Percutaneous transhepatic balloon dilatation of the hepaticojejunal anastomosis for the definitive treatment of the intrahepatic bile duct stones occurring in choledochal cysts excised children

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ABSTRACT
Cyst excision with hepaticojejunostomy is the well defined standard treatment for choledochal cysts. Intra or extrahepatic bile duct stone formation are serious complications observed in long-term follow up after hepaticojejunostomy. Revision of hepaticojejunostomy is the most defined treatment of intra or extrahepatic bile duct stones secondary to hepaticojejunal anastomotic stenosis. We report two cases of common hepatic duct and/or intrahepatic bile duct stones that developed after hepatico-jejunal anastomosis for choledochal cyst resection, that were treated with percutaneous transhepatic balloon dilatation of the hepaticojejunal anastomotic stenosis. During percutaneous transhepatic cholangiography a catheter was passed through the hepaticojejunal anastomotic stenosis and the hepatic duct-jejunal anastomotic junction was dilated with a balloon. The common hepatic duct stone and intrahepatic bile duct stones thus passed to the jejunum following the dilatation. The patients recovered uneventfully and are free of stones.

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1. Case reports
1.1. Case #1

A 26-year-old man, operated for Type 1 choledochal cyst at the age of 6, presented with recurrent cholangitis. Computerized tomography (CT) showed dilatation of the bile ducts proximal to the hepaticojejunal anastomosis. Common hepatic duct stone and multiple intrahepatic bile duct stones were present in the left hepatic segments.

Percutaneous transhepatic cholangiography (PTC) showed left sided intrahepatic bile duct stones, a large cone shaped common hepatic duct stone (5 cm long) and hepaticojejunal anastomotic stenosis (Fig. 1). During PTC a guide was introduced from the right side of the main hepatic duct stone and the stenotic hepaticojejunal anastomosis was dilated with a balloon (Boston Scientific, Natick, USA) (Fig. 2). Thus, the common hepatic duct stone passed through hepaticojejunal anastomosis to the jejunum following the dilatation procedure. Afterward all intrahepatic stones passed through from the dilated hepaticojejunal anastomosis into the jejunum. The trans-anastomotic 8 fr external biliary drainage catheter (Flexima,
Boston Scientific, Natick, USA) was left to ensure bile flow through the dilated hepaticojejunostomy after the PTC. PTC was repeated a week later and hepaticojejunostomy was found to be patent and catheter was removed. Repeated CT showed clearance of all intrahepatic bile duct stones. The patient recovered uneventfully and is free of stones after 27 months follow-up without any symptoms.

1.2. Case #2

A 15-year-old girl operated for Type 1 choledochal cyst when she was 10 years old. She presented with recurrent cholangitis. CT showed dilation of the bile ducts proximal to the hepaticojejunostomy anastomosis and multiple intrahepatic bile duct stones.

PTC showed multiple left sided intrahepatic bile duct stones and hepaticojejunostomy anastomotic stenosis (Fig. 3). During PTC, a guide was passed through the hepaticojejunostomy and the hepaticojejunostomy was dilated with a balloon (Boston Scientific, Natick, USA) (Fig. 4). Following dilation, all of the intrahepatic stones passed through the hepaticojejunostomy into the jejunum. The trans-anastomotic 8 fr external biliary drainage catheter (Flexima, Boston Scientific, Natick, USA) was left to ensure bile flow through the dilated hepaticojejunostomy after the PTC. PTC was repeated a week later and hepaticojejunostomy anastomosis was found to be patent and catheter was removed. Repeated CT showed clearance of all intrahepatic bile duct stones. The patient
recovered uneventfully and is free of stones after 23 months follow-up without any symptoms.

2. Discussion

Cyst excision with Roux-en-Y hepaticojejunostomy is the most preferred treatment for choledochal cysts [1,2]. Intra or extrahaepatic bile duct stones formation are the long term serious complications of choledochal cyst treatment. Intrahepatic bile stone formation has been shown to occur mostly in patients operated older than 5 years [4,5]. Biliary stasis secondary to the hepaticojejunal anastomosis stenosis or residual dilated intrahepatic bile ducts are considered to be the causes of intrahepatic bile stone formation [1-5]. Bile stasis can cause biliary infection and recurrent cholangitis, thus facilitating stone formation. The presence of ascendant gram negative enterobacteria in the intrahepatic bile tree has been shown to play an important role in intrahepatic bile stone formation [8]. Bile sludge present in the intrahepatic bile ducts has also been shown to contribute to intrahepatic bile stone formation [9,10]. Intraoperative endoscopy and irrigation of the biliary system during choledochal cyst excision have been recommended to prevent intrahepatic bile stone formation [10,11]. Excision of the extrahepatic bile duct starting from the confluence of the hepatic duct till pancreaticobiliary junction, together with wide hepaticojejunalostomy is recommended for the prevention of cholangitis and intrahepatic bile stone formation [12].

Revision of the hepaticojejunalostomy is the most utilized treatment of intrahepatic bile stones secondary to hepaticojejunal anastomotic stenosis [5,12,13]. Intracorporal electrohydraulic lithotripsy has been utilized for biliary stones with normal hepaticojejunal anastomosis. Flexible cholangioscope is introduced through jejunal limb during laparotomy for this purpose; the stones are fragmented with electrohydraulic lithotripsy and irrigated [6]. In the presence of a septal intrahepatic bile duct stenosis, the stenotic septa can be resected with a grasper introduced through the cholangioscope and stones can be removed [14].

Minimally invasive methods such as percutaneous transhepatic cholangioscopic lithotripsy (PTCL) and extracorporeal shockwave lithotripsy (ESWL) have been described for the treatment of intrahepatic bile duct stones with normal hepaticojejunal anastomosis [4,7,12]. Multiple sessions of ESWL is needed for a successful lithotripsy [7].

Balloon dilatation of intrahepatic bile duct septa has been reported in conjunction to PTCL in two cases of bile duct stones accompanying intrahepatic stones [12]. To the best of our knowledge percutaneous transhepatic balloon dilatation of the hepaticojejunal anastomotic stenosis to treat common hepatic duct and/or intrahepatic bile duct stones secondary to hepaticojejunal anastomotic stenosis has not been reported. In the present cases balloon dilatation of the hepaticojejunal anastomotic stenosis was sufficient to discharge the stones together with the accumulated bile. No lithotripsy procedure was performed. Even the 5 cm long stone passed through the hepaticojejunal anastomosis to jejunum after dilatation.

3. Conclusion

Balloon dilatation of the hepaticojejunal anastomotic stenosis during PTC is a minimally invasive, safe and effective method in the treatment of intra and/or extrahepatic bile duct stones formed after choledochal cyst excision.

References