



RETROSPECTIVE STUDY OF SINGLE STEP AND ONLY ULTRASOUND GUIDED PERCUTANEOUS TRANSHEPATIC BILIARY DRAINAGE FOR PALLIATIVE MANAGEMENT OF OBSTRUCTIVE JAUNDICE .

Radiodiagnosis

Umakant Prasad	MD (Radiodiagnosis), Assistant Professor, Departement Of Radiodiagnosis, Indira Gandhi Institute Of Medical Sciences, Sheikhpura, Patna, Bihar.
Deepak Kumar*	MD (Radiodiagnosis), Assistant Professor, Departement Of Radiodiagnosis, Indira Gandhi Institute Of Medical Sciences, Sheikhpura, Patna, Bihar. *Corresponding Author
Richa Madhawi	MD (Radiotherapy), Assistant Professor, Departement of radiotherapy Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna, Bihar.
Rakesh Kumar Singh	Mch G.I(surgery), Assistant Professor, Departement Of G.I Surgery, Indira Gandhi Institute Of Medical Sciences, Sheikhpura, Patna, Bihar.

ABSTRACT

Percutaneous Transhepatic Biliary Drainage is usually done with ultrasound and fluoroscopy combined guidance for relief of obstructive jaundice. In our study only ultrasound guided and single step percutaneous transhepatic biliary drainage was performed for relief of obstructive jaundice which is very efficient and cost effective. It is very cost effective and feasible at low infrastructure set up (can be feasible at secondary level of health centres) with good outcome and very effective in decreasing the morbidity and mortality of non operable cases of obstructive jaundice.

KEYWORDS

Percutaneous , biliary drainage , PTBD , Obstructive jaundice .

INTRODUCTION: Obstructive jaundice can be of benign and malignant etiologies. Of the malignant causes, carcinoma gall bladder, cholangiocarcinoma, pancreatic adenocarcinoma, metastasis, and lymph nodal compression of common bile duct (CBD) constitute the majority of cases.

Most of the cases of malignant obstructive jaundice are already advanced and unresectable by the time they are diagnosed, hence carry dismal prognosis with palliation being the only option left. Obstruction needs to be drained even in such cases for alleviation of pain, cholangitis, and pruritus or in certain cases to initiate chemo or intrabiliary brachytherapy. Over the years, palliative care has evolved with the introduction of newer methods and improvisation of existing techniques. Recent palliative measures not only prolong longevity but also improve the quality of life, hence increasing the acceptance to such procedures.

Methods of biliary drainage include:

- Surgical bypass
- Minimally invasive procedures
- Endoscopic retrograde cholangiopancreatography (ERCP)
- Percutaneous transhepatic biliary drainage (PTBD).

Both ERCP and PTBD are well-established and effective means of biliary drainage for palliation in unresectable cases. With increased technical success rate and expertise in these minimally invasive procedure, recent time has witnessed an exemplary surge in the demand for such procedure over surgical bypass. Selecting an option over other; however, is a multidisciplinary opinion, which not only involves expertise of operator and the site of obstruction but also takes into consideration other factors such as expected survival and the level of postprocedural care provided to the patients. ERCP is usually performed in cases of distal CBD block (beyond hilum) PTBD is preferred in proximal biliary obstruction.[1,2,3]

Bismuth–Corlette classification [Table 1] is used worldwide for the classification of hilar cholangiocarcinoma, which is based on the status of primary and secondary confluence.

Table 1: Bismuth–corlette classification for hilar cholangiocarcinoma

Type	Findings
I	Proximal CHD/CBD block :Primary confluence patent
II	Primary confluence is blocked, Secondary patent
III	Secondary confluence blocked (unilateral)
IIIa	Right secondary confluence blocked
IIIb	Left secondary confluence blocked
IV	Bilateral secondary confluence blocked .

CBD: Common bile duct, CHD :Common hepatic duct .

MATERIAL AND METHOD:

The retrospective study was conducted on 50 patients who was a case of obstructive jaundice and referred from department of radiation oncology , medical oncology , gastroenterology and gastrosurgery for PTBD and palliative relief of jaundice . The study was done of PTBD cases done from 15th November 2017 to 25 November 2018 .

Inclusion criteria –admitted patients of obstructive jaundice in which either endoscopic biliary drainage procedure is failed or not done due to time issue ,cost issue or any other hindrance which precludes endoscopic drainage .

Exclusion criteria- Uncorrectable bleeding diathesis, INR> 1.5, Thromocytes<50,000,.

PTBD is an image-guided procedure which can be performed under fluoroscopy or combined ultrasound and fluoroscopic guidance. In this study only ultrasound guidance was used for PTBD procedure .

Indications of PTBD for hyperbilirubinemia impedes the initiation/ continuation of chemotherapy in certain malignancies. Pruritus is a common accompaniment in malignant obstructive jaundice which may be disproportionate to the jaundice and usually alleviated by the drainage of even a single liver segment.

Pain and anorexia further deteriorate the quality of life which may be relieved to some extent by restoring physiological enterohepatic circulation by various drainage means .

EQUIPMENTS–Samsung HD 60 color Doppler machine was used as guidance for biliary duct pictured and liver tissue visualization . Vygone 18 gauze puncture needle, cook ultrastiff guidewire (80 cm), cook fascial dilator and malecot drainage catheter .

PREPROCEDURAL PATIENT'S PREPARATION

- Adequate antibiotic coverage (preferably intravenous) was instituted before and after the procedure, as manipulations in obstructed system carry the risk of cholangitis and sepsis.
- For pain alleviation, intravenous analgesics were administered or optionally the procedure can be performed under conscious sedation
- Patient were preferably fasting or on clear liquid diets for at least 4 h prior to the procedure.

TECHNIQUE

Routinely PTBD procedure is performed under ultrasound and fluoroscopic combined method but in our study it was done by only ultrasound guidance .

Prior to the initiation of procedure, three-dimensional cross-sectional imaging, i.e. computed tomography or magnetic resonance imaging of the patient needs to be reviewed to determine the following:

1. Site of obstruction – high or low. In proximal obstruction, primary biliary confluence may be blocked with variable involvement of secondary confluence. Low obstruction occurs beyond the level of primary biliary confluence (i.e., distal to cystic duct insertion). PTBD and ERCP are the preferred drainage procedures in high and low biliary obstructions, respectively
2. Selection of appropriate target duct in PTBD – right versus left PTBD
 - In case of involvement of biliary confluence, selected duct should drain at least one-sixth of the liver parenchyma. However, in distal obstruction, since primary biliary confluence is patent, a single puncture with placement of single drainage catheter usually suffices
 - There should be no atrophy or portal vein involvement of the targeted lobe as even after biliary drainage, liver function would not improve due to the lack of functioning hepatic parenchyma.

PTBD shall be formidable when cross-sectional imaging is not reviewed due to the observed lesser technical success rate of the procedure.[1,3]

The procedure can be performed either via right (subcostal or intercostal) or left ductal (subxiphoid) approach. Selection of appropriate sided duct (right or left) is a personal preference, although there are certain advantages and disadvantages of both. Reviewing ultrasound prior to biliary puncture is invaluable for assessing the suitability of puncture as well as any contraindication to the procedure. Merits of left-sided percutaneous transhepatic biliary drainage-relatively easy to perform, better patient's compliance, preferred in ascites due to less pericatheter leak of ascites.

Merits of right sided percutaneous transhepatic biliary drainage-more segment of liver cover.

In case of suitably dilated biliary radicle dilatation, with an 18G puncture needle, under ultrasound guidance, appropriate segmental duct is punctured. In portal triad, biliary radicle is flanked by the branch of hepatic artery and portal vein, caliber of which increases toward the hepatic hilum. Due to this, site of puncture should be as peripheral as possible as more central puncture incurs more risk of major vascular injury. When the outflow of bile starts, a 0.035 inch ultrastiff guide wire (Cook) is passed through the puncture needle, punctured needle is withdrawn over the guidewire, tract is dilated under the vision of ultrasound to avoid vascular injury and hepatic parenchymal injury, position of dilator is assessed by ultrasound, after adequate dilation 10F malecot was placed over the stiff guidewire. position of malecot catheter is again assessed by ultrasound. If catheter tip was suitable in position and adequate drainage of bile noted catheter is fixed with suture. In our study terumo wire was not used because it is not visible under ultrasound. More flexible or PTFE guidewire were used in some case but more incidence of wire displacement during dilatation or catheter displacement during over the wire malecot catheter placement noted with these flexible wire

COMPLICATIONS OF PERCUTANEOUS TRANSHEPATIC BILIARY DRAINAGE

With increased expertise and better instrumentation, observed technical success rate of PTBD is ~90–95% with fewer complications observed nowadays. These complications can be further reduced by keeping the biliary manipulation to minimum and good antibiotic coverage.

Minor-pain, pericatheter leak.

Major- Cholangitis, sepsis, Biliary peritonitis, Haemorrhage, Pancreatitis, Pleural effusion, pneumothorax (inadvertent pleural puncture).

Catheter dislodgement is more common in external than internal drainage catheters due to better anchorage in the latter. It can be managed by repositioning or probing by a guide wire through previous catheter's tract.

Pericatheter leak (bile leak along catheter) is a frequently observed

complication. It can be due to side holes catheter lying outside the biliary system, catheter kink/block, or ascites. Management in such cases consists of catheter repositioning or upgradation depending on the findings of check cholangiogram

Cholangitis and biliary sepsis are inevitable complications which can occur despite adequate antibiotic coverage. Although exact etiology is unknown, it can occur due to multitude of factors such as retrograde reflux of intestinal flora during the procedure, ex vivo infection tracking along the drainage catheter, or may be of hematogenous origin. Prophylactically, broad spectrum intravenous antibiotics covering Gram-negative bacteria should be instituted. In addition, during the procedure, manipulations should be kept to minimum coupled with limited use of iodinated contrast during per procedural cholangiography. Symptomatic management should be done in such cases by continuing the antibiotics and maintaining the fluid balance.[1,4]

OBSERVATION AND DISCUSSION

Etiology of obstructive biliary pathology in our study was in 34 cases it was carcinoma gall bladder, 8 cases cholangiocarcinoma, 6 cases periampullary carcinoma and 2 cases of benign biliary stricture (post cholecystectomy). Gall bladder carcinoma cases most were in the fourth and fifth decades but case as young as 21 years old male and as old as 76 years female noted. cholangiocarcinoma cases show age incidence in 4th and 5th decades. periampullary carcinoma age incidence are in 5th and 6th decades.

Majority of gall bladder carcinoma show hilar infiltration with lack of formation of primary confluence and endoscopic drainage procedure was failed. In these cases out of 36 patients 28 were drained by both right and left ductal system. few of the cases show loss of primary as well as secondary confluence, in these cases 2 or 3 ductal system with good liver volume were drained. Most of the periampullary carcinoma cases are drained by single left lobar drainage. Two cases of periampullary carcinoma with mild dilated biliary system were drained by cholecystostomy.

In our study most of the cases show moderate or grossly dilated biliary system. biliary duct punctured with 18 gauge vygon needle is not difficult. Introduction of guidewire in the punctured needle was also not difficult but guidewire advancement in the ductal system is difficult in few cases. tract dilatation is easy with ultrastiff guidewire with little chances of guidewire displacement however it is more common with flexible or PTFE guidewire. in one case there was puncture of left hepatic artery branch however bleeding is stopped within few minutes and no e/o pseudoaneurysm or fistula formation. Three cases show puncture of portal vein branches but no e/o excessive blood loss or persistent hemobilia. None of the cases show procedure induced septicemia. No e/o pericatheter leak or bilioma formation within one week of procedure however it is not with accidental catheter pulled out. Few of the failed endoscopic drainage cases show concurrent and large cholangiolary abscesses in which concurrent percutaneous drain was placed.

Accidental /inadvertently catheter pulled out was common with prolonged percutaneous biliary drainage, though it was observed that when catheter pulled out occur after two weeks of its placement then repeat introduction of the catheter over the guidewire through the previous tract is more feasible. Another advantage of percutaneous drainage is that whenever catheter get blocked it is much easier to flush the catheter or exchange the catheter over the guidewire as contrast with endoscopic catheter exchange which is more time taking, needs pre and post procedure intense monitoring. Cost effectiveness is another advantage of percutaneous drainage, for example if the patients survival is of one year at least three to four catheter exchange may be required in endoscopic catheter drainage which cost about more than one lakh Indian rupees while four time catheter exchange with percutaneous catheter drainage is hardly twenty five thousand. almost all cases with obstructive jaundice subsided completely or decreased markedly with PTBD procedures. Most of the septicemia cases also recovered with PTBD procedures.

All the patients with non operable neoplastic etiology obstructive jaundice get definite improvement in their health status with reduction in bilirubin level at normal level noted in 42 patients. some of these patients undergone palliative chemotherapy. Those patients who underwent for palliative chemotherapy show slow progression of

neoplastic diseases and prolonged survival .three patients with cholangiocarcinoma and twelve patients with gall bladder carcinoma show more than 9 month survival and till date they are alive .

Both proximal and distal biliary obstructions, PTBD complications are similar; however, incidence is higher in cases of proximal (hilar) block due to following reasons

1. Increased risk of cholangitis: Due to inadvertent contrast injection into nondraining segment during cholangiograms
2. Less technical success: PTBD is more demanding in hilar block with lesser chances of internalization in the first attempt and increased risk of catheter dislodgement.[1]



Figure 1: large gall bladder mass with decompression of bilobar intrahepatic biliary system with single left lobe external draining catheter.



Figure 2: left lobe external draining catheter with tract show hypoechoic acoustic shadow on ultrasound study.



Figure 3: Computed tomography study of follow up case of gall bladder mass with biliary obstruction show bilobar decompression of biliary system with malecot catheter in situ.

Endoscopic Retrograde Cholangiopancreatography

ERCP with placement of plastic stent (polyethylene endoprosthesis) is another effective method of biliary drainage. It is the preferred procedure in cases of obstruction beyond the level of hilum, i.e. if the primary biliary confluence is patent as adequate biliary drainage can be accomplished by the placement of single stent. Furthermore, in such cases of low biliary obstruction, ERCP is preferred, as it is a safer procedure in comparison to PTBD.[5,6,7]

Endoscopic (endoscopic Retrograde Cholangiopancreatography) Versus Percutaneous Drainage (percutaneous Transhepatic Biliary Drainage)

In inoperable malignancies causing biliary obstruction, ERCP with placement of plastic endoprosthesis or PTBD with metallic stenting remains the minimally invasive options. However, choosing a procedure over other depends on the level of obstruction, operator's expertise, and the level of postprocedural care provided to the patient.

Distal biliary obstruction

ERCP is unambiguously the preferred procedure worldwide as it is a comparably safer procedure with relatively fewer contraindications. Unlike PTBD, burden of percutaneous drainage catheter and bag is obviated which further compounds the psychological burden of terminally ill patients. In the current scenario, in cases of distal CBD obstruction, ERCP is the preferred technique unless contraindicated (*vide supra*), for which PTBD is done.[8,9]

Proximal biliary obstruction

Opinion is divided regarding the choice of technique with nearly comparable results regarding overall patient's survival and procedure-related complication. However, at many institutions, PTBD is preferred in hilar isolation as ultrasound-guided puncture of appropriate segmental biliary radicle can be done, thus maximizing the drainage of functioning liver parenchyma. Further, malignant stricture is better negotiated in PTBD and the risk of inadvertent contrast instillation into isolated biliary segment is lesser as compared to ERCP.[3, 10,11,12]

Various studies comparing PTBD and ERCP in distal CBD block have reported that both these procedures have nearly equivalent technical success rate with comparable incidences of procedure-related complications and mortality .The American College of Radiology (ACR) has recently proposed an evidence-based algorithmic approach for radiological management of malignant biliary obstruction. In the proposed criteria, various management options are rated based on their appropriateness for particular site of obstruction In general, as per the ACR recommendations of the various management options, PTBD is preferred for hilar block whereas ERCP with stenting in distal block.

Endoscopic verses Percutaneous biliary drainage

- Proximal biliary obstruction(hilar involvement)-PTBD or ERCP.
- Distal (beyond hilum) obstruction : ERCP preferred
- Inoperable cases with short life expectancy (6-12 months)- Metallic biliary stenting .

CONCLUSION:

Single step and ultrasound guided percutaneous biliary drainage (PTBD) is effective method for relief of obstructive jaundice as well as associated septicemia . It is very cost effective and feasible at low infrastructure set up (can be feasible at secondary level of health centres) with good outcome and very effective in decreasing the morbidity and mortality of non operable cases of obstructive jaundice .

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Conflicts of interest

There are no conflicts of interest.

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