

# All About Percutaneous Biliary Drainage in Unresectable Cholangiocarcinoma

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## ABSTRACT

**Purpose:** The aim of this study is to describe the role of the percutaneous biliary drainage (PTBD) in the management of patients with hepatic cholangiocarcinoma (CC) and also to assess outcomes and complications after PTBD procedures.

**Methods and Materials:** 225 consecutive patients with biliary obstruction managed by PTBD were included. All cases were performed by four consultant interventional radiologist between January 2014 and March 2016. Demographic data, patients history, the radiological data base, laboratory test from and following intervention, procedural records, clinical and imaging follow-up were reviewed. Pre procedure imaging with abdominal ultrasound and computed tomography was performed in all patients. Complications were grouped into immediate (occurring <24 hours) early ( 24 hours to 30 days) and late (>30 days). 30-day mortality was calculated.

**Results:** In total there were 111 male (49,3%) and 114 female (51,7 %). The mean age was 61,5 years and ranged from 88-27 years. The approach for PTBD was left sided in 21 cases (9,3%), and right sided in 204 cases (90,7%). There were 6 (<3%) technical failures giving a technical success rate of (97,3 %). These included 2 cases of bleeding and 4 cases were we were unable to cross the obstruction. The procedure related mortality was 5 (2,2 %), these included 4 cases of sepsis and 1 case of pneumonia secondary to pleural effusions post procedure.

**Conclusion:** PTBD represents a safe and valid method in providing palliative treatment for stage IV cholangiocarcinoma.

**Key words:** colangiocarcinoma, interventional radiology, complications

## INTRODUCTION

Cholangiocarcinoma (CC) is a malignant epithelial tumor of the biliary tree that accounts for approximately 10-15 % of all hepatobiliary malignancies (1). At the time of diagnosis the cholangiocarcinoma is unresectable in more than 70% of cases, and the palliative treatment is the only option (2). Nowadays

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the mainstay of the palliative treatment is percutaneous biliary drainage (PTBD) and stenting (2) (fig. 1).

The first goal of the palliative treatment is the restoration of outflow of bile, the treatment of jaundice and accompanying pruritus, and the pain relief. Also it helps in the cases of cholangitis, which requires prompt treatment by antibiotics and drainage of the biliary system.

Another important role of biliary drainage is to decrease the level of bilirubin. Hyperbilirubinemia is a relative or absolute contraindication for several chemotherapy drugs (e.g. Doxorubicin, Irinotecan, and Gemcitabine) (3).

Therefore, in patients with malignant bile duct obstruction lower drug doses may be used to avoid toxicity or chemotherapy initiation may be delayed or contraindicated (4).

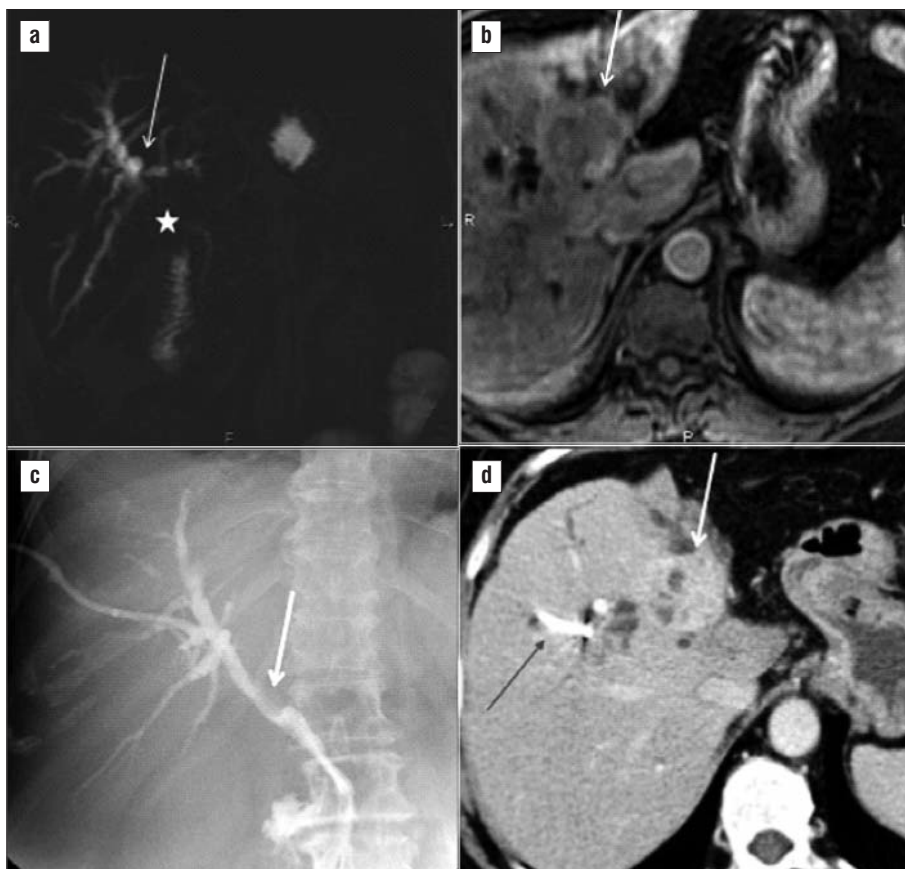
The aim of this study is to describe the role of the percutaneous biliary drainage (PTBD) in the management of patients with hepatic cholangiocarcinoma (CC) by evaluating: complications, technical success, biochemical success, procedure related mortality.

## METHODS AND MATERIALS

225 consecutive patients with biliary obstruction managed by PTBD were included. All cases were performed by four consultant interventional radiologist between January 2014 and March 2016.

### Patients

In total there were 111 male (49, 3%) and 114 female (51, 7%). The mean age was 61,5 years and ranged from 27-88 years. Malignant tumors were the leading cause of biliary obstruction, with hilar CC most



**Figure 1 - 70 yr. old patient with obstructive jaundice. (a) Coronal MRCP reveals dilatation of right intrahepatic bile ducts (arrow), with sudden narrowing at the left/right junction (point star); normal aspect of the main bile duct. (b) MRI3D T1 Dynamic, in portal phase: nodular tumoral lesion located in the IV liver segment. (c) PTBD with internal-external biliary drainage who reveals stenosis at the biliary junction (arrow). (d) Axial CT (portal phase) one month after the procedure reveals the biliary drainage catheter and tumoral lesion from the IV liver segment (white arrows)**

frequent diagnosis 40% (n=92). The benign etiology of biliary obstruction were dominated by post operative stenosis of the main bile duct 6,6% (n=15) (fig. 2).

Demographic data, patients history, the radiological data base, laboratory test from the time and following intervention, procedural records, site of lesion, approach site, technical success, complications, clinical and imaging follow-up were reviewed. Laboratory tests before and following the intervention included: platelets (plts), international normalized ratio (INR), bilirubin, creatinine, alkaline phosphatase (ALP), gamma glutamyl transpeptidase (GGT), white blood cells (wbc). Pre procedure imaging with abdominal ultrasound and computed tomography was performed in all patients. Magnetic Resonance Cholangiopancreatography (MRCP) was performed only in complex cases for the procedural planning. A definitive diagnosis was made only in

patients with intrahepatic lesions either by percutaneous hepatic biopsy or from surgical specimens.

Complications were grouped into immediate (occurring <24 hours from the procedure) early (occurring from 24 hours to 30 days from the procedure) and late (occurring >30 days from the procedure). Technical success was evaluated. Technical success was defined as gaining access to the biliary system, with or without internalization, performing bile drainage.

**Percutaneous biliary drainage technique**

The workup before percutaneous trans hepatic cholangiography (PTC) should include: a review of the imaging studies, of the laboratory results (coagulation parameters, prothrombin time (PT), activated partial thromboplastin time and platelet count), and of the liver function results.

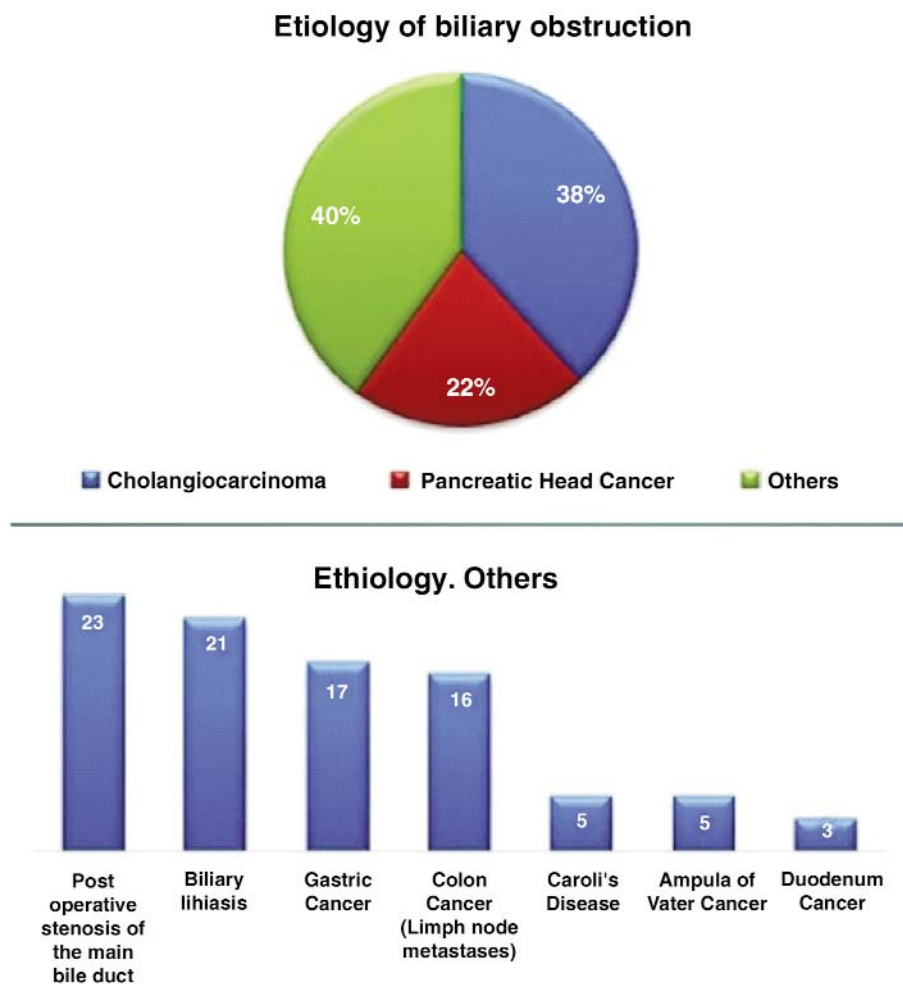


Figure 2 - Causes of biliary obstruction

The patient is placed in a supine position, and sterile preparation and draping are performed. After the patient is positioned and draped, intravenous sedatives are given. The skin-puncture site is anesthetized with a local anesthetic (2% lidocaine).

Conscious sedation is needed for adequate pain control. PTBD begins with the performance of percutaneous transhepatic cholangiography (PTC). Once the needle is in the bile duct, a 0.018-in wire is advanced. After the wire is passed to a secure position in the biliary tree, the needle is removed.

A sheath of the coaxial system can be passed over the 0.018-in. Cholangiography with further injection of contrast agent can be performed at this stage to improve delineation of the level of obstruction. A 4-French catheter with a distal curve and a 0.035-in hydrophilic guide wire are usually used to cross the

obstructing lesion. For further interventions, a larger wire is needed (e.g.: Amplatz superstiff wire). On the stiff wire a biliary drainage catheter is advanced. Catheters are also secured to skin by using suture material (*fig. 3*).

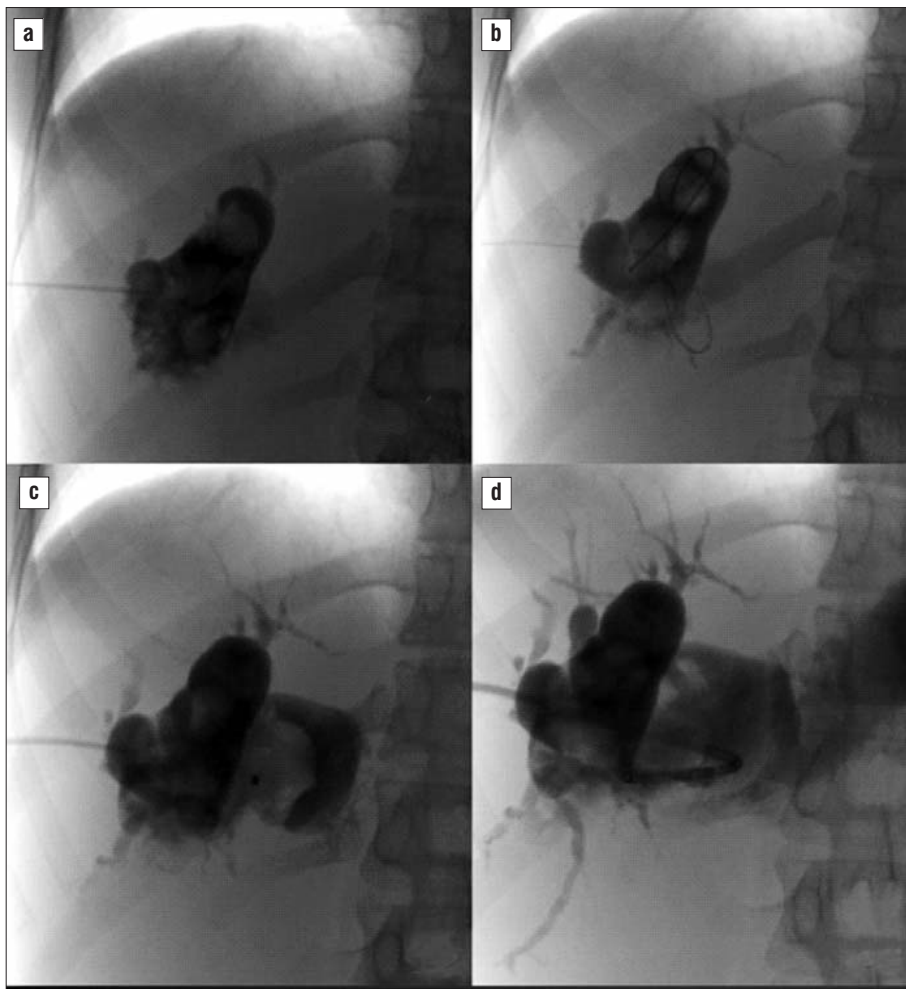
The approach for PTBD was left sided in 21 cases (9,3%), and right sided in 204 cases (90,7%).

## RESULTS

### *Procedure outcomes*

There were 6 (<3%) technical failures giving a technical success rate of (97,3 %). These included 2 cases of bleeding and 4 cases were we were unable to cross the obstruction.

The procedure related mortality was 2 (0,88 %), these included 1 case of sepsis and 1 case of pneumonia



**Figure 3 - A 30 years old patient with Caroli Disease. Fluoroscopic images presenting following steps of placing the percutaneous Trans hepatic biliary drain**

secondary to pleural effusions post procedure. Laboratory tests before the intervention (last result preceding drainage) and after PTBD were reviewed to assess the effectiveness of the procedure, and also to assess the general condition of patients. Elevated serum bilirubin was noted in 194 (86,2%) of patients.

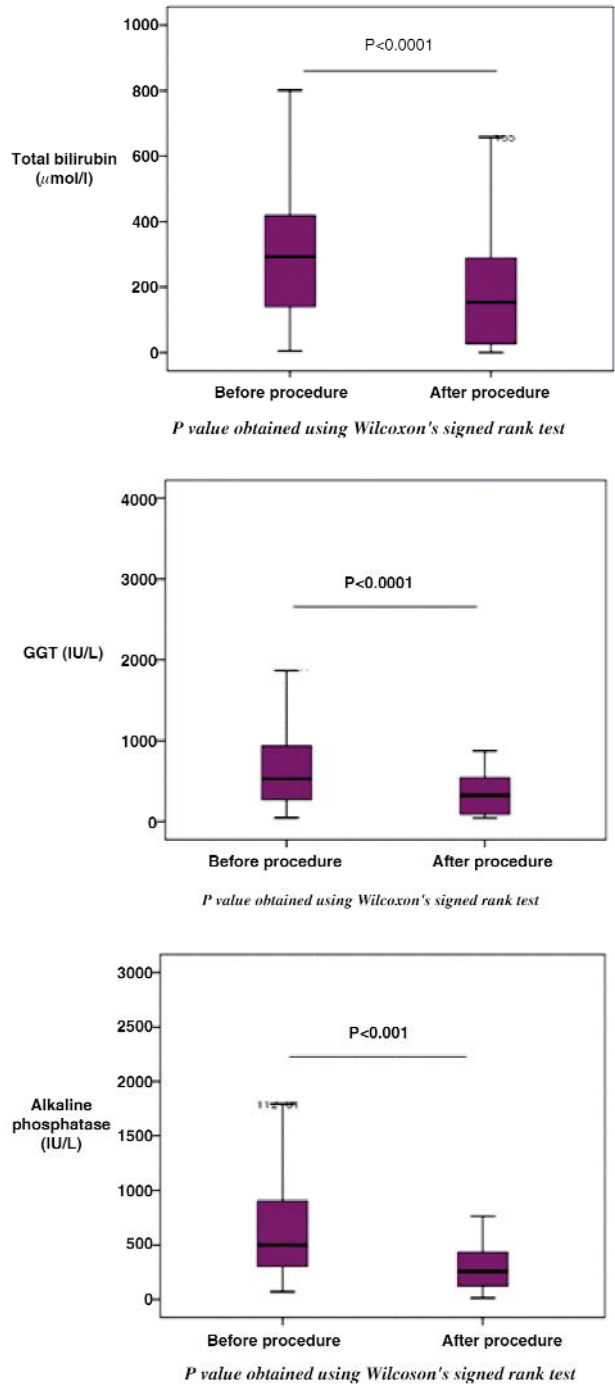
Total bilirubin, presented before PTBD was 274,28  $\mu\text{mol/L}$ , with an interquartile range of 139,36 – 419,37. The median value of bilirubin level after PTBD was 153,9  $\mu\text{mol/L}$ , with an interquartile range of 27.36-289.42 ( $p < 0,0001$ ). Following PTBD there was a decrease of GGT in 81,3 % ( $n = 183$ ). The median level of GGT before treatment was 549,00 IU/L while a reduction after the procedure to a median of 324 ( $p < 0,0001$ ). The median value of ALP was found to be 490,50 IU/L, higher than normal, with an interquartile range of 307,00 – 861,50 UI/L. The median value of ALP after treatment was 324 IU/L, with an average of declining after procedure of 241 ( $p < 0,0001$ ) (fig. 4).

Complications: All patients were included in the analysis of complications from table 1. There were a total of 41 (17, 2%) complications and adverse effects associated with PTBD. Immediately complications (till 24 hours) occurred in 19 patients (8,4 %). The most common complications during the procedure was hemobilia, in 8 patients (3,5%). Immediately after the procedure the fever was the most common complication, observed in 11 patients (4,8%). The most common early complication (1-30 days) was the drain dislocation, found in 4 patients (1,7%), and abscess, in 1 patient (<1%). Long term complications (>30 days) of PTBD appeared in 16 patients (7.1%). The most frequent was drain dislocation in 14 patients (6, 2%).

**DISCUSSION**

PTBD is a validated method used for the relief of malignant and benign biliary obstruction (2, 5, and 6). Also the potential beneficial effects of chemotherapy on patient survival following PTBD have been discussed in several studies (7).

But in some publications the possible benefits of preoperative biliary drainage for CC and pancreatic cancer are debated (8-9), and some authors say that little is known regarding the real clinical impact of PTBD and stent placement, in particular on clinical benefit, the resolution of jaundice, and a subsequent administration of chemotherapy (10-11). Therefore, it is necessary to elucidate which features patients possess in order to ensure the minimal side effects and complications and maximum possible benefits for survival. In the present study, 225 consecutive patients



**Figure 4 - Box plots representing Bilirubin, Alkaline phosphatase and GGT before and after the procedure**

**Table 1 - Analysis of complications**

Immediat	19 (8.4%)	Fever-11 (4.8%) Heamobilia-8 (3.5%)
Early	5 (2.2%)	Drain Dislocation-4 (1.7%) Abces-1 (<1%)
Late	16 (7.1%)	Drain dislocation-14 (6,2%) Rupture-1 (<1%) Clogging-1 (<1%)

who had undergone PTBD were reviewed.

The PTBD in our center was successful in 97, 3 %. This confirms the safety of the procedure and numbers reported in several studies (10). The main indication for PTBD was hilar CC. Also is important to remember that other frequent indications are pancreatic head tumor (as an alternative for ERCP), hilar adenopathy's, cholangitis, and the benign cases (1, 12). With proper technique like peripheral bile duct puncture, serious bleeding complications are uncommon.

Many authors note that during the procedure, the needle will always pass a hepatic artery branch, a portal vein, because all of the travel side by side within portal triads, resulting in a transient hemobilia (13). That explains why the most common complication stated in the study group during the procedure was hemobilia. In our case the most frequent was drain dislocation that also appears in other studies (14-15). At our institution the guidelines suggest that, depending on patient's allergic background, prophylactic antibiotic therapy should be initiated one day before the procedure. This may explain the low percentage of patients with post procedure cholangitis and abscess (<1%). However despite prophylactic antibiotics coverage fever and transient bacteremia can occur right after the procedure or within the few hours after the procedure (16).

Most of the studies describes that after successful PTBD, the total bilirubin level was reduced (10, 15, and 16). In the current study the average value was decrease post procedural by 55%. Also, both levels of ALP and GGT were reduced after the PTBD.

However at our institution, depending on patient conditions and drugs involved, chemotherapy might be initiated with a threshold of TSB of up to 3 mg/dl. Only 14, 6 % (n=33) were able to initiate chemotherapy. One of the answers might be that we seem to be performing PTBD too late in the patient's disease history. Therefore, chemotherapy initiation and/o drug doses might be compromised, reducing life expectancy (16-17).

## CONCLUSIONS

PTBD is a valid method in providing palliative treatment for patients with malignant biliary obstruction.

PTBD represents a safe method that can be performed with high technical success and low complications rates.

Although PTBD is effective in achieving a significant

decrease in typical markers of cholestasis, the chemotherapy-initiation threshold was achieved in only 15% of patients.

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