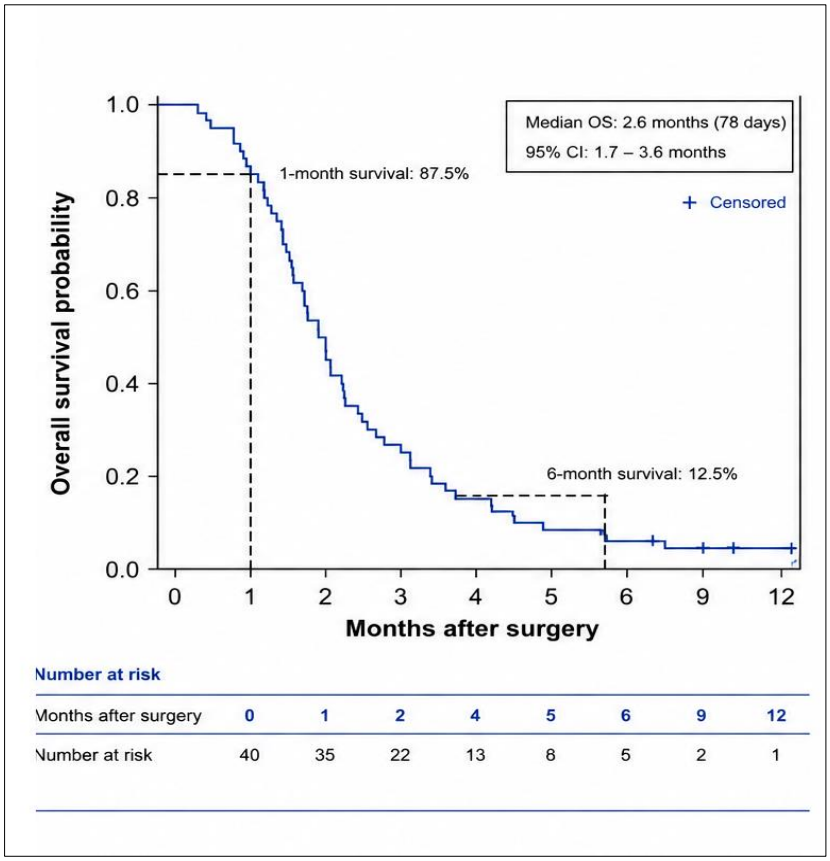

Figure 6: Kaplan–Meier overall survival curve following surgical biliodigestive bypass for advanced pancreatic cancer. Shaded areas represent 95% confidence intervals. Numbers at risk are displayed below the x-axis. Median overall survival was 2.6 months.

Note: Five patients were censored at the last follow-up assessment.

Prognostic Factors Associated with Survival

Univariate analyses identified hypertension, diabetes mellitus, smoking, and alcohol consumption as potential predictors of reduced overall survival.

Patients with hypertension tended to have shorter survival than normotensive patients; however, this association did not remain statistically significant after multivariable adjustment.

In the multivariable model, diabetes mellitus (adjusted HR: 2.65, 95% CI: 1.10–6.38; p = 0.030) and smoking (adjusted HR: 2.36, 95% CI: 1.05–5.31; p = 0.039) emerged as independent predictors of poor overall survival.

Detailed results of the univariate and multivariable Cox regression analyses are presented in Tables 7 and 8.

The Kaplan–Meier survival curves according to hypertension status are shown in Figure 7, while the forest plot summarizing prognostic factors is presented in Figure 8.

Table 6: Survival outcomes

Outcome	Value
Number of deaths	35 (87.5)
Median overall survival	2.6 months (78 days)
Mean overall survival	9.0 ± 20.2 months
30-day mortality	5 (12.5)
1-month survival rate	35 (87.5)
6-month survival rate	5 (12.5)
Median follow-up	2.6 months

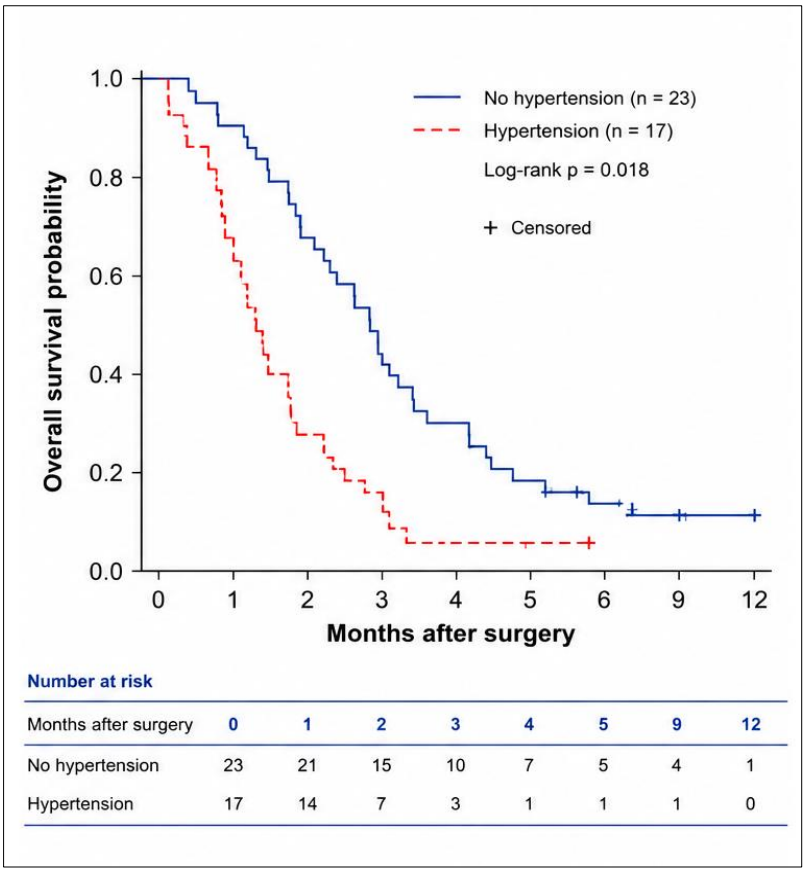

Figure 7: Kaplan–Meier overall survival curves according to hypertension status among patients undergoing surgical biliodigestive bypass for advanced pancreatic cancer

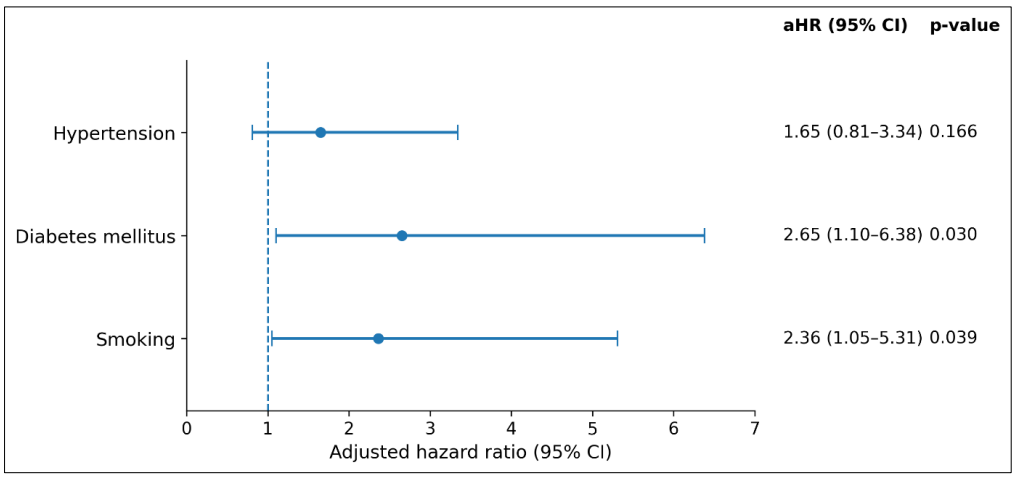

Figure 8: Forest plot of adjusted hazard ratios for independent prognostic factors associated with overall survival after surgical biliodigestive bypass for advanced pancreatic cancer. Horizontal lines indicate 95% confidence intervals, and the vertical dashed line represents the null value (HR = 1.0)

Table 7: Univariate Cox regression analysis of factors associated with overall survival

Variable	Crude HR	95% CI	p-value
Age ≥60 years	1.13	0.56–2.29	0.739
Hypertension	1.50	0.75–3.01	0.254
Diabetes mellitus	1.85	0.84–4.07	0.126
Smoking	1.73	0.83–3.60	0.146
Alcohol consumption	1.52	0.77–3.00	0.230
ASA III–IV	0.96	0.33–2.76	0.941

Abbreviations: HR, hazard ratio; CI, confidence interval; ASA, American Society of Anesthesiologists.

Table 8: Multivariable Cox regression analysis of factors associated with overall survival

Variable	Adjusted HR	95% CI	p-value
Hypertension	1.65	0.81–3.34	0.166
Diabetes mellitus	2.65	1.10–6.38	0.030
Smoking	2.36	1.05–5.31	0.039

Abbreviations: HR, hazard ratio; CI, confidence interval.

DISCUSSION

This study provides one of the first detailed evaluations of surgical biliodigestive bypass for advanced pancreatic cancer in sub-Saharan Africa and, to our knowledge, the first dedicated Cameroonian series focusing specifically on postoperative morbidity and survival following these procedures. Our findings highlight four key observations: (i) patients presented at an advanced stage with a high burden of metastatic disease; (ii) surgical palliation relied predominantly on double bypass procedures combining biliary drainage and gastroenterostomy; (iii) postoperative morbidity was substantial but remained acceptable considering the advanced disease stage; and (iv) overall survival was poor, with diabetes mellitus and smoking emerging as independent predictors of mortality.

The demographic characteristics of our cohort are consistent with previous reports from both high-income and low-resource settings. The mean age of 60.1 years and the predominance of male patients align with epidemiological studies indicating that pancreatic cancer primarily affects individuals in their sixth and seventh decades of life, with a modest male predominance [3–17]. The high prevalence of smoking and alcohol consumption observed in our study further reflects the established role of modifiable risk factors in pancreatic carcinogenesis [21, 22].

A striking finding of our study was the universal presence of stage IV disease at diagnosis. In addition, hepatic metastases were identified in nearly three-quarters of patients, and half presented with pulmonary metastases. These findings underscore the persistent challenge of delayed diagnosis in low- and middle-income countries. Similar observations have been reported across sub-Saharan Africa, where limited awareness, delayed healthcare seeking, financial constraints, and restricted access to advanced imaging contribute to late-stage presentation [15–23]. In Cameroon, previous studies have shown that most patients with pancreatic cancer are diagnosed at an unresectable stage, resulting in a predominance of palliative rather than curative treatment strategies [19, 20].

Although endoscopic biliary stenting is currently recommended as the first-line palliative approach for malignant biliary obstruction in high-income settings [9-24], its widespread implementation remains challenging in many African countries because of limited access to therapeutic endoscopy, endoscopic ultrasound, and interventional radiology. Consequently, surgical bypass continues to play a central role in symptom palliation [11–13].

In our series, choledochoduodenostomy and choledochojejunostomy were the most frequently performed procedures, and gastroenterostomy was systematically associated. The high proportion of double bypass procedures reflects the surgeons' preference for preventing future gastric outlet obstruction, which occurs in a substantial proportion of patients with advanced pancreatic head tumors [25]. Previous studies have demonstrated that prophylactic gastroenterostomy performed during surgical exploration for unresectable pancreatic cancer reduces the risk of subsequent duodenal obstruction without significantly increasing postoperative morbidity [26, 27].

The overall postoperative morbidity rate of 57.5% observed in our study appears higher than rates reported in some high-volume centers, where morbidity following palliative biliary bypass generally ranges from 20% to 45% [14-28]. However, direct comparisons should be interpreted cautiously because our cohort consisted exclusively of patients with metastatic disease, poor performance status, and a high prevalence of ASA III–IV classification. Furthermore, limited perioperative resources and delayed presentation may contribute to the increased complication burden observed in low-resource settings [29].

Surgical site infection was the most common postoperative complication, followed by biliary and digestive fistulas. Similar patterns have been described in previous African studies, where advanced disease stage, malnutrition, cholestasis, and limited access to perioperative nutritional support increase the risk of postoperative complications [11-23]. Despite the relatively high morbidity rate, the 30-day mortality of 12.5% remains within the range reported in studies of palliative surgery for advanced pancreatic cancer in resource-constrained environments [30].

Survival outcomes in our cohort were poor, with a median overall survival of only 2.6 months. This figure is considerably lower than the median survival of 6 to 11 months reported in high-income countries following palliative biliary bypass [31, 32]. Several factors may explain this disparity, including the advanced stage at diagnosis, limited access to systemic chemotherapy, delayed referral, poor nutritional status, and restricted availability of multidisciplinary cancer care [33].

Importantly, diabetes mellitus and smoking emerged as independent predictors of reduced overall survival. The association between diabetes and pancreatic cancer prognosis is complex and likely bidirectional. Long-standing diabetes is a recognized risk factor for pancreatic cancer, while pancreatic cancer itself may induce glucose metabolism disorders [34]. Hyperglycemia, insulin resistance, and chronic inflammation may contribute to tumor progression and poorer treatment outcomes [35]. Smoking has also been consistently associated with reduced survival in pancreatic cancer through mechanisms involving enhanced tumor aggressiveness, impaired immune response, and increased postoperative complications [22-36].

Contrary to our initial hypothesis, hypertension was not independently associated with survival after multivariable adjustment. This finding suggests that the apparent association observed in univariate analyses may have been confounded by age, comorbidity burden, or other clinical variables.

Our study has several strengths. It represents one of the largest series of surgical biliodigestive bypass procedures for pancreatic cancer reported from Central Africa and provides valuable real-world data from two tertiary referral centers. In addition, the use of survival analyses and multivariable modeling allowed identification of clinically relevant prognostic factors.

Nevertheless, several limitations should be acknowledged. First, the retrospective design exposed the study to potential selection and information biases. Second, the relatively small sample size limited statistical power and the number of variables that could be included in multivariable analyses. Third, some biological variables, including CA 19-9 and CEA levels, were missing despite otherwise complete medical records. Finally, the absence of a comparison group undergoing endoscopic palliation precluded direct evaluation of the relative effectiveness of surgical versus endoscopic approaches.

CONCLUSION

Surgical biliodigestive bypass remains an essential palliative strategy for advanced pancreatic cancer in low-resource settings where endoscopic alternatives are not readily available. Although postoperative morbidity is substantial, surgical bypass provides durable symptom relief in a population characterized by advanced disease and limited therapeutic options. The poor survival observed in this study highlights the urgent need for earlier diagnosis, improved access to minimally invasive palliation, wider availability of systemic therapies, and strengthened multidisciplinary cancer care pathways in sub-Saharan Africa.

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Cite This Article: Jean Paul Engbang, Fred Dikongue, Valery Onana Mvondo, Basile Essola, Djanilla Anne Djoumessi Fomena, Achille Many Essomba (2026). Surgical Biliary Bypass for Advanced Pancreatic Cancer in Cameroon: Postoperative Morbidity and Survival in a 10-Year Bicentric Cohort. *East African Scholars J Med Surg, 8*(6), 299-310.