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Results and Prognostic Factors of Bilio-Digestive Derivations at the Brazzaville University Hospital

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Abstract

Introduction: The objective of this study was to evaluate the results of biliary -digestive derivations (DBD) and to identify the prognostic factors of postoperative morbidity and mortality in the digestive surgery department of the University Hospital of Brazzaville (CHUB).

Patients and Methods: This was a cross-sectional analytical study, with both retrospective and prospective data collection, conducted in the digestive surgery department of the CHUB over a ten-year period, from January 1, 2014 to December 31, 2023. The study included all patients who underwent DBD in the digestive surgery department of the CHUB.

Results: We collected 110 patients. Postoperative morbidity and mortality were 60.7%, including 30.9% deaths and 21.8% procedure-related morbidity. These complications were significantly associated with: a low socio-economic level (p = 0.02), comorbidity (OR = 2.5; p= 0.00), a delay in consultation (OR = 2; p = 0.04), an alteration of the general condition (OR = 4.2; p = 0.00), a low prothrombin time (PT) and an operative time greater than 4 hours (OR = 4.8; p = 0.02). Overall patient survival was 35.4% at 6 months, and 5.4% at 12 months.

Conclusion: The results of DBD at CHUB are still marked by high postoperative morbidity and mortality. The use of DBD must be evaluated according to risk factors, with rigorous and anticipated postoperative management.

Keywords: Bilio -digestive derivation; Anastomosis; Prognosis; Brazzaville

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Introduction

Bilio -digestive derivation (BDD) is a surgical procedure that involves anastomosing the main bile ducts, whether pedicular or accessory, to the duodenum or to an excluded jejunal loop, in order to ensure permanent drainage of bile to the-the small intestine [1]. It is a surgical alternative with palliative aim, indicated in several clinical contexts (benign or malignant biliary obstructions, sclerosing cholangitis, certain traumas of the biliary tract). This technique plays an integral role in the surgical management of biliary tract diseases during the last century [2]. It was indicated in abdominal pathologies preventing biliary drainage (cancer of the head of the pancreas, lithiasis of the main bile duct, cancers of the main bile ducts [3,4]. Nowadays, in developed countries, DBD is less and less indicated as a first-line treatment, due to major advances in interventional radiology and minimally invasive surgery [5]. DBD methods are numerous and include cholecystoduodenostomy, cholecystojejunostomy, choledocoduodenostomy [6]. In sub-Saharan Africa, the frequency of anastomoses varies according to the authors, for example in cancers of the head of the pancreas 51.3% of DBD for Sidibe et al. [7] in Mali and 30.6% for Diallo [8] in Guinea. In Congo-Brazzaville, it is a therapeutic standard for the management of biliary obstructions, but its practice remains poorly documented. This work aims to evaluate the results of DBD in the digestive surgery department of the University Hospital of Brazzaville (CHUB) and to identify the prognostic factors influencing post-operative morbidity and mortality.

Patients and Methods

Type, period and framework of study

The study, analytical and cross-sectional, with retrospective and prospective data collection, was carried out in the digestive surgery department of the CHUB, from January 1, 2014 to December 31,

2023 (10). The retrospective phase extended from January 1, 2014 to December 31, 2018 (5 years) and the prospective phase from January 1, 2019 to December 31, 2023 (5 years).

Patients sample

The data were obtained from an exhaustive analysis of usable medical records (clinical observation, biological and radiological examinations, operative report, anesthesia sheet) of patients having had DBD. However, only those aged 18 years or older, of both sexes, and those who gave free and informed consent were included in the study.

Patients who underwent DBD in another institution and were then referred at the CHUB for post-operative care and those with unusable medical records were not included.

A total of 110 patients met the inclusion criteria.

Data were collected using a pre-prepared survey form.

Surgical techniques

DBD was performed under general anesthesia with orotracheal intubation. The surgical approach was a supra- and infra-umbilical midline laparotomy in all cases. The different operative times were:

- Cholecystectomy (Figure 1);
- Dissection and placement on the bile duct (Figure 2);
- The realization of the end- to-side hepatico- or choledoco -jejunal anastomosis (Figure 3);
- The anastomosis jejunojejunal (Figure 4);
- The placement of two drains (in the cul-de-sac of Douglas and in the subhepatic region);
- Gastrojejunal anastomosis at the same time of surgery in case of pancreatic head tumor with risk of secondary duodenal stenosis;
- Closure plane by plane followed by a dressing.

Postoperatively, patients were placed on a strict diet for at least 5 days. Postoperative medical treatment included: dual antibiotic therapy (cephalosporin + imidazole), rehydration solutions (glucose serum, saline serum and Ringer Lactate as needed), analgesics (levels I and II), proton pump inhibitor, low molecular weight heparin.

Follow-up was at 3, 6, 12 weeks, and then at 6, 9, and 12 months. Patients with tumors were referred to the medical oncology department for oncological management.

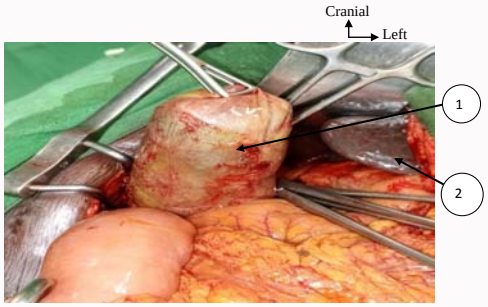

Figure 1: Intraoperative view of the large gallbladder during the first stage of DBD. (Anterograde cholecystectomy).
1 = Gallbladder; 2 = Cirrhotic liver

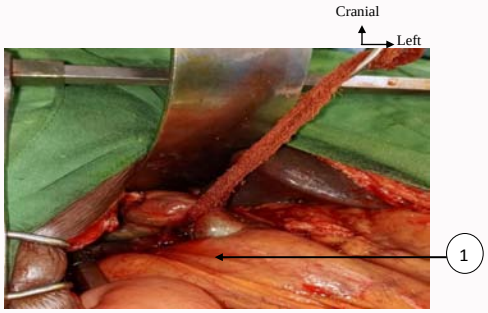

Figure 2: Peroperative view of the dilated bile duct, isolated on a lake (2nd stage).
1 = Bile duct

Figure 3: Intraoperative view of the excluded jejunal loop mounted through a transmesocolic breach (3rd stage).
1 = Transverse colon; 2 = Transmesocolic breach; 3 = Jejunal loop excluded; 4 = Slice of proximal section of the jejunum

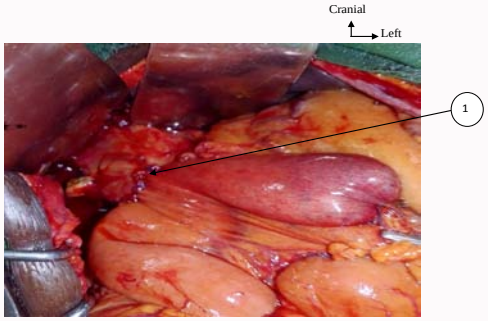

Figure 4: Peroperative view of the choledoco -jejunal anastomosis (4th stage).
1 = End -to-side choledoco -jejunal anastomosis

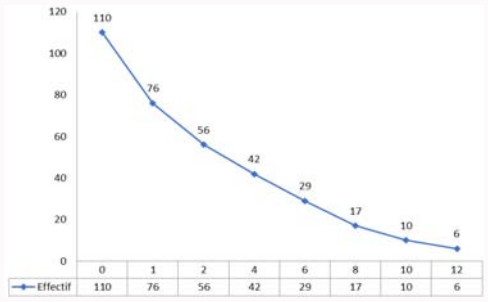

Figure 5: 12-month survival curve of patients who underwent DBD.

For all patients, the following data were collected: socio-demographic (age and sex); clinical (time to consultation, general condition, comorbidity, WHO performance status, body mass index (BMI); paraclinical (prothrombin rate); therapeutic (operative indications, general condition according to the American Society of Anesthesiology (ASA) classification, presence of metastases, ascites, type of bilio -digestive anastomosis, and associated procedures, operative time) And progressive (length of hospital stay, immediate postoperative course, evolution at 6 and 12 months concerning survival, death, loss of sight, incomplete or complete remission of cholestasis), survival curve.

For the assessment of postoperative complications, the Clavien-Dindo classification [9] (Table 1) was used. From this classification, complications were considered minor (grade I and II complications) or majors (grade III and IV complications). In case of multiple complications, only the most severe was retained.

Data analysis

Data collected during the study were analyzed using Microsoft Excel 2016 and Epi info version 7.3.3.2 software. Pearson's chi-square test was used to verify the association between explanatory variables and dependent variables in univariate analysis. Comparisons of more than two percentages were performed using Sokal's S test. Multivariate logistic regression was used to determine confounding factors that showed a significance rate of 5% in univariate analysis. The Kaplan-Meier method was used for statistical analysis of overall survival. Values of p<0.05 were considered statistically significant.

Results

During the years 2014-2023, 110 patients underwent DBD out of 238 patients hospitalized for retentional jaundice, a frequency of 46.2% (59 patients in the prospective study and 51 in the retrospective study). Among them, 58 were men (52.7%) and 52 women (47.3%), giving a sex ratio (M/F) of 1.1. The median age was 59.5 years with extremes of 36 and 81 years. Patients aged 60-69 years were the most represented (30.9%; p>0.05) (Table 2).

The indications for DBD were mainly palliative in 108 cases or 98.2% (p<0.001) and curative in 2 cases or 1.8%. Tumors of the head of the pancreas predominated among the indications (75.5%; p<0.01) (Table 3). They were followed by tumors of the ampulla of Vater (n=11; 10%) and the second duodenum (n=6; 5.5%).

Bilio -digestive anastomosis was performed on the common bile duct in 109 patients (99.1%; p<0.001) and on the accessory bile duct in only one patient (0.9%). Roux-en-Y bilio -jejunal anastomosis was performed in 106 patients (96.4%; p<0.001), including 78 (73.6%; p<0.01) via the transmesocolic route and 28 (26.4%) via the precolic route. Choledoco -jejunostomy and hepatico -jejunostomy were performed in 88.2% (p<0.001) and 7.3%, respectively. (Table 4). In the immediate postoperative period, 34 deaths were recorded, representing 30.9%, and 18 grade II complications (16.4%) of the

Table 2: Distribution of patients by age group.

Range age in years	Effective	Percentage
<40	2	1.8
[40 – 49]	22	20
[50 – 59]	31	28.2
[60 – 69]	34	30.9
[70 – 79]	19	17.3
≥80	2	1.8
Total	**110**	**100**

Table 3: Distribution of patients according to DBD indications.

DBB Indications	Effective	Percentage
Tumor of the head of the pancreas	83	75.5**
Ampullomas waterians	11	10
D2 tumor	6	5.5
Cholangiocarcinoma	5	4.5
CBD stones	3	2.7
Post cholecystectomy stenosis	1	0.9
Iatrogenic injury to the CBD	1	0.9
Total	**110**	**100**

Abbreviation: ***significant difference at p<0.001.

Table 4: Distribution according to gestures.

Gestures		Effective	Percentage
Type of ABD	Choledoco -jejunal	97	88.2***
	Hepatico -jejunal	8	7.3
	Choledoco -duodenal	4	3.6
	Cholecysto -jejunal	1	0.9
Associated gestures	Peritoneal drainage	110	100
	Jejuno- jejunal anastomosis	106	96.4
	Latero-lateral gastrojejunal anastomosis	92	83.6
	Peritoneal biopsy + omentum	25	22.7
	Pancreatic biopsy	4	3.6
	Liver nodule biopsy	4	3.6

Abbreviation: ***significant difference at p<0.001.

Table 1: Clavien-Dindo classification (standard version).

Grade	Definition
I	Any deviation from the normal post-operative course not requiring specific treatment (excluding analgesics, antiemetics, antipyretics, diuretics, electrolytes, physiotherapy). No re-intervention.
II	Complication requiring drug treatment beyond those authorized in grade I (e.g., antibiotics, blood transfusion, parenteral nutrition).
III	Complication requiring surgical, endoscopic or radiological intervention
IIIa	Intervention without general anesthesia.
IIIb	Intervention under anesthesia general
IV	Life-threatening complication requiring treatment in an intensive care unit or resuscitation
IVa	Single organ damage
IVb	Multi-organ failure.
V	Death of the patient

Table 5: Distribution of patients according to the Clavien-Dindo Classification.

Grade	Effective	Percentage	Type of complications
I	3	2.7	Isolated fever, vomiting, superficial skin infection
II	18	16.4	Anemia, malnutrition, severe electrolyte disturbance, hypoproteinemia, diabetic decompensation, parietal suppuration, infectious fever, hypoglycemia
III a	9	8.2	Minimal biliary fistula
IIIb	7	6.4	Medium and large biliary and digestive fistulas
IVa	2	1.8	Respiratory distress, hemostasis disorders
IVb	1	0.9	Renal failure + ketoacidosis with multi-organ failure
V	34	30.9	Death
Total	74	67.3	

Table 6: Distribution of patients according to the evolutionary modalities at 6 and 12 months.

Evolution	Evolution at 6 months		Evolution at 12 months	
	Effective	(%)	Effective	(%)
Survival	29	35.5	6	5.5
Deceased	74	58.2	91	77.3**
Lost sight of	7	6.4	13	11.8
Complete remission of cholestasis	23	30	6	5.5
Incomplete remission of cholestasis	6	5.5	0	0

Abbreviation: **significant difference at p<0.01.

Table 7: Logistic regression of the factors studied.

Variables	Postoperative mortality			Morbidity related to gestures		
	GOLD	95% CI	p	GOLD	IC	p
Sociodemographic variables						
Low socioeconomic level	3.2	[1.1-10.4]	0.04	5.5	[1.4-20.6]	0.01
Average socioeconomic level	0.9	[0.3-2.8]	0.96	0.9	[0.2-3.6]	0.97
Clinical variables						
Consultation time: 5.3 months	4.2	[1.6-11]	0	3.5	[1.3-9.2]	0
Comorbidity	3.8	[1.6-8.9]	0	3	[1.1-7.9]	0.02
General condition altered	4.2	[1.5-11.3]	0	3.9	[1.2-12.5]	0.01
BMI ≤ 18.5kg/m2	5.8	[2.0-17.0]	0	4.4	[1.1-16.4]	0.02
BMI ≥ 25 kg/m2	2.7	[0.5-13.6]	0.2	15	[2.8-80.7]	0.08
WHO stage II	2.3	[0.6-8.7]	0.2			
WHO Stage III	8.8	[1.34-58.7]	0.12			
WHO stage IV	14.14	[0.5-424]	0.02			

Clavien-Dindo classification (Table 5).

The main causes of death were: metabolic disorders; hepatocellular insufficiency; and biliary peritonitis. Twenty-four patients (21.8%) presented complications related to the procedures. These were biliary fistula in 14 patients (12.7%), parietal suppuration in six patients (5.5%), digestive fistula in two patients (1.8%), and postoperative hemorrhage in two patients (1.8%). The median length of hospital stay was 15 days, with extremes of 9 and 30 days. Overall survival was 35.5% at 6 months and 5.5% at 12 months (Table 6 and Figure 5).

Multivariate analysis revealed a significant correlation between low socioeconomic level, consultation time of more than 5.3 months, the presence of comorbidity, deterioration of general condition, body mass index less than 18.5 kg/m^2 and morbidity related to procedures on the one hand and postoperative mortality on the other hand (Table 7).

The application of logistic regression also revealed that postoperative mortality was exclusively associated with WHO stage IV (OR=14.1; p=0.02), low TP (OR=3.5; p=0.01), ASA stage IV (OR=51.3; p=0.00), the presence of ascites (OR=4.2; p=0.00) and peritoneal carcinomatosis (OR=3; p=0.00), the type of hepatico-jejunal anastomosis (OR=4.5; p=0.04), an operating time of more than 4 hours (OR=3.9; p=0.04) and intensive care stay (OR=3.6; p=0.00) (Table 8).

Discussion

Methodological remarks

The study was initiated to contribute to a better understanding of DBD at the CHUB, by focusing on the evolutionary aspects of operated patients. The combination of a retrospective collection and prospective in an analytical study represents a relevant methodological approach that allows the exploitation of existing data while enriching

Table 8: Logistic regression of the factors studied (continued).

Variables	Postoperative mortality		
	GOLD	95% CI	p
Paraclinical variables			
Low TP	3.5	[1.2 – 10.6]	0.01
Therapeutic variables			
ASA II	1.8	0.1 – 19.8	0.6
ASAIII	4	0.4 – 33.5	0.2
ASAIV	51.3	4.6 – 564.1	0
Liver nodule	0.5	0.2 – 1.3	0.22
Macro cirrhosis	1.5	0.7 – 3.1	0.26
Ascite	3	1.4 – 6.7	0
Carcinomatosis	4.2	1.7 – 10.4	0
Hepatico -jejunal	4.5	1.0 – 20.4	0.04
Choledoco -duodenal	2.7	0.3 – 20.4	0.3
Cholecystojejunal	8	0.3 – 204.9	0.2
Operating time			
2 – 4H	0.5	0.1 – 1.9	0.3
4 – 6H	3.9	1.0 – 15.5	0.04
Evolutionary variable			
Stay in intensive care	3.6	1.5 – 8.5	0

the study with direct and up-to-date observation. The prospective nature of the study allowed for better control over data quality and for monitoring patients in order to detect post-operative complications (POC) as early as possible. However, the interpretation of our results must take into account certain limitations. The first is the exclusion of certain files due to incomplete data. The second limitation is the lack of sampling for cancer cases whose clinical presumption was not confirmed by the anatomopathological examination. Finally, the third limitation is related to the loss of follow-up of certain patients after the intervention. These limitations, however, do not completely affect the power of our observations. This study, due to the size of the sample (110 cases), constitutes, to our knowledge, one of the largest cohorts reported in Sub-Saharan Africa on DBD. This allows us to update the particularities of this surgery in the African context, particularly in the Congo.

Descriptive analysis

The main results of the study revealed that the indications for DBD were dominated by tumors of the head of the pancreas, which represented 75.5% cases. This clear predominance of tumor etiologies, which alone represent more than 90% of the indications for DBD in our series, is also reported by other authors in previous work [10,11]. Some studies indicate that DBD is the main palliative surgical treatment for tumors of the biliary-pancreatic junction, particularly in locally advanced forms [10,12]. Other authors recommend it for patients with a life expectancy of more than 6 months [13,14].

Of the 110 operated patients, the overall postoperative morbidity and mortality was 67.3% including 36.4% morbidity and 30.9% mortality. In the literature, DBD, whether laparoscopic or open, is associated with a rate of postoperative complications varying between 12.5% and 30% [15,16]. This difference is explained by the very pronounced delay in consultation in our context and by the use of laparoscopy in others while all our patients underwent open surgery which often presents a higher rate of complications compared to laparoscopy [10]. Referring to the Clavien-Dindo classification, minor complications (grades I and II) represented 19.1% of cases while major complications (grades III and IV) represented 17.3%. It should be noted that DBD is performed in patients already weakened by underlying pathologies and cholestasis. These conditions predispose to hydro-electrolytic, metabolic, nutritional, hemorrhagic imbalances and moderate infectious reactions which give rise to minor post- operative events. Among the complications related to the procedures, biliary fistulas were at the forefront with 12.7% and parietal suppuration with 5.5%. Sidibé et al., in Mali obtained similar results but with different proportions (8.9% and 6.4%) [7]. The high frequency of biliary fistulas in our series is explained by the fact that they often occur on bile ducts weakened by overdistension and biliary stasis, responsible for inflammation and poor vascularization. We recorded 30.9% postoperative mortality. These variations depend on the comorbidities of the patients, the type of causal lesion (advanced cancer or not) and also the delay in consultation and management.

The overall survival and mortality of our patients were 35.5% and 58.2% at 6 months and 5.5% and 77.3% at 12 months, respectively. In the literature, the median survival after palliative DBD varies between 4.5 and 7 months depending on the studies, with approximately 40% to 60% of patients surviving up to 6 months and between 10% to 20% at 12 months [17]. It should be noted that in our case, the survival at 6 and 12 months is influenced by the purely symptomatic nature of DBD and the absence of oncological treatment for most patients. The survival of our patients at 6 months and 12 months is still low compared to the data in the literature.

Analysis of factors associated with morbidity and mortality

Univariate analysis of socio-demographic variables identified that patients aged over 59.5 years, female, and socially disadvantaged were at higher risk of postoperative mortality and procedure-related morbidity. However, in the multivariate analysis, which adjusted for confounding factors, only low socio-economic status was independently associated with postoperative mortality (p=0.04) and procedure-related morbidity (p=0.01). Low socio-economic status could reflect reduced access to care and delayed management.

Furthermore, several clinical variables were significantly associated with postoperative morbidity and mortality in univariate analysis, including a consultation time greater than 5.3 months, the presence of comorbidities, impaired general condition, a body mass index (BMI) less than 18.5 kg/m² and a high WHO performance status (stage II or III). These results are consistent with those reported by Gündoğdu et al. in Turkey, who highlighted the prognostic role of malnutrition and functional performance in the postoperative outcomes of patients with malignant pathologies [18].

The prolonged consultation delay, significantly associated with morbidity and mortality in our cohort, confirms the data of Mutombo et al., in Tanzania, which highlighted the deleterious impact of delayed treatment in biliary-pancreatic cancers [19]. Overall, our results highlight the importance of a comprehensive clinical assessment, including not only biological indicators, but also functional ones.

On the paraclinical level, our results show that the TP was significantly associated with postoperative mortality, both in univariate analysis (chi2=5.8; ddl=1) and in multivariate analysis (OR=3; p=0.01). However, this parameter was not related to

procedure-related morbidity. This suggests that pre-existing coagulation disorders could be a marker of poor vital prognosis after DBD. This result suggests that coagulation abnormalities were predictive of increased mortality after DBD, without a direct impact on non-fatal complications.

In our study, all therapeutic variables were not generally associated with procedure-related morbidity. This observation suggests that the occurrence of non-lethal complications is not solely related to the technical modalities of the procedure, but rather to the pre-operative state of the patient. This finding is in agreement with the results of Constantiniou et al., as well as García-González et al who reported that post-operative morbidity after biliary surgery depended more on the physiological condition of the patient than on the type of anastomosis or the operative time [20,21]. On the other hand, some of these variables were found to be significantly associated with post- biliary- digestive derivation mortality, particularly in multivariate analysis. This is the case of ASA stage IV and presence of ascites and of peritoneal carcinomatosis, the realization of a hepatico -jejunal anastomosis and an operating time >4 hours. These factors are recognized in the literature as predictors of operative mortality. Thus, Jung et al., in South Korea showed that the high ASA score was associated with excess mortality in patients operated on for biliary cancer [22]. Similarly, Hernandez et al. [23] in Colombia as well as Miyazaki et al. [24] in Japan reported a significantly higher mortality in cases of ascites and peritoneal carcinomatosis, considered as signs of decompensation or tumor dissemination. Regarding the operating time, Clavien et al. in a general review, recalled that it constitutes an indirect marker of surgical complexity and increased risk of major peri- or post-operative complications [2]. These results confirm that certain therapeutic elements, although not associated with morbidity, must be considered as negative prognostic factors in terms of survival. They can help to better identify high-risk patients prior to surgery.

Conclusions

Although DBD at CHUB is effective in relieving symptoms and improving patients' quality of life, our results show that, despite some limitations, postoperative complications were recorded in the majority of cases, including 30.9% deaths. Procedure-related morbidity is dominated by biliary fistulas. Factors associated with procedure-related morbidity and postoperative mortality were: low socioeconomic status, a consultation delay of more than 5.3 months, the presence of comorbidity, impaired general condition, and BMI less than 18.5 kg/m2. Factors exclusively associated with postoperative mortality were: WHO performance status stage IV, low PT, ASA stage IV, the presence of ascites, peritoneal carcinomatosis, and an operating time of more than 4 hours. Overall survival was low at 6 and 12 months. In view of the still significant morbidity and mortality, the choice of DBD must be considered taking into account all risk factors. Thus, the future must be devoted to a minimally invasive approach in the practice of DBD at the Brazzaville University Hospital.

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