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Research Article

Percutaneous Biliary Drainage: Experience of the Mohammed V Military Teaching Hospital in Rabat - A Report of 23 Cases

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Abstract

Biliary obstructions, whether benign or malignant, can lead to serious complications like cholangitis, sepsis, or liver failure if untreated. This study retrospectively evaluates 23 cases of percutaneous biliary drainage (PBD) at the Mohammed V Military Hospital from July 2022 to July 2024. The study focuses on patient demographics, procedural techniques, and complications. The majority of biliary obstructions were malignant, primarily due to cholangiocarcinoma and pancreatic head tumors. Technical and clinical success was achieved in 78.3% of cases, with a significant reduction in bilirubin levels post-procedure. However, 26.1% of patients experienced complications, including cholangitis, sepsis, and hemorrhage, with a mortality rate of 4.3%. The median hospital stay was 7 days. PBD remains a crucial intervention for managing biliary obstructions, though it requires careful patient selection, imaging, and post-procedural care to reduce risks and improve outcomes.

Keywords: *Percutaneous Biliary Drainage; Biliary Obstruction; Radiology Intervention*

Introduction

Biliary obstructions, arising from benign or malignant causes, frequently lead to complications such as cholangitis, sepsis, or liver failure if left untreated. Percutaneous biliary drainage (PBD) offers an alternative to endoscopic drainage, especially in cases where endoscopic retrograde cholangiopancreatography (ERCP) is not feasible or fails. In this study, we evaluate the outcomes of 23 cases treated at Mohammed V Military Hospital, focusing on patient demographics, procedural details, and post-procedure complications.

Methods

This retrospective study was conducted on patients undergoing PBD at the Mohamed V Military Hospital between July 2022 and July 2024. It focused on patients treated for benign or malignant biliary stenosis and excluded cases with incomplete records or endoscopic drainage only. Data were collected from the hospital's PACS system, including patient demographics, clinical presentation, imaging results, and procedural outcomes. The procedure involved ultrasound-guided puncture and fluoroscopic placement of drainage catheters using standard 0.035" guidewires and CHIBA needles.

Results

Our study included a total of 23 patients, with a male-to-female ratio of 1.875. The average age of the patients was 64.3 years. 47.8% had associated comorbidities. Biliary obstruction was identified in all patients due to cholestatic jaundice. Jaundice alone was seen in 30.4%, with pruritus in 30.4%. Concurrent fever, health deterioration, and abdominal pain were noted in 39.1% each. The median total bilirubin level before biliary drainage was 200 mg/L.

For diagnosing biliary obstructions, all patients underwent abdominal ultrasound. Additionally, 91.3% had a CT scan with contrast for complex cases, while MRI or MRCP was needed in 65.2% of patients when previous imaging was insufficient. Biliary obstruction was predominantly malignant in 87% of cases, with primary causes, such as cholangiocarcinoma (34.8%) and pancreatic head tumors (26%), being the most common. Benign causes accounted for only 13%, including lithiasis (8.7%) and inflammatory obstruction due to IgG4-related cholangitis (4.3%) (Figure 1). Biliary obstruction was most frequently located at the upper biliary confluence (43.4%), with isolated cases in 8.7% and multiple locations in 34.8% of patients. Obstructions occurred in the common bile duct in 39.1% of cases and in the common hepatic duct in 17.4%. All patients exhibited moderate dilation of the main and intrahepatic bile ducts, with no conditions complicating drainage procedures. Among the patients, 34.8% had metastatic liver disease, 60.9% had a healthy liver, and 4.3% were found to have chronic liver disease incidentally on imaging.

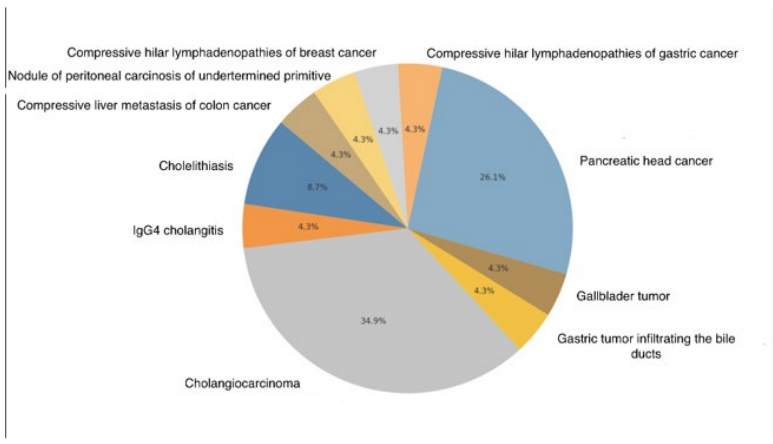

Figure 1: *Distribution of the causes of biliary obstruction among the patients.*

The most common indication for PBD in our series was angiocholitis, seen in 39.1% of patients. Other reasons included cholestatic jaundice with pruritus (30.4%), preoperative drainage (26.1%), palliative care (34%), and reduction of bilirubin levels before chemotherapy administration (4.3%).

In our study, 60.9% of patients had external biliary drainage under ultrasound guidance, while 39.1% received metal stents, with 55% being covered and 45% uncovered. None required plastic stents, and 77% of those with stents first had external drainage before stent placement. Biliary drainage was done under local anesthesia, with 26.1% of patients accessing the left intrahepatic bile duct for various reasons, while 73.9% accessed the right side. All procedures began with ultrasound guidance, and fluoroscopic guidance was used for 34.8% of patients who underwent balloon dilation and stent placement.

8.7% were on antiplatelet therapy and 4.3% on anticoagulants. Antiplatelet treatment continued without interruption, while anticoagulants were paused and replaced with heparin before the procedure, then resumed after 24 hours with no bleeding complications. 13% of cases had ascites, with one requiring therapeutic paracentesis before biliary drainage. All patients received systematic prophylactic antibiotics for 5 days post-procedure.

PBD succeeded technically and clinically in 78.3% of patients. Technical success without clinical improvement occurred in 13%, while 8.7% had technical failure. The median total bilirubin level dropped from 200 mg/L before drainage to 88 mg/L after 15 days, indicating significant improvement in clinical status and effectiveness of PBD in reducing jaundice and improving liver function (Figure 2).

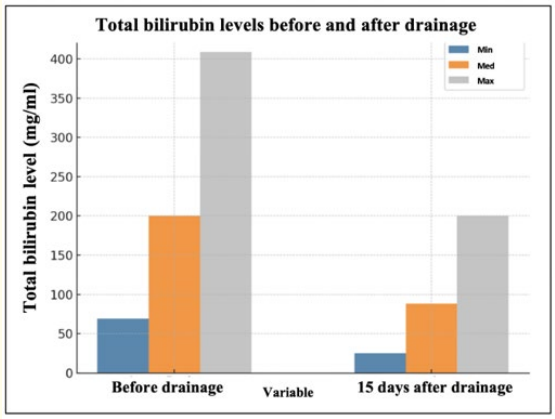

Figure 2: *Evolution of total bilirubin before and after biliary drainage.*

Figure 3 and 4 respectively depict the case of intrahepatic bile duct (IHBD) dilation due to cholangiocarcinoma, with clinical and technical success following the placement of an external drain (Figure 3), and the case of IHBD dilation caused by a pancreatic tumor, with clinical and technical success after the placement of a metallic stent (Figure 4). Post-procedure imaging in both cases confirms success with the disappearance of the IHBD dilation.

Figure 3: *Abdominopelvic CT scan without contrast injection, in axial view, showing IHBD dilation secondary to cholangiocarcinoma (A), follow-up cholangiography after placement of an external drain (B), and subsequent regression of the IHBD dilation after external biliary drainage (C).*

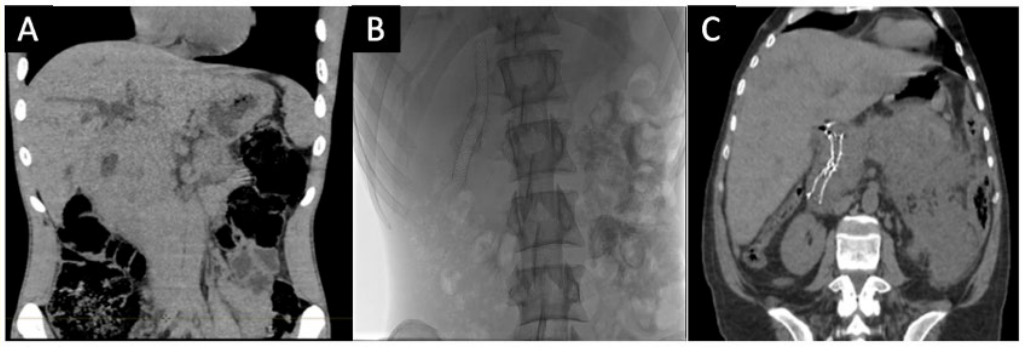

Figure 4: *Abdominopelvic CT scan without contrast injection, in coronal reconstruction, showing IHBD dilation secondary to a pancreatic head process (A), follow-up cholangiography after placement of a metallic stent (B), and subsequent regression of the IHBD dilation after biliary stent placement.*

26.1% of the 23 patients had post-drainage complications. A minor complication of drain obstruction occurred in 4.3% of cases, resolved within 24 hours. Major complications included angiocholitis (8.7%), post-procedure pancreatitis (13%) (Figure 5), and sepsis (13%). Additionally, 8.7% experienced hemorrhagic issues, with one patient suffering significant hemoperitoneum (Figure 6). One patient died from severe biliary sepsis.

Figure 5: *Abdominal CT scan, axial view, parenchymal window, in the arterial phase showing a swollen appearance of the pancreas with loss of its lobulations, associated with infiltration of the adjacent fat, consistent with pancreatitis complicating a biliary drainage. Note the biliary stent in place in the common bile duct (CBD).*

Figure 6: *Abdominal CT scan, axial view, parenchymal window, in the portal venous phase showing hematic peritoneal effusion, more pronounced in the peri-hepatic region, complicating an external biliary drainage (external drain removed).*

The median length of hospitalization for our population of 23 patients is 7 days.

Discussion

PBD is an interventional radiology procedure designed to treat obstructive jaundice by decompressing bile ducts. It restores bile flow through the insertion of drains or stents and is crucial for patients who cannot undergo surgery. Biliary obstructions are more common in men, likely due to higher rates of malignant tumors and risk factors like alcohol and tobacco use. Our study found a male predominance, with a sex ratio of 1.875, consistent with other research [1]. They predominantly affect older adults, with average ages reported between 62 and 69 years [2,3], due to frequent complex underlying conditions. In our study, the average age was 64.3 years, aligning with existing literature. Comorbidities such as diabetes and hypertension are crucial in assessing patients for PBD, linked to poorer outcomes. In our study, 47.8% of patients had at least one comorbidity, primarily diabetes (34.8%) and hypertension (30.4%), consistent with literature [4]. Biliary obstruction typically presents with cholestatic jaundice, often with pruritus, fever, and abdominal pain. A study found jaundice in nearly all cases, with about 30% having fever [4]. In our series, all patients had cholestatic jaundice; 30.4% had isolated jaundice, and 39.1% reported fever and other symptoms. Total bilirubin levels indicate obstruction severity. Kastelijn., *et al*. found 170 mg/L [5], Pedersoli reported 180 mg/L [6], and our study showed 200 mg/L, highlighting the need for drainage. Imaging is essential for evaluating biliary obstructions, starting with ultrasound for gallstones. In complex cases, CT and biliary MRI are preferred, with our study showing CT used in 91.3% and MRI in 65.2% of patients. Each method provides specific advantages for accurate diagnosis and optimal management. Biliary obstructions primarily result from malignant causes, particularly pancreatic cancer, cholangiocarcinomas, and liver metastases, with our study showing 87% of cases being malignant. This aligns with literature indicating around 83% of cases are malignant [2]. Most obstructions are due to primary causes, with 69.5% in our study confirming similar findings from previous research [3]. Cholangiocarcinomas were the most frequent, while pancreatic tumors accounted for 26% of our population. Secondary causes were identified in 17.4% of our patients, with notable variations reported in literature [7]. Benign causes, being also relatively rare in the

literature [8,9], represented 13% in our patients. PBD is a technique for managing both malignant and benign biliary obstructions, serving palliative purposes or preparing patients for surgical or endoscopic interventions. Key indications include cholangitis, which occurs in 26 - 30% of cases in literature [3,7] and 39.1% in this study. PBD also alleviates pruritus from bile salt accumulation, seen in 15 - 20% [3,9] of cases elsewhere and 30.4% here. It is primarily indicated for inoperable malignant obstructions (26 - 50% in literature [4,10]; 34% in our study) and is a backup when ERCP fails (17 - 50% in literature [3]; 26.1% in our study). PBD is used preoperatively to avoid postoperative jaundice (17.7 - 87% reported [3,5]; 26.1% in our findings) and to lower bilirubin levels prior to chemotherapy (8 - 9.6% in literature [11]; 4.3% here). It also addresses postoperative bile leaks and assists in bile stone extraction when endoscopic removal is inadequate. Contraindications are vital for patient safety. Absolute contraindications of PBD include uncontrolled infections (like sepsis) [4] and severe coagulopathy, increasing complication risks. Relative contraindications, such as massive ascites, can be addressed with precautions. Other relative contraindications include severe allergies to contrast agents and complex biliary obstructions, requiring careful risk-benefit analysis. PBD involves placing devices like external or internal-external drains and stents to manage bile flow. External drains are commonly used in acute cases, with a 60.9% usage rate in our study. Internal-external drains were not significantly used. Metallic stents are effective for maintaining bile duct patency in malignant obstructions. In our study, 39.1% of patients received metallic stents, with 55% using covered stents to reduce tumor invasion. Plastic stents, typically for temporary solutions, were not used due to higher complication risks. PBD involves a 1 - 2 hour procedure under anesthesia. Key preparation includes assessing liver function, coagulation, and managing contrast allergies. Antibiotics and ascites drainage may be required to prevent complications [3], and fasting is sometimes recommended to reduce risks during the procedure [12]. Patient monitoring during and after PBD is crucial. General anesthesia is typically used for complex cases [3], while local anesthesia suffices for simpler procedures, all with strict aseptic techniques to prevent infection. Additionally, radiation protection is essential for both operators and patients. Prior to PBD, thorough planning and imaging analysis, such as CT and MRCP, are crucial. Right biliary access is typically preferred for its accessibility, with segment V being the most common target. Left access is chosen in cases like ascites or specific anatomical conditions. In our study, 73.9% of patients had right access, while 26.1% had left access for various reasons. Effective PBD requires essential equipment such as a micro-puncture kit, angiocatheter, hydrophilic guide wire, and biliary drain. While our study data are limited, literature suggests that larger caliber catheters in Internal-external drains and improved fixation devices may enhance success rates and reduce complications. Post-procedure management involves providing analgesics and prophylactic antibiotics. Patients are monitored for complications like fever and abdominal pain, and biological tests are conducted to assess lipase, CRP, and bilirubin levels for effective drainage and early issue detection.

The technical success of PBD is defined by crossing and dilating the biliary stricture, with rates between 70% and 90% for fibrotic strictures [13], reaching up to 95% with multiple procedures [14]. For unresectable tumors, success is based on metal stent patency, with rates from 65% to 95% [15]. The definition of clinical success varies among authors, with Paik., *et al*. [3,16,17] setting it as a reduction in bilirubin to under 50% of the initial value or normalization within two weeks. In this study, 78.3% of patients met this criterion, comparable to other studies reporting rates of 79% to 98.7% [2,3]. Clinical failure of PBD is marked by unresolved symptoms, persistent cholestasis, and radiological signs like unresolved bile duct dilation or absent aerobilia. Causes include difficulty crossing strictures, complex anatomy, or severe conditions like hilar tumors [13]. Failure rates range from 10% to 30%, with our study reporting 21.7%, including both technical and therapeutic failures. Complications from PBD are classified by the Society of Interventional Radiology (SIR) into minor and major categories, ranging from therapeutic abstention to patient death, with six severity levels. Minor complications, such as discomfort at the puncture site and catheter obstruction, occur in 2 - 20% of cases, while serious complications are rare, affecting less than 2 - 3% [3]. In our study, the overall complication rate was 26.1%, with minor complications occurring in 4.3%. Major complications included cholangitis, hemorrhage, with rates aligning with literature findings, while post-procedure pancreatitis was seen in 13% at higher percentage than literature findings, likely due to prior failed endoscopic attempts [3]. Sepsis is also a major complication to watch for. One death was reported, corresponding to 4.3% of the population, consistent with other studies [9,18]. To minimize complications,

managing risk factors like coagulopathies and biliary infections is crucial [2,4]. Limiting contrast use and treating infections is important to prevent severe sepsis. For bleeding, repositioning or using larger catheters can help [3], while arterial injuries may need embolization [19]. These strategies significantly enhance patient safety. Hospital stay after PBD varies based on procedure complexity, patient condition, and complications. In our study, the median stay was 7 days, aligning with reported ranges of 5 to 10 days [10,16].

Conclusion

Our experience with 23 cases of PBD shows that while the procedure is effective in relieving biliary obstruction, it carries risks that must be managed with care. Early detection, precise imaging, and careful patient selection are key to improving outcomes and minimizing complications.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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