Percutaneous Papillary Large Balloon Dilatation (PPLBD) for a Large Choledocholith after Total Gastrectomy

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Abstract

Endoscopic papillary large balloon dilation is recognized as a feasible technique for removing difficult bile duct stones. However, an endoscopic approach to choledocholithiasis in patients with a history of total gastrectomy is still challenging. To overcome this problem, percutaneous papillary large balloon dilatation (PPLBD), a new technique for percutaneous papillary dilatation using a large dilatation balloon, was designed for endoscopy-inaccessible large bile duct stones. We investigated the feasibility and safety of PPLBD for choledocholithiasis in cases with Roux-en-Y reconstruction. The PPLBD technique was performed to remove large bile duct stones in two patients who had previously undergone Roux-en-Y reconstructed total gastrectomy for gastric cancer. Four steps were taken after securing the percutaneous route: (1) a guide wire was introduced through the percutaneous route into the duodenum; (2) the papilla was pre-dilated with an 8-mm dilation balloon; (3) the papilla was dilated with a large dilatation balloon; and (4) stones were pushed into the duodenum with a retrieval balloon over the guidewire. As a result, all stones were removed smoothly in one session of PPLBD. No complications were observed including acute pancreatitis, biliary perforation, or papillary bleeding. There has been no recurrence of stones during two to three years of follow-up. Therefore, PPLBD is feasible and safe enough for proceeding to further advanced studies.

ABBREVIATIONS

CBD; Common Bile Duct; ERCP; Endoscopic Retrograde Cholangio Pancreatography, EST; Endoscopic Sphincterotomy, EPBD; Endoscopic Papillary Balloon Dilatation, EPLBD; Endoscopic Papillary Large-Balloon dilatation, PTCD; Percutaneous Transhepatic Cholangio Drainage, PPBD; Percutaneous Papillary Balloon Dilatation, PPLBD; Percutaneous Papillary Large Balloon Dilatation.

INTRODUCTION

Two main types of techniques, endoscopic sphincterotomy (EST) and endoscopic papillary balloon dilatation (EPBD), have been used for the management of the major papilla in the treatment of common bile duct (CBD) stones. However, in patients with large stones (more than 10 mm in diameter), mechanical lithotripsy is often required. The success rate of complete retrieval of large stones in one-time endoscopic retrograde cholangiopancreatography (ERCP) is lower than that of small stones. For the treatment of large stones, endoscopic papillary large balloon dilatation (EPLBD) was an epoch-making invention as an adjunctive technique to EST or EPBD [1,2]. In EPLBD, following a short sphincterotomy the biliary sphincter is further dilated with a large-diameter (more than 12 mm) dilatation balloon. Large dilatation of the biliary sphincter makes it possible to remove large stones completely without mechanical lithotripsy [3,4].

There are several ways to access the major papilla in patients with a prior Roux-en-Y reconstruction. ERCP in such patients remains challenging. Various techniques including balloon enteroscopy-assisted ERCP and laparoscopy-assisted ERCP have been introduced to improve the therapeutic success rate [5-7]. However, these techniques are more invasive and require more procedure time than does the usual ERCP.

In endoscopy-inaccessible cases, an alternative percutaneous approach has been attempted to eliminate CBD stones. In percutaneous papillary balloon dilatation (PPBD), which is
performed in a wire-guided manner through the route of a preplaced percutaneous transhepatic cholangiodrainage (PTCD), stones are pushed into the intestine using a retrieval balloon following papillary dilatation [8-11]. However, this technique is not effective enough for large stones.

To overcome these problems, percutaneous papillary large balloon dilatation (PPLBD), a new technique for percutaneous papillary dilatation using a large dilatation balloon, was designed for endoscopy-inacssible large CBD stones. Here, the feasibility and complications of PPLBD were evaluated in two consecutive patients who were suffering from large CBD stones and had a prior history of Roux-en-Y reconstructed total gastrectomy.

The PPLBD procedure

PTCD was performed for the treatment of cholangitis with a two-step biliary kit (MD-42470; Sumitomo Bakelite Co. Ltd., Tokyo, Japan) and a 7-Fr external biliary drainage catheter (003-025-0070; Create Medic Co. Ltd., Yokohama, Japan). After recovery from cholangitis, PPLBD was attempted. A guide-wire (5605; Boston Scientific Co. Ltd., Natick, MA, USA) was advanced into the third portion of the duodenum through the major papilla via the percutaneous route (Figure 1A). An 8-mm dilatation balloon (4594; Boston Scientific Co. Ltd.) was placed at the sphincter of Oddi and was inflated at 8 atm for 15 seconds. The balloon effaced the notch of the sphincter completely during the cholangiogram (Figure 1B). Following the initial dilatation, a large dilatation balloon (5841 for 12 mm dilatation; Boston Scientific Co. Ltd.) was placed and inflated up to the targeted balloon size for 30 seconds to expand the narrow distal segment along with the papilla (Figure 1C). The balloon diameter was chosen based on the stone size. However, balloons with a greater diameter than the aperture of the distal bile duct were not selected because of the risk of bile duct perforation. Following sufficient dilatation of the papilla, CBD stones were pushed out into the duodenum using a retrieval balloon (B-V232P-A; Olympus Co. Ltd., Tokyo, Japan) over the guidewire (Figure 1D). At the end of the procedure, a 7-Fr external biliary drainage catheter was re-placed for later cholangiography. After confirming the absence of complications and the complete elimination of CBD stones, the catheter was removed, and the patient left the hospital. This study was approved by the institutional review board of NTT Medical Center Tokyo, and both patients signed an informed consent form prior to the treatment.

CASE PRESENTATION

(Case 1): A 77-year-old woman with a history of a Roux-en-Y reconstructed total gastrectomy for gastric cancer two years prior was referred and admitted to our hospital for the treatment of acute cholangitis caused by a large CBD stone that was 12 mm in diameter (Figure 2A). PTCD relieved her fever, epigastric pain, and hyperbilirubinemia. PPLBD was performed through the PTCD route seven days after the PTCD (Figure 2B). After confirming the presence of the large stone and the shape of the CBD by cholangiography through the PTCD catheter, the papilla was finally expanded up to 12 mm using a large dilatation balloon. In succession, the stone was easily pushed out into the duodenum using a retrieval balloon (Figure 2C). The PTCD catheter was removed five days after the PPLBD and the patient was discharged seven days after the PPLBD without any adverse effects from the procedure.

(Case 2): An 81-year-old man with a history of a Roux-en-Y reconstructed total gastrectomy for gastric cancer 18 years prior
was admitted to our department after one-day complaint of fever and continuous right hypochondrial pain. On admission, CT images showed a large CBD stone that was 12 mm in diameter and dilation of intra- and extra-hepatic bile ducts (Figure 3A). Laboratory tests revealed elevation of liver enzymes and bilirubin. Because the patient showed shock vital and lethargy, he was diagnosed as having acute obstructive suppurative cholangitis and underwent emergent PTCD (Figure 3B). PPLBD was performed through the PTCD route after complete recovery from the cholangitis. The duodenal papilla was expanded up to 12 mm using a large dilatation balloon (Figure 3C). Subsequently, the stone was easily pushed out into duodenum using a retrieval balloon (Figure 3D). No adverse effect by the PPLBD was observed. The patient was discharged with a PTCD catheter three days after the PPLBD. An open cholecystectomy was performed 44 days after the discharge, and the PTCD tube was removed after the operation.

**DISCUSSION**

Here we have described PPLBD, a new technique that we developed, which is made up of two common methods. The first is the EPLBD technique for eliminating large CBD stones, and the second is the PPBD technique for managing endoscopically inaccessible CBD stones. PPLBD, therefore, provides clinicians with the advantages of both techniques. To remove large CBD stones without surgery or lithotripsy, three methods (PPLBD, EPLBD, and EST with a large incision) are available (Table 1). Among them, only PPLBD can be performed without an endoscope. When removal of large stones is attempted without these three methods, then crushing methods are additionally needed, which use mechanical lithotripter or extracorporeal shock wave lithotripsy. Crushing the stones should be avoided whenever possible because stone recurrence is reported to be associated with stone fragmentation [12,13]. Furthermore, PPLBD enables patients to avoid balloon enteroscopy-assisted or laparoscopy-assisted ERCP. However, it is important to pay attention to the complications of both procedures: papillary bleeding, biliary perforation, and acute pancreatitis in EPLBD and biliary peritonitis and catheter migration in PPBD [14]. Both patients in the present study exhibited no complications. Accumulating more cases is important in clarifying the risk of complications.

In the present study, pre-dilatation of the papilla using an 8-mm-diameter dilatation balloon was performed instead of partial EST prior to the large balloon dilatation to avoid biliary perforation. However, the necessity for pre-dilatation requires more consideration because it is still unclear whether pre-dilatation of the papilla can decrease complications of large balloon dilatation [15,16]. A comparison study between PPLBD with and without pre-dilatation should be performed to determine its efficacy and safety.

Based on our preclinical data [17], a large dilatation balloon with a diameter of 12 mm was used for PPLBD. Larger dilatations using balloons with diameters greater than 15 mm should be performed with great caution because biliary perforation can occur.

Thus, the PPLBD technique, which has not been reported previously, should find general acceptance and become a powerful tool for patients with endoscopy-inaccessible large CBDs, although large-scale studies are needed to further prove its safety and effectiveness.

**REFERENCES**

1. Ersoz G, Tekesin O, Ozutemiz AO, Günsar F. Biliary sphincterotomy plus dilation with a large balloon for bile duct stones that are difficult to extract. Gastrointest Endosc. 2009; 57: 156-159.


