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Review Article

The Experience on Percutaneous Biliary Drainage in Malignant Biliary Obstruction and Associated Bilomas

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Abstract: Objective: To handle efficacy of percutaneous biliary drainage not only in cases with malignant biliary obstructive jaundice, but associated bilomas as well. Also, it is to evaluate our series with previous series in this review. Material and Method: Review of previous series in which between January 1998 and July 2008, percutaneous biliary drainage was performed in 47 men and 29 women, 76 patients with malignant biliary obstruction. Ages were between 29 and 80 years, mean age: 55.0 years. Our patients had pain, emesis, vomiting, itching, weakness, and weight loss, while jaundice was the clinical symptom in almost all. Biliary stent was put in 5 (6.6%). Biloma was seen in 3 (4.0%). Success was evaluated by referencing direct bilirubin levels before and after drainage and clinical recovery. These bilirubin levels were statistically compared via Wilcoxon signed ranks test. Results: It was succeeded in 70 patients. Mean bilirubin was 14.2±7.4 mg/dl (3.0-36.0) before drainage and 7.1±5.5 mg/dl (0.2-20.0) after drainage. Direct bilirubin levels decreased significantly ($p<0.001$). The procedure was failed in 2 (2.6%). Success was in 89.5% of malignant biliary drainages and all associated bilomas. Conclusion: Percutaneous biliary drainage is not only an effective interventional radiological method in palliation therapy of malignant biliary obstruction but also associated bilomas. Drainage type should be chosen on the grounds of clinical status of each patient and depending on expertise of operator or intervention a list and should be switched among percutaneous biliary drainage technique and endoscopic biliary drainage or surgical treatment technique.

Keywords: Percutaneous Drainage, Biliary, Malignant, Biloma

1. Introduction

Mortality rate in malignant obstructive jaundice varies between 15% and 60% [1]. Also, these malignancies had high inoperability ratio of ninety percentages. Percutaneous biliary drainage was initiated to decompress dilated bile ductus via catheter four decades previously [2]. That drainage technique achieved an extensive utilization in the world [3, 4]. Drainage technique developed eventually in this period, also fatality ratio and adverse outcome has reduced with increasing experience on the process [5-9].

Computed tomographic (CT), ultrasonographic (US), also angiographic modalities have been used in the palliation of malignant obstructive jaundice and related biloma by means of percutaneous biliary drainage [10, 11].

It was reviewed our experience on percutaneous drainage in the management of malignant obstructive jaundice and related biloma in view of the prior study in which we performed bile drainage in seventy six patients [11]. The other studies in the literature were also evaluated.

2. Patients and Methods

In our series [11], percutaneous biliary drainage has been

performed on 76 patients (29 women, 47 men, average age 55.0±, and range between 29-80 years) between January 1998 and July 2008. The causes of biliary obstruction are demonstrated (table).

Table 1. *Etiologies and rates of malignant biliary obstruction.*

Etiology	Number	Percent (%)
Hilum metastasis[a]	22	29.0
Pancreas adenocarcinoma	17	22.4
Cholangiocarcinoma	14	18.4
Gall bladder carcinoma	6	7.9
Other[b]	17	22.4
Total	76	100

[a]Stomach adenocarcinoma metastasis (n=18), colon adenocarcinoma metastasis (n=2),
stomach lymphoma metastasis (n=1), prostate adenocarcinoma metastasis (n=1).
[b]Hepatocellular carcinoma (n=1), neuroendocrine tumor (n=1)., idiopathic origin (n=15).

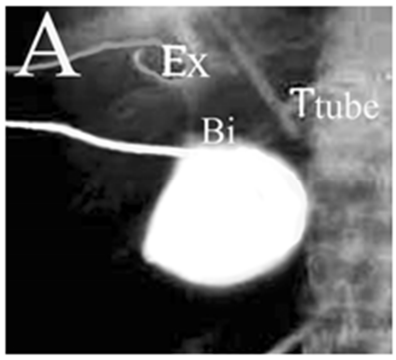
The most frequent finding was mechanic jaundice; also abdominal ache, nausea, vomit, itches, and fatigues were also detected in a number of them.

Besides, dilated biliary vessels with ultrasonography have been encountered in practically every patient. Apart from that finding, the others were distended gall-bladder, hepatic tumor, pancreas tumor, mass, dilated Wirsung canal, plus lymphadenomegaly.

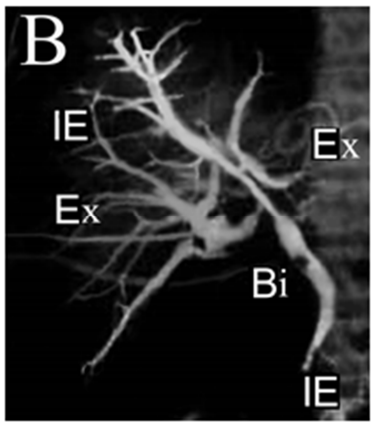
We realized it as interventional radiology procedure, after obtaining permission of the patient to be enlightened previous to the procedure. We made by means of fluoroscopic management. Blood factors, hepatic analysis was regularly performed previous to the process. We positioned the patients lying on the backside. We sterilized by sterile solution, also then locally applied anesthetic through tenth and eleventh costal space. We made cholangiography by thin needle; forwarded fluoroscopy guided. Following internal part taken out, it was attached to contrast solution. We injected it while gradually taking out this needle. Following detecting dilated bile canals, we made an insertion of thin guide-wire through the needle. We forwarded bile sheath system over thin wire following taking away the thin needle. A stiff guide-wire was forwarded through the sheath system. Besides, it was overtaken tapered bile canals and obstructive sites via round moves by help of Glide wire and straight 5 F (French) catheter. External–internal bile drainage from seven to ten French catheter was positioned over stiff wire after dilating the tract. Subsequent complementary effort was, if needed, realized subsequent to 2-3 days in external bile drainage. We inserted catheter into related biloma in detection of it in company with malignant obstructive jaundice.

Antibiotic was ordered on intervention time. We monitored the patient subsequent to the intervention, also and catheter care was made. Drainage was internally provided via sealing last part of drainage catheter.

Our bile drainages were such as: on one occasion; one external (fifty two), one external–internal (fifteen), one external–internal plus one external (three), two external–internal plus one external (two), two external (two), one external–internal plus cholecystostomy (a patient), also two external and cholecystostomy (a patient). A stent was put into bile duct in five. Gastric cancer was detected in a patient in whom we put external bile catheter. Inside fistula plus related biloma was observed subsequent to choledoc narrowing. It was seen this interior fistula stopped within two weeks via bile drainage. A male patient in the company of external and external–internal bile drainage it was put three catheters (two external–internal to right side plus an external to the other side. T-tube was placed to the choledoc. It was seen dilated bile system plus biloma at liver hilum. Our practices were such as; percutaneous cholangiographic procedure, external catheter to right anterior side, biloma, drainage, external drainage to left side, external–internal drainage to right posterior side, pulling out previous T-tube, extraction of catheter after biloma treatment, replace external catheter by means of external–internal one. Therefore, it was put two external–internal catheters to right side and one external to the other side (figures 1a and 1b). The latter put out of the place on the ninth month, but the patient died at this time.



(A) Right external biliary drainage catheter (Ex), T tube, and biloma (Bi) are seen. Contrast medium passes to distal choledoc and duodenum.



(B) Right internal-external drainage catheter (IE), right and left external drainage catheters (Ex and arrows), and cholangiography with catheter are observed. Please note that T-tube was withdrawn and biloma catheter (Bi). Then biloma catheter was taken back.

Figure 1. *We have treated cholestasis and biloma in a patient with cholangiocarcinoma.*

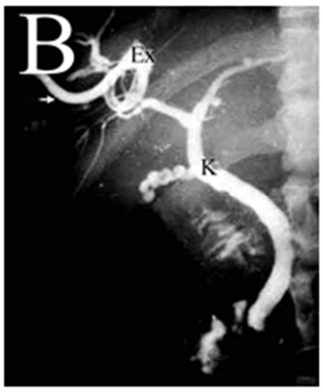
Related bilomas were seen in three cases in the company of

malignant obstructive jaundice. These were such as; the 1. st was male whose biloma was dealt with pig-tail catheter intervention (figure 1) the 2. nd by means of catheter drainage of the bilomas (figures 2a and 2b). The last was treated with biloma drainage within two weeks. This had gastric cancer invading to the main bile duct and related biloma after surgical intervention as cholecystectomy.

We put cholecystostomy catheter into gall bladder in a female to treat for her severe cholecystitis. Percutaneous has been succeeded in the patient. We put metallic stents in five cases (figure 3). In a male patient in the company of pancreatic cancer plus hepatic metastasis, it was placed an external–internal catheter after that insertion a stent (ten/forty), also he was followed until the thirteenth month. It was positioned through main bile duct a stent (ten/ hundred) in the course of a stent (ten/sixty) in a different patient in the presence of bile duct cancer, but this patient passed away on the 3. rd month. The 3. rd had pancreatic cancer whose stent was ten/sixty. The other two patients had individually gastric and colon metastases.

Achievement was assessed using examining direct bilirubin levels and medical progress. We have used Wilcoxon analysis performing in support of direct bilirubin levels prior to and following bile catheter drainage.

(A) We have placed a catheter (Bi) for extrahepatic biloma and external biliary catheter (Ex and arrow) for intrahepatic biloma.



(B) Extrahepatic biloma disappeared with drainage, whereas intrahepatic biloma is being treated with biliary drainage catheter (Ex and arrow). K: choledoc.

Figure 2. *A patient with infected bilomas is seen.*

Figure 3. *A patient with pancreatic head adenocarcinoma is shown. Internal-external drainage catheter (C), and self-expandable metallic stent (St and arrows) with markers at the proximal and distal ends are shown. Metallic stent is effective on control cholangiography.*

3. Results

Patients were monitored from two days to four years (mean: eighty three days). We gained achievement in seventy (92.1%), mean direct bilirubin level is 7.1±5.5 mg/dl (range, 0.2-20.0) after the procedure whereas this is 14.2±7.4 mg/dl (range, 3.0-36.0) before drainage: direct bilirubin levels have decreased significantly in the patients ($p<0.001$) [11].

Five deaths were such: a patient was observed in the beginning of the drainage, which was major complication. The other ones are as a result of progression of the malignancy for the period of follow-up on the fifth, twentieth, twenty sixth, and thirty seventh days, in that order. Thirty day death was four in seventy six patients. The different minor complications were such: catheter dislocation in two (one not recatheterized for death on the fifth day), hemobilia in six, and catheter obstruction in a patient with catheter switch over on the tenth day. Complication was seen with a rate of 22.4% (17/76) [11]. Of minor complications, pain has been detected in 12 patients with a rate of 15.8%; pain has been managed with analgesics within 12-24 hours [11].

Failure has been seen in total 8 patients (10.5%), in two patients as procedure and in six as direct bilirubin levels, while success was gained in sixty eight patients (89.5%) [11]. Moreover, drainage procedures were successful in total three patients with bilomas [11].

4. Discussion

Apart from treating malignant bile obstruction, it is important to decompress bile ducts with percutaneous biliary drainage and to treat cholangitis frequently seen in bile duct obstruction in benign strictures and preoperatively obstructive jaundice, as well [11]. Serum bilirubin levels greater than ten mg/dl have been associated with increased operative mortality [6-8, 11, 12]. Percutaneous bile drainage catheters have

usually been used for intend of palliative treatment of malignant obstructive jaundice. In drainage of proximal bile ducts, endoscopic procedures are useless, while percutaneous bile drainage is effective. Conversely, percutaneous bile drainage is more effective in these proximal bile ducts [1].

Besides, bile outflow near to drainage catheter, infection, pain caused by drainage catheter and fluid-electrolyte discrepancy is seen as weakness in only external catheter drainage. Elevated price, repeated jaundice and infection, furthermore difficulty caused by narrowing of bile ducts in placing into duodenum are detected in external–internal drainage [2, 11]. We have chosen bile drainage variety by point of obstructive sign, narrowing of bile duct, and patient general condition [11]. Consequently, our chose was preferentially internal bile drainage by sealing external part of drainage catheter. This was performed in intervals, in case infection should not be seen as a complication in this sealing period.

The number of stents needed to decompress the bile tree in case of occlusion depends on its type. Therefore, in type I occlusion, an endoprosthesis is inserted into the common bile duct from the left or the right side. Type II occlusion is treated usually by inserting two stents, one in each hepatic duct. For type III occlusion, a stent is implanted into every occluded hepatic duct [13]. Even when Pappas et al. used only one stent draining the larger hepatic lobe in a type II obstruction, in order to reduce the possibility of complications in fragile patients, the bilirubin serum level decreased significantly. Further, cholangitis did not occur in the rest of the bile tree, indicating that further procedures were not necessary [13].

The prevalence of procedure related major complications and deaths in Yee et al.'s series have been 5.34% and 1.94%, respectively [14]. The authors reported in this series substantially fewer complications in patients with benign biliary diseases compared to those with malignant biliary diseases [14]. In Knap et al.'s study, the most common postprocedure complication was drain dislocation, which also appeared in other studies [15]. The low percentage of patients with postprocedure hemobilia (1.61%) was confirmed in several published studies. However, because of the anatomy of portal triads, the procedure must be performed with suitable technique in order to prevent severe bleeding. Moreover, percutaneous biliary drainage should not be performed on patients with nondilated bile ducts, because of high risk of complications. The success rate of percutaneous biliary drainage for patients with dilated bile ducts is significantly greater [15]. Our success in percutaneous biliary drainage has been found as 89.5% which was complied with other series in the literature [14-18].

The term "isolation" becomes an important factor when considering multiple stents for high bile duct obstruction. Covey and Brown [16] described three types of isolation. In complete ductal isolation, cholangiography shows no opacification of the isolated system (s). Opacified ducts do not drain in effective isolation, and in impending isolation, ducts are both opacified and drained. However, in impending isolation, there is a central narrowing that will cause effective or complete isolation in the near future. Effective and impending isolations have a high risk of cholangitis because of ineffective drainage and colonization. In patients with high bile duct obstruction and contralateral complete isolation, it may be advisable to use a primary stent if there has not been a previous endoscopic intervention or bilioenteric bypass. If the decrease in the serum bilirubin level is not sufficient, or if cholangitis develops, it may be necessary to achieve complete drainage or even triple stenting. Also, if there is ongoing cholangitis, a nonfunctional part of the liver (secondary to portal vein thrombosis and atrophy) may need to be drained. When metallic stenting is considered in patients with cholangitis, all of the infected ducts must be drained. In their study, all of the patients except one (87.5%) presented with acute cholangitis, and there were impending or effective isolations in all patients [16].

Complications are cholangitis, catheter dislocation, bile leakage, catheter obstruction, hemobilia, electrolyte imbalance, biliopleural fistula, pneumothorax, perforation in extrahepatic bile duct, hypotension, and sepsis. Their rates vary between 4.76% and 69.0% in the series [4, 7, 8]. Complications have been seen in 22.4% rate, among which there were hemobilia in 7.9% and catheter dislocation in 2.6%. The latter has been, to our knowledge, found in 4.1% in the literature [8]. We have accordingly encountered with 30-day mortality in 5.3%, and mortality rate varies from 4.5% to 30.0 in the literature [4, 6, 9].

The reported incidence of early cholangitis associated with percutaneous biliary drainage and endoscopic biliary drainage ranges from 11% to 48% [17]. It is generally believed that endoscopic biliary drainage is less invasive and has fewer complications than percutaneous drainage [18]. Other than the earliest randomized clinical trial (RCT) in 1987, this has not been validated statistically in any comparative studies included in this Korean J Radiol 13 (Suppl 1), Jan/Feb S60 2012 kjronline. org Ho et al. review. In fact, in malignant hilar obstruction, one RCT and one retrospective non-randomized study reported a significantly higher rate of cholangitis in the endoscopic biliary drainage group compared with the percutaneous group [18].

Bare self-expandable metallic stents (SEMS) offer significantly longer patency significantly higher than the cost of the plastic stents, however their placement was considered as cost-effective due to the longer patency [19]. Usually uncovered SEMS are associated with obstruction due to ingrowth while covered SEMS have higher migration rates and association with cholecystitis if placed across the cystic duct in patients not cholecystomized [20]. In order to overcome the main problem of obstruction due to tumor ingrowth when using the uncovered SEMS, the use of novel SEMS that are combined with radioactive seeds [20]. An added benefit of the use of internal/external biliary drainage catheters is that of using the transhepatic biliary access to deliver high doses of radiation i. e. brachytherapy [21].

In fact, the choice between percutaneous biliary drainage, endoscopic drainage/papillotomy, or surgical therapy will greatly depend on the clinical status (comorbidities) of the patient, the etiology and extent of the biliary pathology, and

the expertise of the clinical specialist. The choice between percutaneous biliary drainage techniques and endoscopic or surgical techniques will vary from institution to institution depending on operator expertise [21].

Exitus is mostly originated from obstructive jaundice caused by tumor instead of its other complications. Percutaneous biliary drainage improves survival time. So, this obstructive jaundice should be treated at once. We applied to this criterion in all the patients.

The term biloma was introduced in 1979 by Gould and Pater to describe a loculated collection located outside the biliary tree. Kuligowska et al. extended the term biloma to include intrahepatic as well as extrahepatic collections of bile [23]. Bilomas are defined as loculated collections of bile located outside the biliary tree and represent one of the most common and serious complications after cholecystectomy [23]. The formation of biloma related to intrahepatic bile duct injury was first described by Whipple in 1898 [24]. Early use of CT scan and HIDA (hepatobiliary iminodiacetic acid) imaging enables the prompt identification and management of the problem [24]. The diagnosis of traumatic complications (such as biliary complications) is ideally facilitated by the judicious use of CT scans [24]. Patients who require additional workup include those with increasing abdominal distension, worsening or persistent abdominal pain, tachycardia, feeding intolerance, increasing bilirubin levels, and jaundice [24]. Angiography, CT scanning, HIDA imaging, and endoscopic retrograde cholangiopancreatography (ERCP) are valuable tools that can not only help to diagnose, but can treat many of the complications of blunt traumatic liver injuries. Additional radiographic evaluations such as serial CT scans may be helpful, in selected cases, to follow the course of liver injuries. For example, selective arterial angiographic embolization can resolve late life-threatening hepatic hemorrhage. HIDA scans can aid in the localization of the site of bile duct injury. ERCP can be used to stent the common bile duct, and create a sphincterotomy to decompress the biliary system and thereby facilitate healing [24]. El Idrissi-Lamghari et al. have reported that combined endoscopic and transhepatic internal/external drainage that includes an intraduodenal ‘‘rendezvous’’ technique frequently is used for the management of common bile duct obstructions, but not for biloma. They have described an unreported combined technique including an intrabiloma ‘‘rendezvous’’ to treat a large intrahepatic biloma [25].

Related biloma obstructive jaundice caused by bile duct cancer is exceptionally unexpected 12]. We managed such a case via percutaneous biliary and biloma drainage. These patients were similarly treated in this way in the literature [10].

5. Conclusion

Percutaneous bile drainage is not merely effective in palliative therapy of malignant bile obstruction but related bilomas, as well. Drainage type should be chosen on the grounds of clinical status of each patient and depending on expertise of operator or interventionalist and should be switched between percutaneous biliary drainage technique and endoscopic biliary drainage/papillotomy or surgical treatment technique.

Conflict of Interests

All the authors do not have any possible conflicts of interest.

Patient Consent

Each patient gave informed consent.

Ethics Approval

This review paper is waived for ethics approval.

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