PERCUTANEOUS TRANSHEPATIC BILIARY DRAINAGE OF THE RIGHT HEPATIC LOBE USING THE SUBCOSTAL APPROACH WITH ULTRASOUND GUIDANCE

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ABSTRACT

We present a method for performing transhepatic biliary drainage of the right hepatic lobe under real-time sonographic guidance. With the right subcostal approach, the peripheral bile duct of the anterior inferior right lobe was punctured providing sufficient intrabiliary distance for more multiple side holes to promote better drainage. This puncture site is more comfortable for the patient and easier to care for. With this technique, transpleural puncture or trauma to the intercostal vessels and nerves, which can be complications using conventional techniques, can be avoided. This route can also be used for subsequent permanent placement of the metallic stent. The results and limitations are discussed.

Key Words: Drainage, Percutaneous, Bile duct obstruction, Ultrasonography, Interventional, Subcostal

INTRODUCTION

Percutaneous transhepatic biliary drainage (PTBD) has been widely accepted for an effective temporary or permanent decompression of a biliary obstruction.[1-6] The conventional approach through the right hepatic lobe using a two-step method under fluoroscopic guidance is the most commonly used technique. However, this procedure needs a blind puncture of the right or common hepatic duct related to indirect anatomical landmarks, most often the T11, which may require several punctures. Morever, certain complications such as trauma to the diaphragm, pleura or intercostal artery and nerve have been reported. The PTBD of the left hepatic lobe with subxyphoid approach using a sonographic control is an alternative which can avoid these difficulties and complications. However, the left hepatic lobe in some patients is small and hidden in the bony thoracic cage, making such a left lobe approach impossible. We introduce the subcostal approach of the right hepatic lobe as another alternative which provides some benefits.

PATIENTS

Case 1: A 36 year-old man presented with jaundice. A physical examination confirmed the scleral jaundice and revealed hepatomegaly without tenderness.The blood chemistry showed 13.3 mg% of the total bilirubin and 11.4 mg% of the direct bilirubin. His sonography and computed tomography (Fig. 1) showed dilatation of the bile ducts in both right and left hepatic lobes with a normal-sized common bile duct. No mass was visible. Endoscopic retrograde cholangiography showed severe stricture of the common hepatic duct. The stricture involved the proximal ducts of

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the anterior segment of the right lobe, posterior segment of the right lobe and the left lobe resulting in separation of the dilated ducts (Fig 2). Failure to place a stent was due to very tight stricture regardless of dilatation with a balloon. PTBD was requested to decompress the biliary obstruction of the posterior segment of the right hepatic lobe which was the largest hepatic segment.

Case 2: A 66 year-old woman presented with jaundice and weight loss. Her serum biochemistry showed elevated both total and direct bilirubin (25.9 mg% and 22.3 mg% respectively). The computed tomography showed dilatation of the right and left intrahepatic bile ducts with obstruction at the level of the proximal common hepatic duct. Sonography demonstrated thickened wall of the common bile duct which was likely a malignant stricture. Endoscopic cholangiography showed a short segment of severe stricture involving the common hepatic duct and adjacent proximal ducts of both right and left hepatic lobes. Initial decompression was done with endoscopic placement of a 7 Fr stent in the CBD with its upper tip above the obstruction. During the 2-month follow up, 2 admissions were required because of high fever which was subsequently found to be cholangitis. During the second admission, septic shock with elevated serum bilirubin was noted and cholangitis following occlusion of the stent were considered. An emergency PTBD was requested.

Case 3: A 74 year-old man presented with progressive jaundice and pruritis. The physical examination revealed yellow sclerae and skin with a small soft mass at the right upper quadrant of the abdomen which could have been the distended gallbladder. His blood chemistry showed 31.9 mg% of total bilirubin and 26.6 mg% of direct bilirubin. The endoscopic retrograde cholangiography demonstrated severe 7-mm-long stricture of the common bile duct. Placement of the common bile duct stent was not possible due to failure of the guide wire to cross the obstructive point. PTBD was requested to decompress the biliary obstruction and to relieve the pruritis.

Case 4: A 77 year-old man was referred from another hospital after the endoscopic retrograde cholangiography demonstrated an obstruction at the mid part of the common bile duct. The patient subsequently developed a severe abdominal pain. His serum direct and indirect bilirubin levels were 10.60 and 12.90 mg%, respectively.

TECHNIQUE

With the patient in the supine position, the subcostal area at about the right anterior axillary line was chosen as the site of puncture. Sonography was performed and the dilated duct in segment 6 of the right hepatic lobe was demonstrated longitudinally. Deep inspiration was available to provide better demonstration but was not necessary in our cases. An 18-G puncture needle was used. After successful puncture, about 1mL of the bile was aspirated and sent for bacterial culture. A diluted contrast medium was injected for diagnosis. A guidewire was inserted and advanced under fluoroscopic control.

(Note: Passing successfully through the stenotic point may require a straight guidewire and control can be better with a 5 F cobra or straight catheter. However, if the stenotic site is severe and looks complete, the drainage catheter should be left distal to the obstructive point. After good drainage of the dilated bile duct distal to the occlusion and proper intravenous antibiotic for a week, the bile may become less viscous and the tissue around the stenotic point may be reduced and passing the stenotic site can be acchieved.)

In case 1, a 5 F cobra catheter and an angled Radiofocus guidewire were used. After the guidewire had crossed the stenotic point and its tip had reached the duodenum, the cobra catheter

was advanced until the tip of the catheter was in the ascending duodenum. The Radiofucus guidewire was replaced by a J-shaped heavy-duty guidewire. An 8 F catheter for both external and internal drainage was then inserted (Fig. 2).

In cases 2 and 3, the catheter was placed in the right hepatic duct for external drainage. The internal drainage in case 2 was achieved with revision of the common bile duct stent endoscopically.

In case 4, the catheter was placed in the common hepatic duct for 12 days. After his clinical condition improved, the spiral Z stent was placed via the same tract into the common bile duct across the stricture.

RESULTS

Case 1: The patient lived for 6 months after the placement of the PTBD. During that period, 4 admissions were required because of cholangitis. However, the catheter was in a good position and no obstruction or dilated bile duct was shown on a cholangiography. His serum total and direct bilirubin was at a near-normal level (2.35 mg% and 1.29 mg%, respectively). To decrease the cholangitis, the tip of the catheter was replaced in the dilated duct of the anterior segment of the right hepatic lobe proximal to the stricture (Fig 4). The patient refused the placement of the metallic stent, thus only external drainage was possible during his later treatment.

Case 2: During the 4-month follow-up after placement of PTBD, the patient had no fever or pain. Good external drainage and presence of normal serum bilirubin were noted. The follow-up was lost after this period.

Case 3: The subcostal PTBD was dislodged after 2 months following the initial placement. During this period, the pruritis completely disappeared. Progressive decrease of the serum bilirubin was noted. For more sterile procedure, the left hepatic lobe PTBD was subsequently performed.

Case 4: The abdominal pain, which was likely caused by cholangitis after the previous endoscopic retrograde cholangiography, disappeared shortly after the placement of the PTBD. Within 1 month after the placement of the metallic Z stent, his serum bilirubin level became normal.

Fig. 1. The computed tomography of case 1 shows dilatation of the right and left intrahepatic bile ducts as well as the atrophic left hepatic lobe.

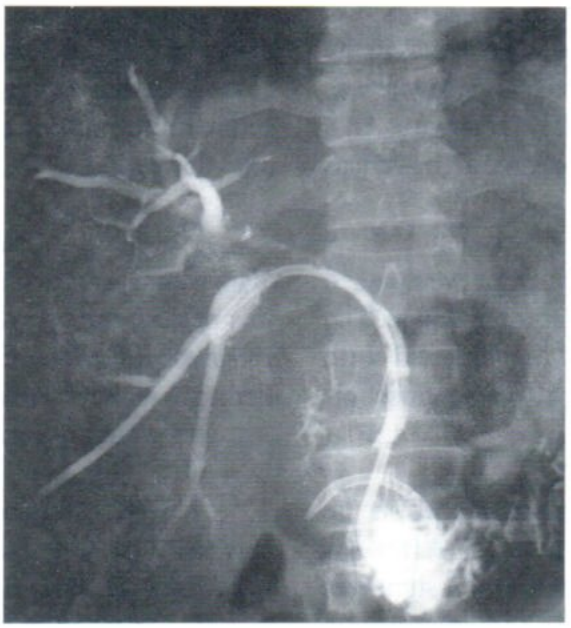

Fig. 2. The cholangiography shows that the stricture involved the proximal part of the ducts of the anterior and posterior segments of the right hepatic lobe. Note the sufficient intraductal distance of the catheter for more side holes to promote drainage. Also note the smooth alignment of the puncture site and the catheter with no association with the rib.

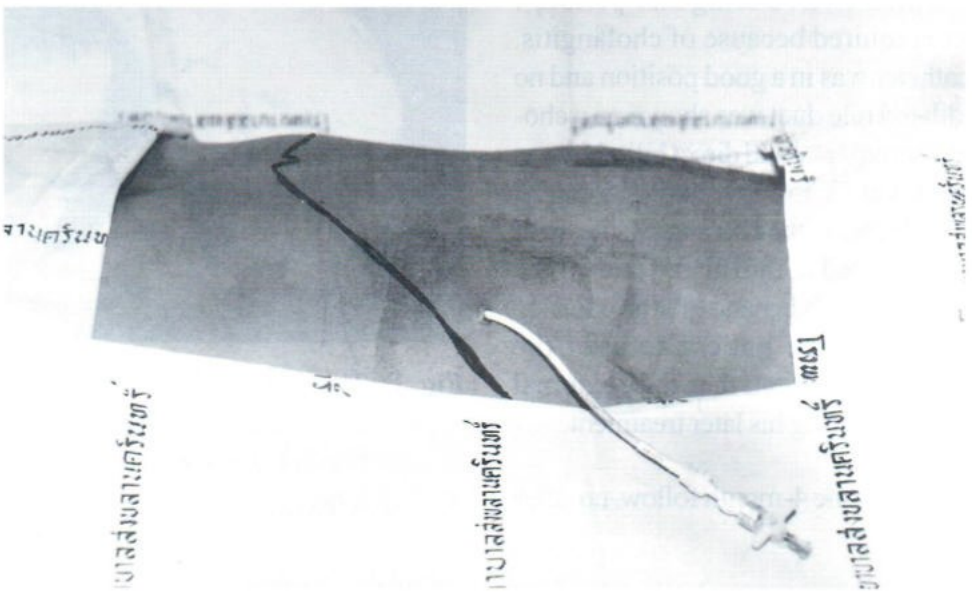

Fig. 3. The photograph shows that the puncture site was at the anterior axillary line which was more comfortable and easier to care for. The drawn line indicates the costal margin.

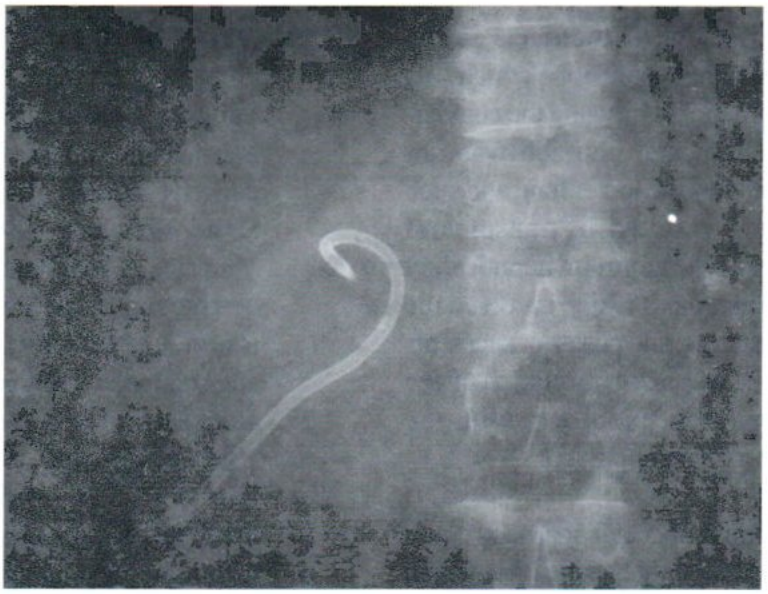

Fig. 4. A plain radiograph shows that the tip of the catheter could also be placed in the dilated duct of the anterior segment of the right hepatic lobe proximal to the stricture to provide simultaneous decompression of these 2 segments with a single catheter.

DISCUSSION

The subcostal approach PTBD through the anterior inferior duct of the right hepatic lobe gave an effective decompression of the biliary obstruction similar to the conventional method. In contrast to the conventional PTBD, which needs a blind puncture and 2-step technique, using a real-time sonographic guidance in the subcostal PTBD gave a more precise puncture of the bile duct, resulting in less time consumed and less trauma to the patient.[4-6] Moreover, transpleural puncture or trauma to the intercostal vessels and nerves which have been reported as complications in conventional PTBD with intercostal approach can be avoided.

Since the peripheral bile duct was punctured at the inferior liver margin far from the obstructive site, sufficient intrabiliary distance for more multiple side holes which could promote the better drainage was provided (Fig. 2). The puncture site was on an anterior axillary line that was more comfortable for the patient and easier tocare for (Fig. 3). The alignment of the puncture site and the catheter were in the same direction and not related to the rib (Fig. 2). With strong respiration, the catheter slightly but freely moved forth and back through the abdominal wall without being kinked by the ribs as observed in the intercostal approach of the conventional PTBD. In cases with separate dilatation of the ducts in the anterior and posterior segments of the right hepatic lobe, simultaneous decompression with a single catheter was possible with the subcostal technique (Fig. 4).

In case 1, who had separate dilatation of the anterior and posterior segments of the right hepatic lobe and PTBD of the left lobe was not possible, this subcostal PTBD was a the technique of choice to decompress the posterior segment of the

right hepatic lobe. Puncture of the ducts in the anterior segment of the right hepatic lobe which was inferior to the diaphragmatic dome using the conventional mid-axillary intercostal apprach was not possible since it is limited by the lower lung and such an attempt might have resulted in transpleural puncture. The stricture of the common hepatic duct with possible surrounding mass which involved the proximal ducts of the anterrior and posterior segments of the right hepatic lobe was also a limitation of the puncture of the common hepatic duct with the conventional right mid-axillary approach.

Limitations of this subcostal approach could be seen in cases with a small right hepatic lobe, which could be totally covered by the bony thoracic cage. In this setting, sonographic guidance can be enhanced with deep inspiration by the patient. However, this needs good patient cooperation.

This method is also suitable for the subsequent placement of a metallic stent as it was successfully performed in case 4.

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