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Combined Percutaneous Lithotripsy and Transjejunal Stone Extraction for Intrahepatic Bile Duct Stones

Parul Garg[1] Malay Sharma[1]

[1] Department of Interventional Radiology, Aryavart Hospital, Meerut, Uttar Pradesh, India

Address for correspondence Parul Garg, MD, DNB, Department of Interventional Radiology Aryavart Hospital, Meerut 250110, Uttar Pradesh, India (e-mail: drgargparul@gmail.com).

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Abstract

This case report describes the treatment of intrahepatic duct stones in a 21-year-old woman, who developed these stones as a long-term complication after undergoing choledochal cyst excision and hepaticojejunostomy at the age of 3 years. The calculi were fragmented by combining percutaneous SpyGlass laser lithotripsy and percutaneous transjejunal crushing and retrieval of stones using a lithotripter and endoscopic retrograde cholangiopancreatography balloon extraction catheter. This case reminds us of long-term complications of stone formation after choledochal cyst surgery with biliary-enteric anastomosis and emphasizes the use of combined methods we can utilize for treating these stones.

Keywords

- intrahepatic duct stones
- percutaneous transhepatic laser lithotripsy
- transjejunal stone removal

Introduction

Excision and hepaticojejunostomy (HJ) are well-established treatments for choledochal cysts. The reported incidence of formation of intraductal stones after choledochal cyst excision is 10% or more.[1] Surgery is the classical treatment modality but has many disadvantages, including invasiveness, bleeding risk, and a relatively high rate of stone recurrence. Percutaneous transhepatic lithotripsy is a minimally invasive intervention with many advantages relative to surgery.[2]

Case Report

A 21-year-old woman presented with pain in the right upper abdomen with nausea and loss of appetite. She had a history of operated type IVA choledochal cyst with HJ at the age of 3 years. On imaging, there were multiple intraductal calculi in both right and left hepatic ducts with mild intrahepatic biliary radical dilatation with the largest calculus measuring 20 mm in the left hepatic duct. The serum bilirubin and alkaline phosphatase (ALP) were mildly raised (serum bilirubin 2.0 mg/dL and ALP 1,298 U/L).

As a first step, bilateral percutaneous transhepatic biliary drainage (PTBD) was performed to relieve obstructive jaundice. Bilateral PTBD enables bilateral spyglass insertion to be in proper alignment for stone fragmentation and 12-Fr Malecot catheters were placed. Percutaneous transhepatic cholangiography showed two large calculi and a few smaller calculi in the right and left hepatic ducts (►**Fig. 1A**). The HJ anastomosis was mildly stenotic. Balloon dilatation of HJ stricture was done by 10 × 40 mm balloon with free flow of contrast into the jejunum. Three sessions of percutaneous laser lithotripsy were done by the passage of spyglass (Boston Scientific) through an 11-Fr sheath, 11 cm in length to break the stones in both right and left ducts (►**Fig. 1B–D** and ►**Video 1**) and (►**Fig. 2A–C**). The duration of each session was 15 to 20 minutes from spyglass insertion to fragmentation. The fragmented stones (►**Fig. 2D**) were flushed out by saline and balloon swept into the jejunum by a 10 × 40 mm balloon (Advance Balloon catheter, Cook)

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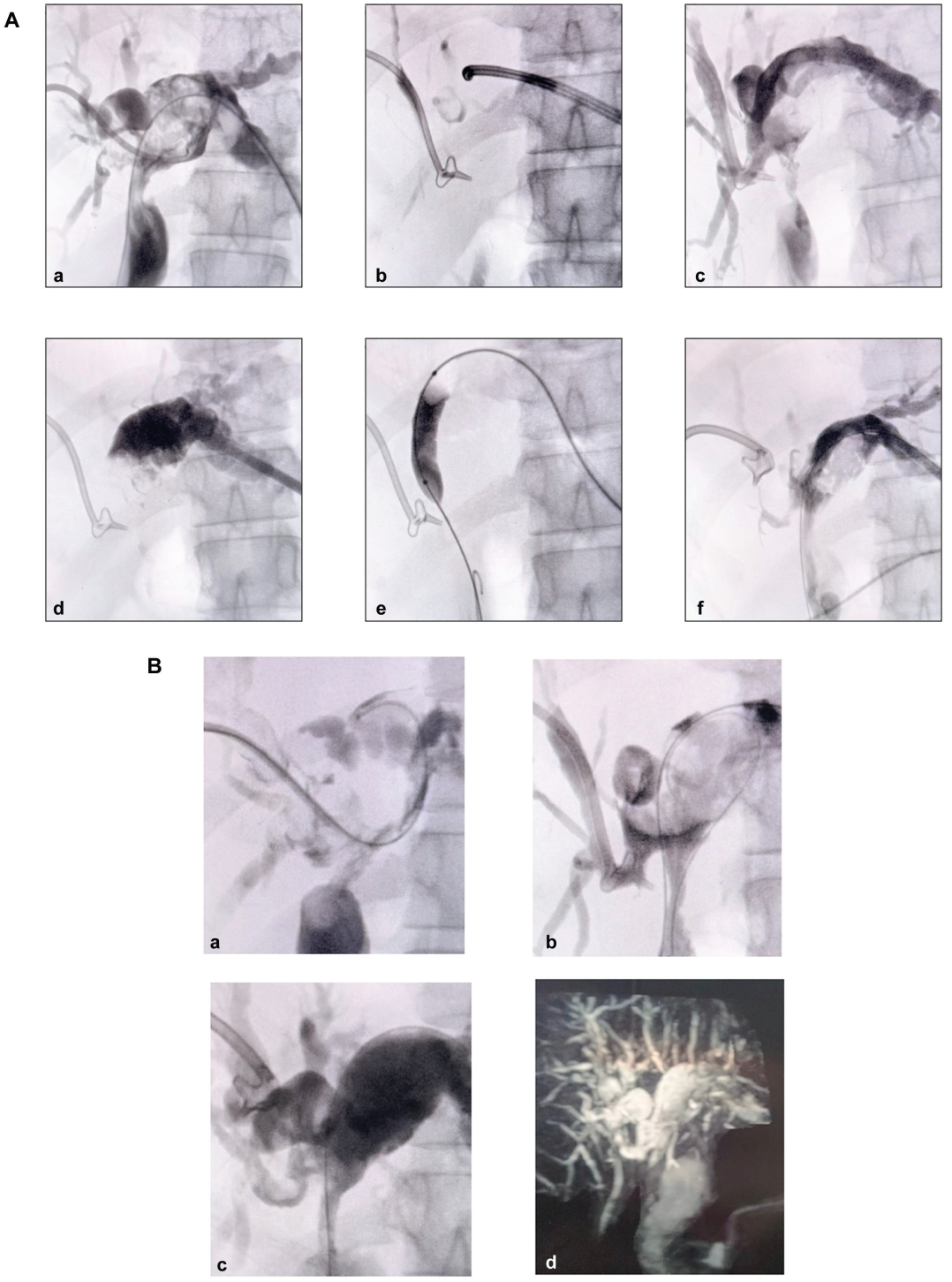

Fig. 1 (A)—(**a**) Large stone in left hepatic duct, (**b**) spyglass in left hepatic duct, (**c**) first sitting of laser lithotripsy, (**d**) crushed stones seen as filling defects in left hepatic duct, (**e**) balloon sweep done for crushed stones, and (**f**) residual stone after three sittings. (**B**)—(**a**) Right hepatic duct stones seen as filling defects, (**b**) large left hepatic duct stone, (**c**) posttreatment cholangiogram—no stone, and (**d**) magnetic resonance cholangiopancreatography posttreatment.

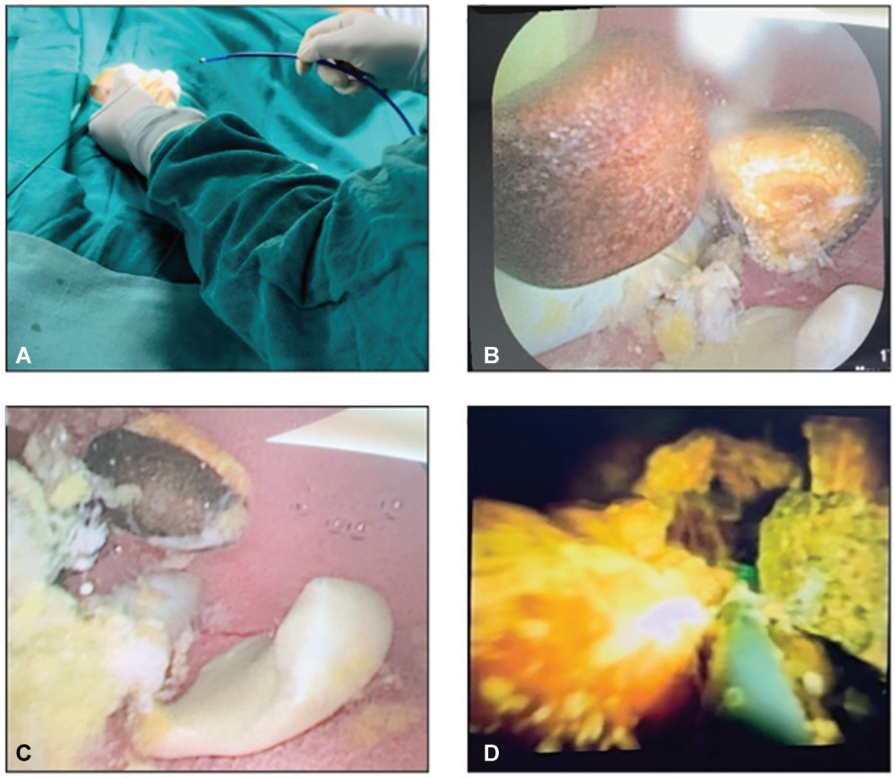

Fig. 2 (A) Spyglass being introduced through percutaneous sheath, (**B, C**) cholangioscopic view of intraductal stones, and (**D**) fragmented stones after laser.

(►**Fig. 1E**). The gap between the three sessions was 1 week. Right duct stones were smaller and were tackled by spyglass in the first session only.

Video 1

Percutaneous laser lithotripsy by SpyGlass. Online content including video sequences viewable at: https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0044-1792101.

To extract the residual left duct stone, transjejunal approach was planned after a gap of 2 weeks. A percutaneous jejunal anchor (Cope Gastrointestinal Suture Anchor Set, Cook Medical) was taken under ultrasound guidance and an 8-Fr Sheath was placed in the jejunal loop across the HJ (►**Fig. 3A**). The jejunal loop was identified by injecting fluid through a catheter placed through the PTBD route and visualizing it in the subhepatic region by ultrasound. The jejunal loop was free and not anchored at the time of HJ surgery in childhood. The stone was fragmented by a Dormia basket, and the fragments of stone were swept down by an endoscopic retrograde cholangiopancreatography (ERCP) balloon extraction catheter (►**Fig. 3B–D**). A catheter was left in place in jejunum along with bilateral PTBD. In the next session, on check cholangiogram, there was no residual stone, and bilateral PTBD and jejunal catheters were removed. The patient was discharged in satisfactory condition.

Discussion

Cyst excision with hepaticoenterostomy is the treatment of choice for choledochal cyst. Postoperative complications, including cholangitis, intrahepatic stones, and development of carcinoma of the residual bile duct are serious long-term complications after cyst excision especially in type IV choledochal cysts as intrahepatic dilated ducts persist after HJ.[3]

Surgery has been the predominant method of treatment of intrahepatic ductal stones; however, surgery carries high morbidity and mortality. In cases of HJ, ERCP is difficult due to restricted access to the biliary tree. Therefore, many different percutaneous procedures can be applied for stone removal and fragmentation.

Percutaneous transhepatic biliary laser lithotripsy provides an alternative treatment option for patients unsuitable for ERCP with widespread intraductal calculi or a large calculus.[4] Laser lithotripsy through spyglass has a high complete ductal clearance rate (95.1%) together with a higher stone fragmentation rate (92.5%).[5]

Percutaneous transjejunal biliary interventions can also be used to treat intrahepatic stones. The jejunal loop of HJ is accessed under ultrasound guidance and anchors are placed to fix the loop to the abdominal wall. Transjejunal sheath can then be used for fragmentation or retrieval of the stones

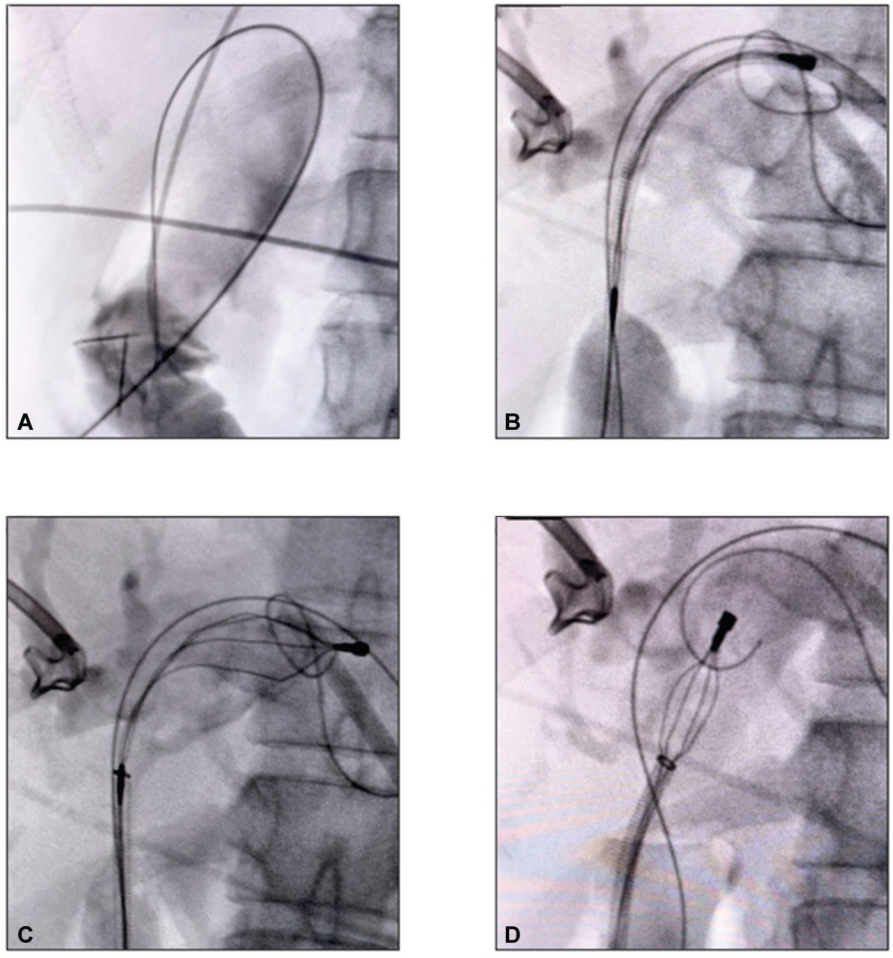

Fig. 3 (**A**) Percutaneously placed jejunal anchors and guide wire in the jejunal loop of hepaticojejunostomy, (**B, C**) Dormia basket to crush and retrieve stones, and (**D**) Dormia basket being retrieved through sheath.

using mechanical lithotripters, Dormia baskets, and ERCP balloon extraction catheters.[6]

In our case, the stones were very large, and percutaneous laser lithotripsy through spyglass alone was not able to achieve complete stone clearance. So, transjejunal extraction of stones helped in completely removing the residual stones.

Therefore, the optimal treatments require a multidisciplinary approach, including endoscopic and radiologic interventional procedures before and/or after surgery.

Conclusion

Combined use of percutaneous laser lithotripsy by spyglass and jejunal loop anchor approach for stone extraction can enable fragmentation of chronic impacted intraductal calculi as a result of HJ stricture or chronic bile stasis in a case of operated choledochal cyst.

Conflict of Interest

None declared.

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