PERCUTANEOUS BILIARY DRAINAGE: A REVIEW OF 150 CASES

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ABSTRACT

Objective: To review our technique of ultrasound and fluoroscopically guided Percutaneous Transhepatic Biliary Drainage (PTBD) procedures, and compare our complication rate with internationally accepted standards.
Study Design: Retrospective study.
Place and Duration of Study: Department of Interventional Radiology, Armed Forces Institute of Radiology and Imaging, Rawalpindi, Pakistan, from Jan 2017 to Oct 18.
Material and Methods: Procedure was performed on 159 adult patients. All the referrals were evaluated with a CT scan, 148 cases were done in direct ultrasound guidance while 2 were done via fluoroscopy. USG guided puncture of bile ducts was done. Internalization was attempted. Depending on the outcome of attempt, external or internal – external locking pigtail drains were placed over wire. Patients were monitored for early and delayed complications. Data was organized in MS Excel 2007.
Results: Percutaneous biliary drainage procedures were successfully performed in 148 out of 150 patients (98.6%) of obstructive jaundice. Ultrasound guided punctures of dilated bile ducts were made using predominantly needles of 18G and 20G. The technique was varied according to the pathology of the patient and the degree/level of obstruction. Eighty drains were placed via left sided access (54%), 52 via right sided access (35%) and bilateral drainage was done in 16 cases (11%). Internalization was achieved in 90 (60.8%) cases while external drain placement was done in 58 cases (39.2%). In the second attempt made in 19 cases, 12 (63%) were internalized.
Our complication rate was up to 12% for minor and up to 5% for major complications. We had a mortality of 1.3%. Our technique was cost-effective.
Conclusion: Ultrasound guided percutaneous biliary drainage in experienced hands is a useful palliative procedure. Variations in technique to suit patient pathology and other constraints is often necessary without affecting outcome. Poor general condition of these patients and the variable technical difficulties in the procedure entail certain complications and mortality within limits.

Keywords: Biliary intervention, Biliary malignancy, Cholangiogram, Obstructive jaundice, Percutaneous biliary drainage.

INTRODUCTION

Patients of benign and malignant biliary duct obstruction can be a challenging clinical problem. Malignancies with obstructive jaundice generally present too late to perform curative surgery[1].

Due to progressing hyperbilirubinemia with its consequent adverse effects, drainage needs to be established even in advanced terminal cases[1,2]. In malignant bile duct obstruction, these interventions are used for palliation of symptoms including anorexia and pruritus as well as to reduce the serum bilirubin levels to allow administration of chemotherapy.

With the current modern technique in experienced hands, Percutaneous Transhepatic Biliary Drainage (PTBD) equals endoscopic retrograde cholangio pancreatography (ERCP) regarding technical success and complications[1]. In addition, there is a reduction in immediate procedure-related mortality with proven survival benefit[1-7]. Moreover, it is the only immediate life-saving procedure in cholangitis and sepsis[3,4]. We present a review of 150 cases performed in our interventional radiology department and discuss our techniques and complications. We modified our technique to reduce the cost incurred on the procedures.

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PATIENTS AND METHODS

Study design was retrospective study. The study was conducted at the Department of International radiology Armed Forces Institute of Radiology and Imaging, Rawalpindi from Jan 2017 to Oct 2018. Method of sampling was non-probability convenience sampling. All referrals were from Gastroenterology department of Pak Emirates Military Hospital, Rawalpindi. Procedures were performed on 150 adult patients. All cases had an INR less than 1.5 and a platelet count above 50,000. They had raised serum bilirubin and serum alkaline phosphatase levels.

All the referrals were evaluated with a computed tomography (CT) scan. Ultrasound was also used for approach planning and immediate assessment prior to the procedure. Curved array 3.5-5 MHz probe of Toshiba Xario 200 was used for ultrasound.

One hundred forty eight (98.7%) cases were done in direct ultrasound guidance while 2 (1.3%) were done via fluoroscopy. One hundred forty nine cases were done under local anesthesia using 2% lignocaine while 1 case needed general anesthesia.

Ultrasound guided percutaneous puncture of bile ducts was done with an 18G LP or Chiba needle in 128 cases, 20G needles in 19 cases and 21G micro-access set in 3 cases including one post-transplant patient. This was followed by passage of 0.035 wire and femoral access sheath in case of 18G needle puncture and 0.018 wire and radial sheath in case of 0.018 wire.

Internalization was attempted with a 20G needle with curved 0.035 hydrophilic (Terumo) normal/ stiff wire and V18 0.018 wire using support by 5F Cobra 2 and vertebral catheter. Depending on the outcome of the attempt, external or internal-external locking pig-tail drains, 8.5-10F, were placed over the wire (fig-1).

The drains were locked, stitched to skin and drainage bag attached in all cases. Conscious sedation was used during the procedures and broad spectrum anti-biotic cover was given for 5 days.

Re-attempt at internalization was made after two weeks in 19 cases. All patients were monitored for early and delayed complications. Data was analyzed in MS Excel 2007. Descriptive statistics like frequency, mean, standard deviation and percentages were calculated.

Figure-1: A: Cholangiogram via left sided access showing the point of obstruction at confluence of right and left hepatic ducts, B: Successful passage of 8.5 F pigtail drain through the stricture into duodenum.

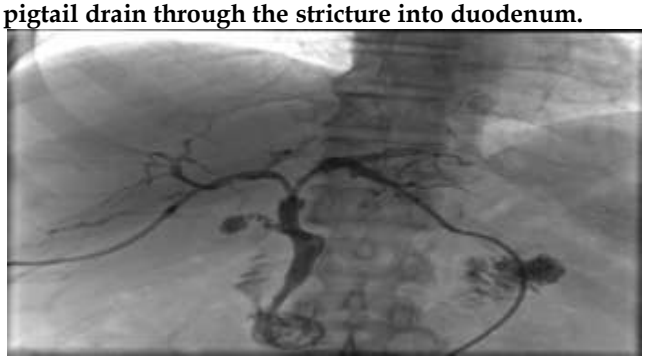

Figure-2: Cholangiogram after bilateral biliary drain placement.

RESULTS

Our 150 patients had an age range of 30-85 years with mean age of 57.9 ± 12. They consisted of 91 males (60.7%) and 59 females (39.3%). Our

indications of PTBD were malignant biliary obstruction in 83% of cases. Benign diseases were all post-operative cases with obstruction at hepatico-jejunostomy site (15%) and iatrogenic bile leak (2%).

We were successful in 148 cases (98.7%) in providing some kind of drainage while 2 (1.3%) cases were unsuccessful. We achieved internalization of the drain in 90 (60.8%) cases while external drain placement was done in 58 cases (39.2%). In the second attempt made in 19 cases, 12 (63%) were internalized.

Eighty drains were placed via left sided access (54%), 52 via right sided access (35%) and bilateral drainage was done in 16 cases (11%). About 5 cases who were initially provided left sided drainage did not show significant clinical and biochemical improvement and were referred back and bilateral access was done making the total bilateral cases 21 (14%) (fig-2). Our procedural details are summarized in fig-5.

Our minor complications included access site pain in 17 cases (12%), transient hemobilia lasting less than 24 hours in 15 cases (10%), drain blockage/dislodgement in 6 cases (4%) and subcapsular collection in 3 cases (2%). Our major complications included persistent hemobilia in 3 cases (2%), bile leak with biliary-pleural fistula and pleural effusion formation in 2 cases (1.3%), cholangitis, sepsis and abscess formation in 7 cases (5%) and acute pancreatitis in 2 cases (1.3%).

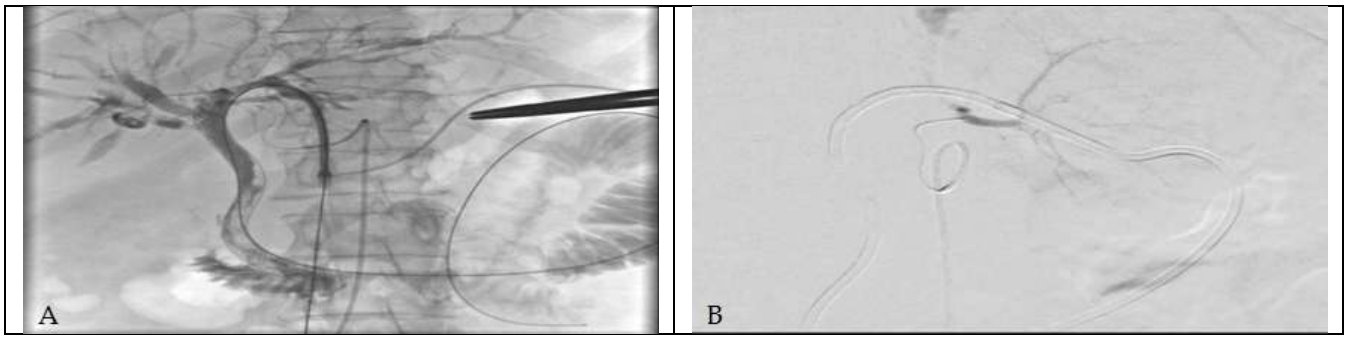

Figure-3: A: Hepatic artery angiogram and a post PTBD patient presenting with persistent hemobilia showing transaction of segment III branch of left hepatic artery which was then closed with gelfoam, B: Cholangiogram after the procedure showing no bleed at present.

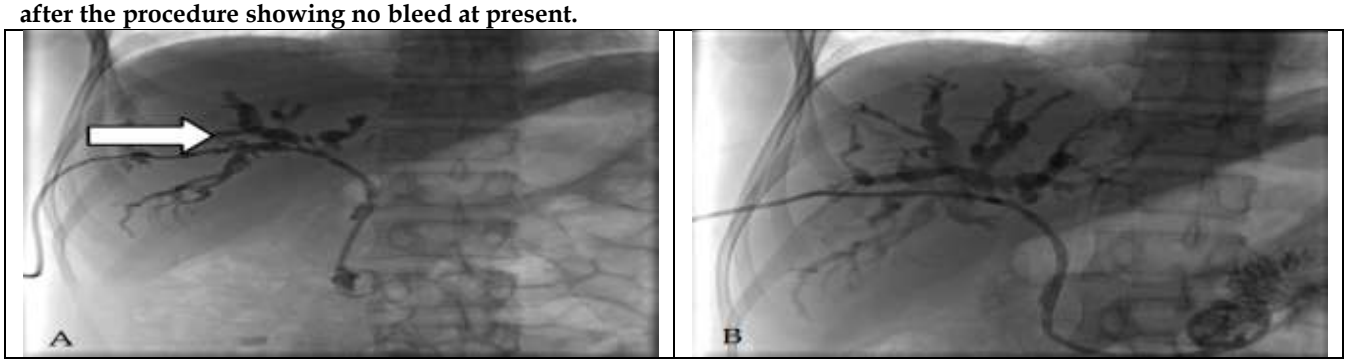

Figure-4: A: Cholangiogram showing bile leak at accesjs site and posterior displacement of drain, B: After upsizing and repositioning of catheter, no leak is noted.

Two patients died (1.4%), one due to acute pancreatitis related complications and one post-transplant patient who developed sepsis secondary to biliary-pleural fistula.

DISCUSSION

The primary aim of biliary drainage procedures in patients of obstructive jaundice is to provide symptomatic relief and biochemical improvement[1-3]. Drainage of a single lobe (or at least 20% of liver parenchyma) is sufficient to relieve jaundice and improve liver functions in

patients with hilar cholangiocarcinoma whose primary biliary confluence is most often blocked[4,5]. The factors determining the selection of lobe to be drained are the size of the lobe and involvement of secondary biliary confluence. Typically, the bile duct that drains the maximum amount of functional hepatic parenchyma is targeted. Imaging review before the procedure is imperative to choose the appropriate puncture site[5].

In cases, where the right and left systems were communicating or a reasonably large left lobe was seen, we preferred a left sided approach to avoid pleural transgression. The right lobe was chosen when the left lobe was atrophic due to portal vein involvement or longstanding cholestasis[1]. Some cases required bilateral access initially in cases of complete/effective or impending isolation of the biliary channels of the lobes to avoid risk of cholangitis due to retained contrast in the non-draining lobe[2]. Patients who already had cholangitis were also drained bilaterally in the first instance.

We generally used larger bore 18G needles rather than the more common 21G needles in the initial puncture. Puncturing with a 21G needle usually requires a dedicatedmicro puncture set like Accustik (Boston-Scientific) or Neff (Cook) and then conversion to a 0.035 system. This generally involves significant additional cost as these sets are expensive.

We also used larger needles because referrals in our set-up generally present late and ducts are more markedly dilated which makes accurate placement of the larger bore needle easier. We always took care to ensure a single wall puncture to reduce complications[2,6,7]. When a 20G needle was used, we improvised by using a radial access sheath whose set already contains a short 0.018 wire and we passed the radial sheath over that wire. This again saved the cost of using a dedicated micro-puncture set. After removal of the dilator there is no difference in the same size radial and femoral sheath.

We relied heavily on USG for nearly all punctures because of the advantage of direct visualization to keep track of the needle and avoid any blood vessels or other structures. Also, we had a preference for left lobe puncture where ultrasound guidance is more commonly used[1].

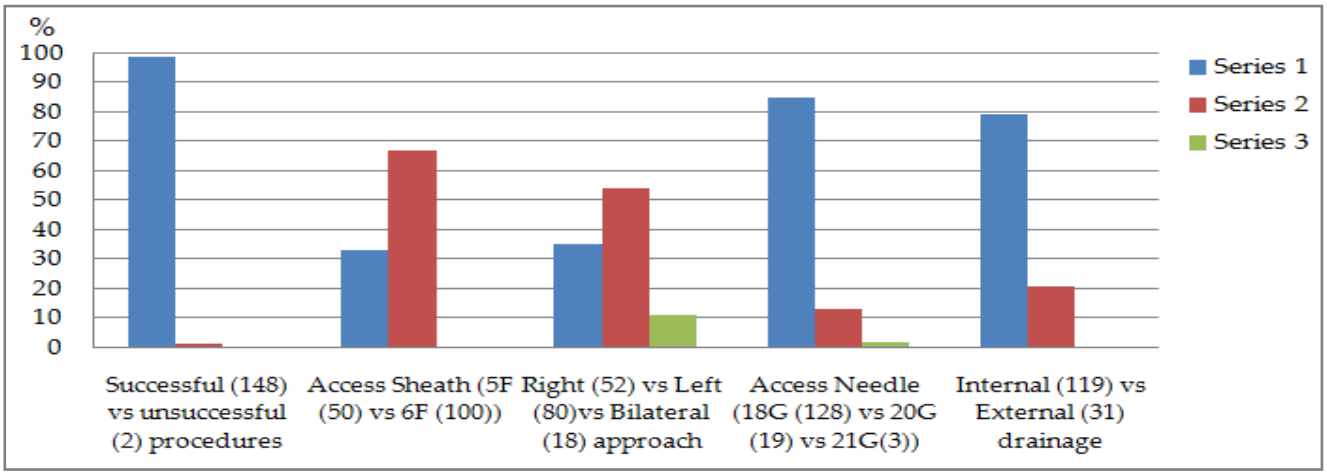

Figure-5: Summary of procedural details.

Another change in technique which we sometimes employed was that once USG puncture was done and flow of bile through the puncture needle was seen, we passed the wire under USG before doing a cholangiogram to prevent loss of needle access. We then combined wire feel with fluoroscopy to assess wire position. In such cases if we were not absolutely sure that the wire is in the biliary system we initially passed just the thinner stiffener of the sheath to do a cholangiogram rather than introducing the larger sheath directly. However, in a majority

of cases we performed a cholangiogram via needle before passing wire and sheath under fluoroscopy.

A challenging step in the percutaneous biliary drainage is to cross the stricture so that the drainage can be internalized upto the duodenum. Internalized drainage has many advantages[1] which include a more secure drain, preservation and entry of bile salts in gut to aid digestion/ avoid electrolyte imbalances, relief from a cumbersome external bag and future stent placement. A support catheter and soft wire is used to cross the stricture. We used a 5F Cobra 2 catheter in 110 cases, a 5F vertebral catheter in 34 cases while 6 cases required both. We achieved internalization in 80% of cases using soft hydrophilic wire only while a stiffer hydrophilic wire or thinner V18 0.018 wires was used in 20% of cases. The choice of support catheter was decided by the position of the stricture vis-a-vis our approach angle. In cases where internalization was not achieved, a re-attempt was planned leaving an external drainage in situ. This reduces inflammation/edema and makes negotiating the stricture easier in the second attempt[1,7]. We had a similar experience as a majority of re-attempt cases were internalized.

Our overall technical success rate 98.6% of providing internal or external biliary drainage compared favorably with internationally accepted rates of 95 to 100% for dilated biliary systems[8,9].

Patients who undergo percutaneous biliary drainage typically are quite ill and often terminal. As such, a certain number of complications can be expected. The interventional radiologist must be aware of these complications and manage them appropriately. A relatively recent study demonstrated an overall complication rate of 25% with PTBD[10]. The Society of Interventional Radiologists (SIR) has suggested specific threshold for intra-procedural sepsis, hemorrhage and inflammatory/infectious complications of 5%, while the threshold is 2 and 3% for pleural complications and death respectively[11].

The commonest minor complication of PTBD is access site pain 6 and the same was noted in our study. It was appropriately managed by increasing analgesia.

Transient hemobilia lasting less than 24 hours is taken as a normal finding in percutaneous biliary drainage and we also treated it as such[7,12].

Drain blockage with peri-catheter leak and/ or sub capsular collection is another common minor complication that we noted (4%). Although its incidence was within normal limits, one factor in its causation was that we did not recommend routine daily flushing of the drain as is generally done internationally due to poor aseptic technique in wards/home and non-availability of prefilled sterile normal saline syringes.

The reported rate of significant bleed after PTBD varies from 2 to 3%[6,13,14] and our rate was 2%. We managed two of these patients with upsizing of drain which stopped bleeding by tamponade effect. The third patient was noted to have pulsatile bleeding when upsizing of drain was attempted. A decision was made to carry out a hepatic angiogram which outlined abrupt cutoff of segment III artery at the site of drain suggestive of arterial transgression. This was embolised with gel foam and the drain was also upsized. There were no further complications in this patient (fig-3).

Our two cases of bile leak with biliary pleural fistula (1.3%) were considered major complications. They presented with persistent pain and right sided pleural effusion. Both were right sided punctures where such complications are higher. Both were treated with upsizing and repositioning of the drain which closed the leak (fig-4). One of them was a post-transplant patient who later died from sepsis. In various studies, PTBD in post-transplant patients is considered technically more difficult as in spite of obstruction the biliary channels are not significantly dilated[12].

Infectious conditions like sepsis, cholangitis and liver abscess formation are considered major

complications and were at the upper threshold of SIR standards of practice in our study. PTBD is considered a 'dirty' procedure and has the highest infection rate among all interventional radiological procedures[15-18]. The infections were managed by the clinicians while abscess drainage was provided by our interventional team[19].

Acute pancreatitis is an under-reported complication of percutaneous biliary drainage. In one study 19% of patients had a transient elevation of serum amylase after PTBD while 6% developed acute pancreatitis[6,18,20]. In our study the two patients who developed pancreatitis also had hemobilia initially which is a known association[20,21]. While one patient improved with conservative management by gastroenterologists, the other died from acute pancreatitis related complications. This patient also had a metallic biliary stent placed which increases the incidence of acute pancreatitis as compared to routine PTBD. We thus had a procedure related mortality rate of 2 patients (1.3%) which is within accep-table limits.

CONCLUSION

Ultrasound guided percutaneous biliary drainage in experienced hands is a useful palliative procedure. Variations in technique to suit patient pathology and other constraints is often necessary without affecting outcome. Poor general condition of these patients and the variable technical difficulties in the procedure entail certain complications and mortality within limits.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any authors.

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