

# BILLIARY DRAINAGE IN OBSTRUCTIVE JAUNDICE

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## ABSTRACT

In patients with obstructive jaundice, when the endoscopic approach fails to achieve biliary drainage, percutaneous cannulation and combined endoscopic/percutaneous endoprosthesis insertion can simultaneously or subsequently be performed. The present study compares these two approaches. Endoscopic retrograde biliary drainage (ERBD) and percutaneous transhepatic biliary drainage (PTBD) are the two main non-surgical treatment options for obstructive jaundice in patients with hepatocellular carcinoma (HCC). ERBD is usually the first-line treatment because of its low hemorrhage risk. Some authors have reported that the successful drainage rate ranges from 72 to 100%. Mean stent patency time and mean survival range from 1,0 to 15,9 and from 2,8 to 12,3 months, respectively. PTBD is often an important second-line treatment when ERBD is impossible. With regard to materials, metallic stents offer the benefit of longer patency than plastic stents. The dominant effect of biliary drainage suggests that successful jaundice therapy could enhance anticancer treatment by increasing the life expectancy, decreasing the mortality, or both. We present an overview of the efficacy of ERBD and PTBD for obstructive jaundice in HCC patients who are not candidates for surgical resection and summarize the current indications and outcomes of reported clinical use. Traditionally, surgical techniques have been used, however, in the last 20 years the availability of both endoscopic and interventional radiological procedures has increased. The technical success of the procedure depends on the experience of the interventional radiologist performing the drainage. It can be as high as nearly 100%. Clinical efficacy is usually lower but still over 90%. When endoscopic drainage alone fails, a combined percutaneous/endoscopic procedure should only be performed if it can be carried out simultaneously.

**Key words:** *biliary drainage, obstructive jaundice, percutaneous transhepatic biliary drainage, endoscopic retrograde biliary drainage, hepatocellular carcinoma*

## INTRODUCTION

Controversy exists concerning the preferred technique of percutaneous biliary drainage (PBD), either via endoscopic retrograde biliary drainage (ERBD) or by means of antegrade percutaneous transhepatic biliary drainage (PTBD) (42). PTBD is the preferred method in Japan for relief of obstructive jaundice due to proximal obstruction. In Europe and the USA, endoscopic biliary drainage (EBD) is usually performed as primary intervention and is followed by PTBD only when EBD has failed.

Internal drainage by EBD, although a less invasive technique, carries increased risk of developing cholangitis due to bacterial contamination from the duodenum and increased risk of procedure-related complications such as duodenal perforation and post-EBD acute pancreatitis (12,22). Drainage by means of PTBD is associated with hemobilia, portal vein thrombosis, cancer seeding and potentially more patient's discomfort (2). Three published prospective randomized controlled trials comparing EBD versus PTBD include patients with unresectable bile duct tumours or carcinoma of the gallbladder and pancreas showing conflicting results. These studies address palliative treatment and although important in the context of biliary drainage, no distinction is made between distal and proximal bile duct obstruction. In patients with HCC with involvement of the segmental biliary ducts, drainage

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of the intrahepatic biliary tree is challenging and mostly requires multiple drains or stents. However, in patients with a distal bile duct obstruction, usually caused by a tumour in the region of the pancreatic head, drainage is more straightforward and requires a single drain or stent. In the latter category of jaundiced patients in whom partial liver resection is usually not undertaken, PBD remains a controversial issue (11).

To date, there are no studies regarding the optimal route of drainage in patients with a potentially resectable HCC. Therefore, the aim of the present study is to compare the success rate and complications of ERBD and PTBD in patients eligible for resection of a suspected HCC.

Diagnostic percutaneous transhepatic cholangiography gradually develops into a technique, which allows prolonged external catheter drainage of malignant strictures in the biliary system (18). Further developments include percutaneous placement of multiple side-hole catheters into the duodenum, thereby establishing the internal bile drainage (28). Early series show a considerable number of infectious complications (approximately 40%), but further refinements produce better results (26).

#### *Percutaneous biliary drainage*

The technique we currently routinely use involves the use of ultrasound guidance, a thin Chiba needle and a 0.014-inch guide-wire to gain access to the biliary system. A sheath is then placed over an 0.35-inch guide-wire and strictures are negotiated using standard 5-French angiographic catheters and hydrophilic guide-wires. For permanent stenting self-expandable metallic stents are used. Metal self-expandable stents are the standard in PTBD and thus being preferred over plastic endoprotheses. Metal stents have higher patency rates than plastic ones and in case of recurrent obstruction a new stent can easily be placed in the blocked metal stent, without having to remove the old one (as opposed to plastic stents) (26). Metal stents are associated with shorter hospital stay and lower cost than plastic stents (16,22,23). A new development is the use of covered stents, which aim at reducing the incidence of recurrent jaundice by preventing tumour ingrowth into the stent. Although tumour ingrowth is probably prevented to some extent by the covering of these stents, it is

unclear whether clogging is also prevented (3,14,27,34). Potential drawbacks of such stents are the increased chance of stent migration, occlusion of side-branches, when stenting hilar lesions, and occlusion of the cystic duct, potentially leading to cholecystitis. Another concern is the potential lack of costeffectiveness of the use of such stents. Currently, there is not enough evidence to support the routine use of covered stents in malignant bile duct obstruction, although in selected cases these may be useful. At least as important as advances in PTBD technique are the improvements, which are made in pre-procedure planning by imaging with ultrasound, computed tomography (CT) and magnetic resonance cholangiopancreatography (MRCP). Particularly when performing drainage and stenting of hilar obstruction, treatment planning on the basis of imaging is crucial (10). PTBD should never be performed without a proper non-invasive evaluation of the biliary tree.

#### *Surgical versus non-surgical biliary drainage*

Surgical biliary bypass is often performed when exploratory laparotomy for a tumour of the pancreatic head region shows unresectability of the tumour. Adequate decompression of the biliary tree can be obtained by performing a hepatico-jejunostomy and a gastric bypass is performed simultaneously. This prevents the need for an additional laparotomy later in the course of the disease when gastric outlet obstruction may develop as a result of local tumour progression. However, mortality and morbidity rates of this 'double bypass' procedure remain considerable, as they range from 2% to 5%, and from 17% to 37%, respectively (24,25,40). Several randomized trials compare surgical with non-surgical drainage (mostly performed endoscopically) in patients with pancreatic head carcinoma (1,15,37). Surgical treatment is associated with higher postoperative mortality and morbidity rates and a longer hospital stay than non-surgical drainage (mostly performed endoscopically), but recurrent jaundice requiring stent exchange and late duodenal obstruction are more common in the non-surgical drainage group (15,35). Similarly, a randomized study comparing percutaneous biliary drainage with surgical bypass in patients with unresectable pancreatic head cancer demonstrates successful drainage in all the patients,

but there are higher 30-day mortality and procedure-related mortality as well as a longer hospital stay in the surgical group. These advantages of percutaneous drainage are partly annihilated by the higher number of readmissions for recurrent jaundice and duodenal obstruction requiring surgery (4). The endoscopic stent placement is more cost-effective than surgical biliary drainage, although frequent stent exchanges were necessary in the non-surgical group (32). It is currently accepted to consider surgical biliary drainage only in patients with pancreatic head cancer who are in an otherwise good condition and who have a life expectancy of more than 6 months (38). This means that surgical drainage is only performed in patients who undergo an exploratory laparotomy and are unresectable. The advent of duodenal stenting in addition to biliary stenting may obviate the need for surgical treatment of gastric outlet obstruction and this may further expand indications for biliary stenting in the near future. Currently, prospective studies comparing combined biliary and duodenal stenting versus surgery are lacking and the results of such studies should be awaited (39). A different situation occurs in the patients with malignant obstruction at the hilum. Patients with Bismuth type I and II lesions are surgical candidates. Resection of a type III lesion often requires major surgery and only a minority of these patients will eventually undergo resection. Type IV lesions are generally considered to be irresectable. In patients with unresectable hilar cholangiocarcinoma, performing a hepatico-jejunostomy at the hilum is technically difficult and associated with higher complication and mortality rates than non-surgical stenting (20,29). In addition, gastric outlet obstruction is an uncommon sequelae of hilar cholangiocarcinoma and surgery for this complication is, therefore, only rarely required. Thus, non-surgical drainage of the biliary system is the preferred treatment option in the vast majority of patients with unresectable hilar malignancy (36).

#### ***Percutaneous versus endoscopic biliary drainage***

When comparing percutaneous and endoscopic treatment, distal and proximal bile duct obstruction should be distinguished again. However, in a two prospective randomized trials comparing PTBD and endoscopic retrograde cholangiopancreatography (ERCP) for palliation of inoperable malignancy

causing bile duct obstruction, this distinction has not been made (17,33). PTBD with self-expanding metal stents is compared with conventional endoscopic polyethylene endoprostheses (EPE) which reflects current practice in most institutions (31). The technical success rates of both procedures are similar (PTBD, 75% and EPE, 58%;  $p=0,29$ ), whereas therapeutic success is higher in the PTBD group (71% versus 42%;  $p=0,03$ ). Major complications are more common in the this group (61% versus 35%;  $p=0,09$ ) but does not account for differences in 30-day mortality rates (PTBD, 36% and EPE, 42%;  $p=0,83$ ). Overall median survival is significantly higher in the PTBD group than in the EPE one (3,7 versus 2,0 months;  $p=0,02$ ). In the majority of patients (7/11) in whom endoscopic stent placement fails, subsequent percutaneous stent placement is successful. It is concluded that PTBD with placement of a self-expanding metal stent is an alternative to placement of an EPE.

Numerous non-comparative studies assessing PTBD and ERCP for treatment of distal bile duct obstruction suggest that there are no significant differences in technical success rates between percutaneous and endoscopic treatment (6,7,19). Complication and mortality rates are comparable, although the type of complications differs. Pancreatitis is more often seen after ERCP, whereas bile leakage is more frequently seen after PTBD. An advantage of ERCP over PTBD is the absence of a percutaneous drainage tube, which may be uncomfortable for the patient and requires removal after several days in most cases. Furthermore, PTBD may be painful in some patients, but patient's preference for either technique has not been studied. Success and complication rates for both ERCP and PTBD depend on the operator's skills and experience and this may influence the choice for one of these techniques in different institutions. In most centres, ERCP is used as the primary procedure for palliative stenting of malignant distal bile duct obstruction. Until recently, ERCP is considered an important diagnostic tool for assessment of patients with malignant distal bile duct obstruction, too. Its diagnostic role is now replaced by ultrasound, CT, and MRCP almost completely and the only diagnostic value of ERCP lies in its ability to obtain brush cytology of suspected lesions. In spite of the

evidence of superior patency of metallic stents, plastic endoprostheses are usually inserted during ERCP only to be replaced by metallic stents when they occlude after short intervals (6,41). As a result, frequent stent exchanges are necessary using this approach and this may counterbalance the short term cost benefit of applying the plastic stents (13,43).

In current practice, PTBD in distal bile duct obstruction is mostly reserved for cases where ERCP fails or is impossible. The most common reasons for this are duodenal stenosis, failure to pass the biliary stricture or to cannulate the papilla (e.g. because of its position in a duodenal diverticulum), altered anatomy after surgery (B2 stomach), or prior creation of a bilioenteric anastomosis. In most of such cases, PTBD is technically successful and PTBD use as a secondary tool after failure of or inability to perform ERCP is widely accepted. In hilar obstruction, the situation is less clear and both PTBD and ERCP are used as a primary drainage modality in different institutions. PTBD has a distinct advantage over ERCP in that with ultrasound guidance one or more appropriate segments for drainage can be chosen and injection of contrast matter in segments too small to be drained can be prevented. As stated before, ultrasound guidance during PTBD is extremely useful in such patients. Furthermore, negotiating the hilar strictures and draining the appropriate segments can be very difficult with ERCP and success rates are lower than for distal strictures (5,8). Whether PTBD or ERCP is used as the primary tool in patients with hilar obstruction depends on specific patient's circumstances and the referring physician's preference as well as on local availability and expertise. As hilar cholangiocarcinoma is a relatively rare tumour and both percutaneous and endoscopic palliations require considerable expertise, it is probably useful to concentrate.

In conclusion, the technical success of the procedure depends on the experience of the interventional radiologist performing the drainage. It can be as high as nearly 100%. Clinical efficacy is usually lower but still over 90%. When endoscopic drainage alone fails, a combined percutaneous/endoscopic procedure should only be performed if it can be carried out simultaneously.

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