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Percutaneous transhepatic papillary balloon dilation as a therapeutic option for choledocholithiasis

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Abstract
Background. For choledocholithiasis, endoscopic therapy, including endoscopic sphincterotomy (EST) or endoscopic papillary balloon dilation (EPBD), is now standard. However, the procedure of endoscopic therapy is very complicated and sometimes incomplete for reasons of anatomical anomalies. Therefore, we started performing percutaneous transhepatic papillary balloon dilations (PTPBD) instead of endoscopic therapy for choledocholithiasis 1 year ago for some selected patients. We report our technical methods of PTPBD.
Methods. First, percutaneous transhepatic cholangiodrainage (PTCD) was performed under ultrasound guidance. Via the drainage route, the balloon catheter was inserted until the common bile duct was reached. Then, cholangiography was performed and the stones were identified. The balloon was maintained in the inflated state with 4 ml air at the papilla of Vater for 3 min. Next, the stones were pushed out rapidly into the duodenum with the same balloon catheter. If the stone diameter was larger than 8 mm, then basket lithotripsy was performed before balloon dilation.
Results. Five patients underwent PTPBDs. The bile duct stones were successfully pushed out into the duodenum in all patients. The first three patients required two sessions for complete stone clearance due to technical problems; however, the last two patients needed only one session. There were no deaths and no complications.
Conclusions. We recommend that PTPBD might be a feasible and alternative therapeutic option for choledocholithiasis.

Key words Choledocholithiasis · Percutaneous transhepatic papillary balloon dilation (PTPBD) · Percutaneous transhepatic cholangiodrainage (PTCD)

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Summary

The authors devised a percutaneous transhepatic papillary balloon dilation (PTPBD) technique as an alternative therapeutic option for choledocholithiais instead of endoscopic treatment. PTPBD is simple and easy to perform, and should be recommended in some selected patients for whom it is difficult to perform endoscopic treatment.

Introduction

It is well accepted that endoscopic therapy, i.e., endoscopic sphincterotomy (EST) or endoscopic papillary balloon dilation (EPBD), is the standard therapeutic procedure for choledocholithiasis. However, endoscopic therapies still have some problems; these are complicated procedures that take a long time to complete and induce significant pain in many patients. We started performing percutaneous transhepatic papillary balloon dilation (PTPBD) instead of the endoscopic therapies for choledocholithiasis 1 year ago, and have continued performing PTPBDs in some selected cases, especially patients who could not undergo endoscopic retrograde cholangiography (ERC) due to anatomical anomalies, such as diverticuli near the papilla or Billroth II gastrectomies. We report our technical methods of PTPBD.

Technique

First, we have to perform percutaneous transhepatic cholangiodrainage (PTCD) under ultrasound guidance. The best puncturing point is the root of the right anterior biliary branch, because the best leverage for pushing stones into duodenum can be achieved there.

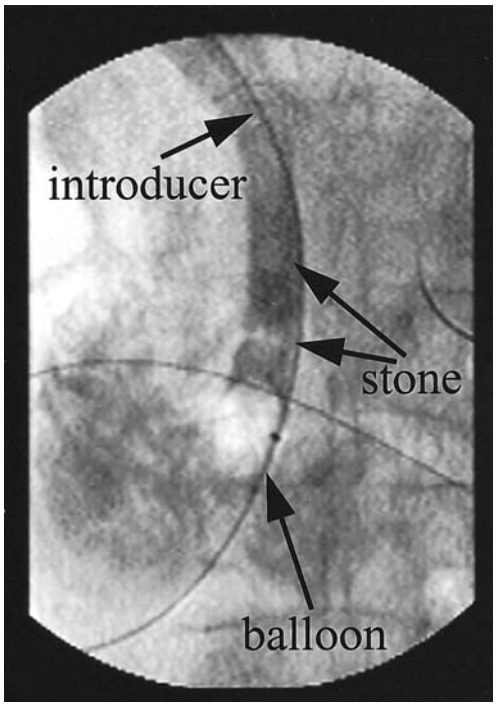

Fig. 1. The balloon, inflated with 4 ml air, is placed at the papilla of Vater for 3 min

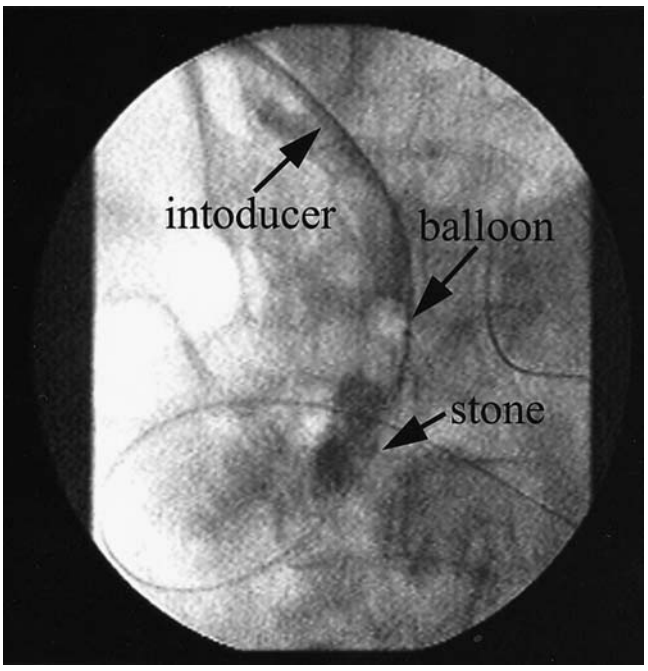

Fig. 2. The balloon catheter is deflated and pulled above the stones, and then reinflated and quickly pushed down into the duodenum via the papilla to push out the stones. At this moment the introducer plays an important role to prevent curving of the balloon catheter

Usually we use the 18 Gazi needle for puncturing, and then place the 7-French tube to drain bile.

A couple of days later, a fistula between abdominal wall and liver is created, then PTPBD is performed as follows. (1) The 7-French introducer, which avoids curving of the balloon catheter when the stone is pushed into the duodenum, is inserted into the PTCD route and fixed to the abdominal wall with suturing material. (2) Cholangiography through the PTCD route is performed and the stone in the bile duct is confirmed. (3) The balloon catheter is placed at the papilla of Vater, inflated with 4 ml air, and kept inflated for 3 min to dilate the papilla (Fig. 1). (4) After 3 min, the balloon is deflated and pulled above the stone, and then reinflated and quickly pushed down into the duodenum via the papilla to push out the stones (Fig. 2). (5) Cholangiography is performed, and it is confirmed that no stones remain. Otherwise, the procedure of step 4 is repeated. If the stone diameter exceeds 8 mm, lithotripsy is performed with the basket catheter before papilla balloon dilation (Fig. 3).

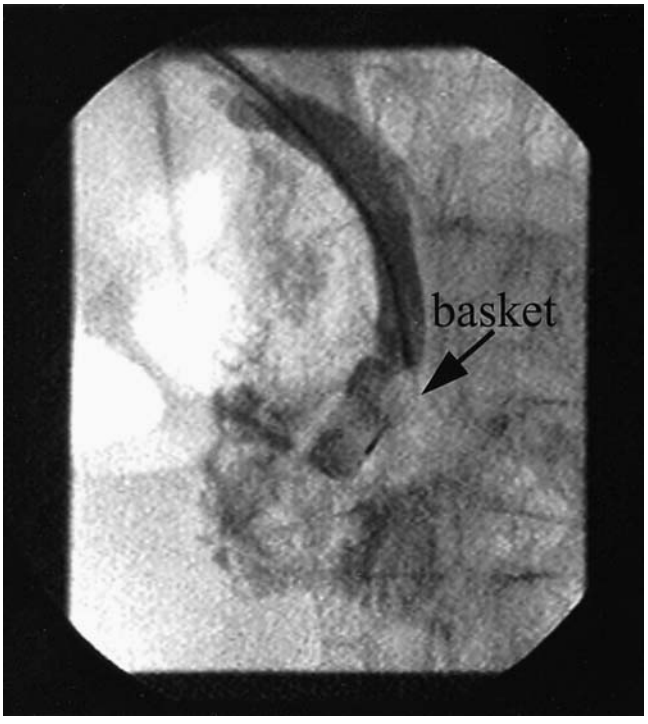

Fig. 3. If the stone diameter exceeds 8 mm, lithotripsy is performed with the basket catheter before papilla balloon dilation

Results

Five patients underwent PTPBD. The bile duct stones were successfully pushed into the duodenum in all the patients. The first three patients required two sessions

Table 1. Clinical course of the five cases of percutaneous transhepatic papillary balloon dilation (PTPBD)

Patient name (initials)	Number of sessions	Duration (min)	Morbidity
I.H.	2	50/40	None
M.M.	2	45/40	None
H.I.	2	40/30	None
T.K.	1	30	None
T.S.	1	20	None

for complete stone clearance due to technical problems; however, the last two needed only one session (Table 1). Two of them needed lithotripsy because the diameters of the stones were 8 mm and 12 mm, respectively. The lithotripsies were performed successfully. There were no deaths or complications in any of the patients.

Discussion

We agree that endoscopic therapies have initiated a great revolution in the treatment of choledocholithiasis. If endoscopic therapy is successfully completed, patients can avoid the stress of open surgery and general anesthesia. However, the procedure of endoscopic therapy is very complicated and painful, and sometimes uncompleted because of anatomical anomalies such as diverticuli near the papilla or Billroth II gastrectomies.

On the other hand, PTCD is completed only if the root of the biliary anterior branch is dilated enough to be punctured, regardless of any anomalies described above. The root of the biliary anterior branch is often dilated even though the peripheral biliary branches are not so dilated. Once the route of PTCD is completed, PTPBD is simpler and easier to perform under adequate sedation and analgesia compared to endoscopic therapy.

There have been some reports presenting the efficacy of PTPBD in treating choledocholithiasis.[1–9] However, these studies did not demonstrate the technical details of PTPBD. There are some specific "tricks" in performing our technique of PTPBD, such as the following. (1) The introducer plays an important role to keep the route of the balloon catheter straight to avoid weakening the ability to push out the stones into the duodenum, and should be fixed to the abdominal wall. (2) The patient should be placed in the head-up position to move the stones down to the lower common bile duct during the procedure. (3) The inflated balloon should be placed exactly at the papilla during the process of balloon dilation. (4) After dilation, the balloon catheter is deflated and pulled above the stones, and then reinflated and quickly pushed down into the duodenum via the papilla to push out the stones.

Last, we recommend that PTPBD might be a feasible and alternative therapeutic option for choledocholithiasis in some selected patients, especially in those with anatomical anomalies such as diverticuli near the papilla or Billroth II gastrectomy.

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