Pancreatogenic choledocholithiasis in common bile duct stump after Roux-en-Y hepaticojejunostomy
A case report
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Abstract
Rationale: Choledocholithiasis in common bile duct (CBD) stump after Roux-en-Y hepaticojejunostomy (RYHJ) is incredibly rare and its pathophysiology is poorly understood.

Patient concerns: A 79-year-old woman was admitted to our hospital with upper abdominal pain radiating through to the back in November 2016.

Diagnoses: Abdominal computed tomography (CT) scan and magnetic resonance cholangiopancreatography (MRCP) revealed filling defects in CBD stump, chronic pancreatitis, and dilatation of CBD stump and main pancreatic duct (MPD).

Interventions: During the endoscopic retrograde cholangiopancreatography (ERCP), cannulation proceeded easily from MPD to CBD through a variant pancreatic duct, and then white crushed stones extracted from the CBD stump. Elemental analysis and infrared spectrophotometry demonstrated that the main constituent of the calculi was calcium carbonate.

Outcomes: After a therapeutic ERCP, the patient’s symptoms disappeared, and a 9-month follow-up indicated no remaining stones or lithiasis relapse.

Lessons: This type of choledocholithiasis in CBD stump after RYHJ has never been reported before. We nominated it as “pancreatogenic choledocholithiasis,” and pancreatobiliary reflux caused by a variant pancreatic duct may be the main cause.

Abbreviations: AP = acute pancreatitis, ASC = acute suppurative cholangitis, BDS = bile duct stone, BI = biliary infection, CBD = common bile duct, CHD = common hepatic duct, CP = chronic pancreatitis, CT = computed tomography, ENBD = endoscopic nasobiliary drainage, ERBD = endoscopic retrograde biliary drainage, ERCP = endoscopic retrograde cholangiopancreatography, ERPD = endoscopic retrograde pancreatic drainage, EST = endoscopic sphincterotomy, GS = gallbladder stone, HJ = hepaticojejunostomy, MDP = major duodenal papilla, MPD = main pancreatic duct, MRCP = magnetic resonance cholangiopancreatography, PBM = pancreatobiliary maljunction, PTCD = percutaneous transhepatic cholangial drainage, RYHJ = Roux-en-Y hepaticojejunostomy.

Keywords: choledocholithiasis, endoscopic retrograde cholangiopancreatography, pancreatic duct, pancreatobiliary reflux

1. Introduction
Choledocholithiasis is an endemic condition in the world.[1] It is estimated that up to 10% of patients with symptomatic gallstones had common bile duct (CBD) stones concomitantly.[2] The majority of choledocholithiasis are the cholesterol, pigment, or mixed type. Calcium carbonate is seldom reported to be a major component of CBD stones.[3] To our knowledge, no previous case of choledocholethiasis in CBD stump after Roux-en-Y hepaticejejunostomy (RYHJ) mainly composed of calcium carbonate has been reported. In this article, we report a patient who had undergone RYHJ reappearing CBD stump stones mainly containing calcium carbonate, which determined by endoscopic retrograde cholangiopancreatography (ERCP) and chemical composition analysis.

This case report has been approved by the Ethics Committee of Qilu Hospital of Shandong University, Jinan, China, and the written informed consent was acquired.

2. Case report
A 49-year-old female had mildly icteric sclera since 1986, her ultrasonic examination showed a small gallbladder stone. Intermittently she had choleretic and litholytic herbal medicine in the following 9 years. In 1995, her ultrasound result showed both gallbladder stones and polyps. Then cholecystectomy and T-tube choledochotomy was performed, which no stones and strictures were found in biliary duct. Four years after cholecystectomy, this patient had intermittent nausea and dull
epigastric pain. With the pain radiated to the back and nausea worsened after eating, she lost 7.5kg in 2 months. The serum amylase level remained normal but urine amylase increased to 844u/L (Somogyi). Abdominal computed tomography (CT) scan revealed a dilated proximal biliary system, which demonstrated the presence of biliary infection and chronic pancreatitis (CP). After 2 months of conservative treatment, percutaneous transhepatic cholangial drainage (PTCD) and anti-infective therapy, her worsened symptoms had no obvious relief. Therefore, RYHJ had to be performed in 1999. The Roux limb is prepared by transecting the jejunum and the mesentery 15cm distal to the ligament of Treitz. End-to-side anastomosis was performed between expanded common hepatic duct (CHD) and the afferent intestinal limb at 5cm from the sutured intestinal end. Then end-to-side anastomosis was performed between the proximal and distal jejunum (40 cm from the biliary-intestinal anastomosis). After operation her recurrent episodes of pain and nausea were alleviated. And long-term oral administration of digestive enzymes was applied continually.

However, the patient has had 3 times of recurrent acute pancreatitis (AP) from 2002 to 2011. The second time was the most serious episode that she suffered from AP combined with acute suppurative cholangitis (ASC). Each time endoscopic sphincterotomy (EST) was performed, endoscopic retrograde biliary drainage (ERBD) tube was installed, and the tube was removed 3 days after the procedures. During the third time of AP in 2011, her abdominal CT showed choledocholithiasis, dilated CBD stump and AP (Supplementary Fig. 1A, http://links.lww.com/MD/B960). ERCP showed filling defect in the CBD remnant. The stone extracted from the bile duct stump was grayish-white in color, rough and horny in contour and very hard (Supplementary Fig. 1B, http://links.lww.com/MD/B960). After operation her symptoms were relieved.

The 79-year-old woman was admitted again to our hospital with a 2-month history of upper abdominal pain spreading through to the back in November 2016. Physical examination revealed no abdominal tenderness and icteric sclera. Laboratory blood tests, including blood cell count, liver function tests, and so on, were in normal ranges. Abdominal CT scan and magnetic resonance cholangiopancreatography (MRCP) revealed filling defects in CBD stump, CP, and dilatation of CBD stump, and main pancreatic duct (MPD) (Fig. 1A–B). Therefore, an elective ERCP exploration was performed.

During the ERCP, a balloon catheter was pulled through the major duodenal papilla (MDP) after EST was performed, and no stone was found, then pancreatic stent was placed for the stricture in the opening of the MPD in the following procedures. Next, the balloon catheter was pulled through the CBD, and white crushed stones were removed from the CBD remnant into the duodenum (Fig. 1C–D). It looks like pancreatic duct stones that have white grain of sand and hard texture. Then endoscopic nasobiliary drainage (ENBD) tube placement was performed after clearance of CBD stump stones. Elemental analysis and infrared spectrophotometry demonstrated that the main constituent of the calculi showed in Supplementary Figure 1B and Figure 1D, http://links.lww.com/MD/B960 was calcium carbonate, identical to the common chemical composition of pancreatic duct stone. As CBD has been transected for RYHJ, how did this stone be created? We thought pancreatobiliary reflux induced by several ESTs was the main cause of choledocholithiasis, but we found other reasons for the occurrence of CBD stump stones during the latest ERCP.

After the papilla was identified, cannulation and Iopromide injection sailed through for cholangiopancreatography. There were filling defects that considered to be crush stones in the distal CBD stump, dilation of CBD stump, and stricture in the opening of MPD with proximal duct dilation on fluoroscopy. And there
are not classified. It has been reported that high concentrations of calculus calcium, which are typically found in bile duct stones, may cause bile duct obstruction, leading to chronic pancreatitis. This was a rare case of choledocholithiasis in CBD stump following RYHJ, which was diagnosed after reviewing the MRCP images. As far as we know, this sort of disease course and treatment was shown in Figure 2. However, pancreatobiliary reflux persists as the ERCP procedure could not ligate or plug up the variant pancreatic duct. Therefore, the treatment of pancreatobiliary reflux needs further investigation.

3. Discussion

This was a rare case of choledocholithiasis in CBD stump following RYHJ caused by anatomical variation-induced pancreatobiliary reflux. It was only during cannulation that we accidentally discovered the variant pancreatic duct. As the hydrostatic pressure of the pancreatic duct is greater than that of the bile duct, pancreatic juice could reflux into the CBD stump through the pancreatic duct variant. Commonly, pancreatobiliary reflux can occur in cases of pancreatobiliary maljunction (PBM), sphincter dysfunction, and a variety of other conditions. It has been reported that high confluence of pancreatobiliary ducts that are not classified as PBM is also prone to pancreatobiliary reflux. The variant pancreatic duct communicating between CBD and MPD enriches the mechanism of pancreatobiliary reflux, and its clinical implications and appropriate management need further investigation.

On the basis of the composition, bile duct stones can be divided into cholesterol, pigment, and mixed stones. Other constituents are calcium carbonate, palmitate phosphate, and other bile pigments. Though there has been a few articles reported concerning bile duct stones mainly composed of calcium carbonate in children,[6,7] the calcium carbonate calculi we extracted from CBD stump is extremely rare in adults. Increased levels of mucin and calcium in the bile were the main cause of the formation of calcium carbonate gallstones, whereas pancreatic stone formation required persistent stasis of protein-rich pancreatic juice secondary to duct obstruction.[11] However, in this case, the patient’s bile duct had been transected for RYHJ.

Here we report the case of a patient presenting with pancreatogenic choledocholithiasis in CBD stump after RYHJ, followed by identifying a variant pancreatic duct which joins CBD during ERCP. Elemental analysis and infrared spectrophotometry demonstrated that the main constituent of the calculi was calcium carbonate. This type of pancreatogenic choledocholithiasis has never been reported before and pancreatobiliary reflux caused by the variant pancreatic duct may be the culprit.

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