




CASE REPORT

Percutaneous transhepatic choledochoscopic lithotripsy and Interventional radiology techniques hybrid procedure in treatment of complex recurrent hepatolithiasis

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Abstract

Hepatolithiasis is a complex disease with a high recurrence rate, and may lead to recurrent cholangitis, biliary cirrhosis and cholangiocarcinoma. Traditional surgery to treat hepatolithiasis has its shortcomings such as causing injury and incomplete removal of stones. Percutaneous transhepatic choledochoscopic lithotripsy (PTCSL) is a safe and reliable method for hepatolithiasis causing minimal trauma, a fast recovery and a small incision. Cholangioscopes and ureterscope inability to reach the target bile duct is usually due to the difficult acute angle of bile duct caused by biliary stricture and biliary fibrosis. We used PTCSL in conjunction with interventional radiology (IR) techniques and Endoscopic retrograde cholangiopancreatography (ERCP) accessories for this situation and achieved an effective stone clearance.

Keywords

Percutaneous transhepatic choledochoscopic lithotripsy (PTCSL); Interventional radiology (IR) techniques; Endoscopic retrograde cholangiopancreatography (ERCP); Recurrent complex hepatolithiasis

1. Case report

A 41-year-old female was admitted for intermittent upper abdominal pain and fever. Thirteen years ago, the patient had been diagnosed with biliary tract stones and a laparoscopic bile duct exploration was performed. Six years ago, she was treated with Roux-en-Y hepaticojejunostomy due to recurrent hepatolithiasis.

In our hospital, jaundice and epigastric tenderness was observed. The serum total bilirubin level was 25.6 $\mu\text{mol/L}$ (reference range: 2.3-20.4 $\mu\text{mol/L}$). MRCP images showed that plenty of stones was blocking in intrahepatic duct with serious biliary tract expansion and cholangitis (Fig. 1a-e). Considering the patient's poor health and complex biliary stones, as well as the patient's refusal to have another operation, accompanied with the fact that Endoscopic retrograde cholangiopancreatography (ERCP) by enteroscopy was excluded due to high risk of intestinal perforation. A multidisciplinary team initially decided in favor of a two-session Percutaneous transhepatic choledochoscopic lithotripsy (PTCSL) plan: first, percutaneous transhepatic cholangial drainage (PTCD) to control the inflammation of bile duct; second, PTCSL to remove the biliary stones.

1.1 First session: PTCD

PTCD was performed to lower the pressure of bile duct; meanwhile, antibiotics were used to treat cholangitis. After receiving conservative treatments, the patient recovered from cholangitis and discharged, with an improved general condition. Cholangiography showed full filling stones in the bile duct (Fig. 2).

1.2 Second session: PTCSL

During the next month, the patient did not show signs of fever or chill. Investigations showed that white blood cell (WBC) and neutrophil counts were normal, liver function improved and total bilirubin level was normal. The PTCSL procedure was performed under intubated general anesthesia. The main steps of PTCSL were as the follows: dilate the PTC access to 16F, insert a 16F sheath, place choledochoscope or ureterscope, perform ballistic lithotripsy.

However, due to the difficult angle of bile duct, the choledochoscope and ureterscope could not reach the large stone in anastomotic stoma, finally a 16F drainage tube was placed in intrahepatic bile duct. Cholangiography showed many residual stones after PTCSL (Fig. 3). The patient suffered from sepsis after PTCSL and was treated using antibiotics. Due to these facts a third session was proposed.

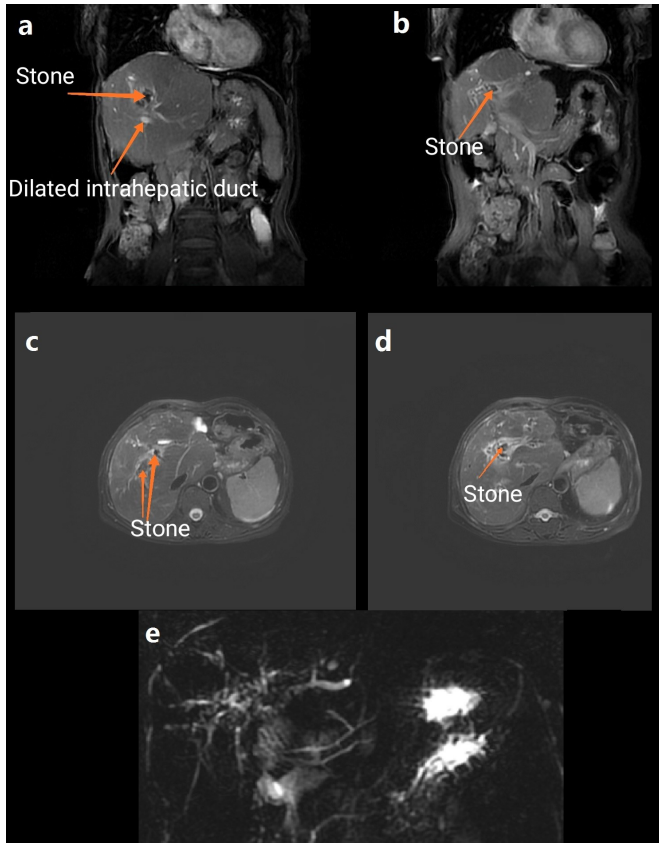


FIGURE 1. (a-e) MRCP showed that plenty of stones blocking in the intrahepatic duct. (arrow)



FIGURE 2. Percutaneous transhepatic cholangiography showed full filling defect in intrahepatic duct.

1.3 Third session: PTCSL and IR techniques hybrid procedure

About one month later, the patient was in good general condition, and was readmitted to hospital. Interventional radiology (IR) techniques were applied to remove bile duct stones. Cholangiography showed that plenty of stones blocked the intrahepatic bile duct and a large stone has impacted in the right biliary duct (Fig. 4). A guidewire was passed through the PTC access and placed into jejunum through hepaticojejunostomy. Percutaneous transhepatic balloon (balloon



FIGURE 3. Cholangiography after PTCL, indicating many residual stones in the right biliary duct.



FIGURE 4. Cholangiography before the third course showed that a huge stone has impacted in the right biliary ducts.

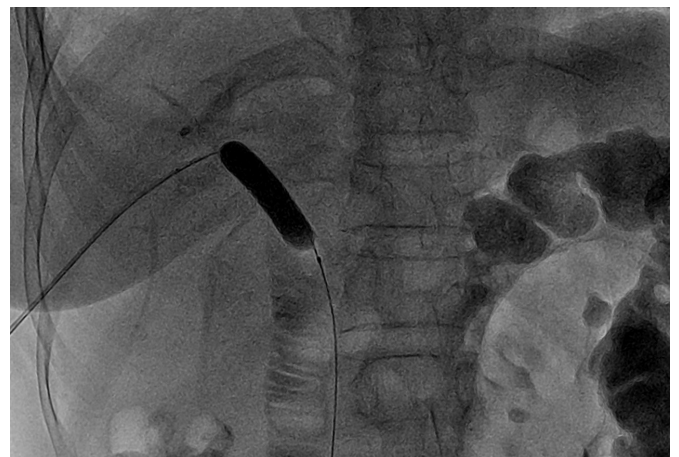


FIGURE 5. The hepaticojejunostomy was dilated by Dilation Balloon.

diameter 10 mm and duration 60 s) dilated the anastomosis stoma along the guidewire (Fig. 5). Next, the large stone in the right biliary duct was crushed and removed using basket lithotripsy (Fig. 6) and pushed into the intestine with Fogarty

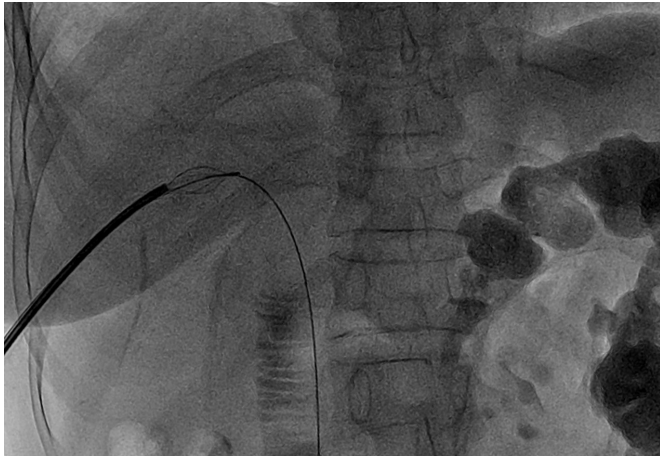


FIGURE 6. The huge biliary stone was crushed by Mechanical Lithotripter.



FIGURE 7. The stones were pushed into the intestine with Fogarty balloon catheter.



FIGURE 8. Cholangiography shows complete clearance of stone after the interventional procedure and the stones was pushed into the intestine.

balloon catheter (Fig. 7). Cholangiography identified that the anastomosis stoma was unobstructed and with no stone residue (Fig. 8). Then, a biliary tract drainage tube was placed. The patient only suffered from mild abdominal pain post operation.

2. Discussion

Hepatoolithiasis is a common disease in many countries especially in east Asia. Due to the lack of effective measures to prevent recurrent hepatolithiasis, patients are forced to undergo multiple operations and suffer both physical and mental trauma. With the rapid development of minimally invasive technology, such as ERCP, PTCSL or PTCSL plus IR technique hybrid procedure, more and more doctors are choosing to treat recurrent hepatolithiasis using these minimally invasive methods [1].

PTCSL is a safe, well-tolerated and highly effective technique for managing biliary stones, especially for patients with difficult anatomic situation and are high-risk surgical candidates [2, 3]. Due to the difficult acute angle of bile duct caused by biliary stricture and biliary fibrosis, cholangioscopes and ureteroscope cannot reach the target bile duct in some patients. Under these circumstances, PTCSL plus IR technique hybrid procedure advantages emerge. The use of PTCSL plus IR techniques can be effectively used in most complex cases. When comparing the use of PTCSL alone with PTCSL plus IR techniques, a lower recurrence rate was observed in PTCSL plus radiological techniques group, these results might be related to the effectiveness of IR techniques in dealing with biliary strictures which in turn contribute to the higher risk of stone recurrence if left untreated [4].

In this case, IR techniques and Endoscopic Retrograde Cholangiopancreatography (ERCP) special accessories were used, the hepaticojejunostomy dilated using Balloon dilator, the biliary stones crushed using Lithotripsy wire basket and then pushed out into the duodenum using an Extraction Balloon. All of the procedures were conducted under X-ray fluoroscopic guidance to reach the target bile duct and avoid possible complications, such as intestine and bile duct perforation. This procedure has been accepted by Ozcan as a feasible alternative to surgery when endoscopic extraction fails or is rejected by the patient [5].

In our case, Lithotripsy wire basket was used to crush the biliary stones, even though, it is not considered to be a safe method due to the size of the stone [5]. Recently, use of SpyGlass in percutaneous cholangioscopy, which initially used in ERCP, accompanied with direct laser lithotripsy were successfully applied to treat a patient with complex biliary stones [6, 7]. SpyGlass with direct laser lithotripsy maybe a more safe and effective method than Lithotripsy wire basket in treating complex biliary stones.

3. Conclusions

The effective treatment of complex biliary stone by minimally invasive means depends on the following points: an efficient and systematic treatment plan; the integration and comprehensive utilization of various minimally invasive method. In this case, we have applied PTCSL technology, IR techniques and ERCP accessories flexibly to remove of the biliary stones and alleviate patients' pain.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Written informed consent was obtained from the patient according to the Ethical Committee of our Institution.

ACKNOWLEDGMENTS

The authors thank the Department of Radiology of Second Affiliated Hospital of Chongqing Medical University for offering the images of CT, MRI.

CONFLICT OF INTEREST

The authors declare they have no conflict of interest.

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How to cite this article: Haitham Salameen, Yao Cheng, Jian-Ping Gong, Chun-Mu Miao. Percutaneous transhepatic choledochoscopic lithotripsy and Interventional radiology techniques hybrid procedure in treatment of complex recurrent hepatolithiasis. *Signa Vitae*. 2021;17(2):231-234. doi:10.22514/sv.2020.16.0106.