



Original research

Laparoscopic common bile duct exploration and primary closure of choledochotomy after failed endoscopic sphincterotomy

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H I G H L I G H T S

- Collected adequate information on primary closure of choledochotomy after failed EST.
- Immediate laparoscopic common bile duct exploration (LCBDE) was performed after failed EST.
- Routine cholecystectomy was performed after failed EST.
- Primary closure of choledochotomy following EST is safe and feasible.

A R T I C L E I N F O

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A B S T R A C T

Background: The aim of this study is to evaluate the safety and feasibility of laparoscopic common bile duct exploration and primary closure of choledochotomy for the patients with common bile duct stones (CBDS) who failed in endoscopic sphincterotomy (EST).

Methods: Between January 2007 and June 2012, a total of 78 patients who subjected to endoscopic retrograde cholangiopancreatography (ERCP) and EST, but failed in endoscopic stone extraction, were referred to us. The following day, laparoscopic cholecystectomy, laparoscopic common bile duct exploration (LCBDE) and primary closure of choledochotomy were performed in all patients.

Results: No intraoperative complications were experienced in the patients. 6 patients required conversion to open cholecystectomy due to impacted stones. The mean operative time was 145 min. The mean postoperative hospital stay was 6d. All the patients achieved successful stone clearance. 13 cases had slight bile leaks, which resolved spontaneously. None of the patients experienced biliary peritonitis, biliary fistula, pancreatitis, or cholangitis.

Conclusion: If it is performed by experienced laparoscopic surgeons, primary closure following immediate laparoscopic common bile duct exploration (LCBDE) is safe and feasible for patients with CBDS who fail in endoscopic stone extraction.

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1. Background

The last 20 years have seen major developments in the management of choledocholithiasis. The approach to routine treatment of CBDS is preoperative endoscopic retrograde cholangiopancreatography (ERCP) with endoscopic sphincterotomy

(EST), followed by laparoscopic cholecystectomy. Primary closure of common bile duct has been proven to be a safe and feasible treatment after common bile duct exploration, and gained wider acceptance [1–3]. However, the patient failed in endoscopic stone extraction is usually subjected to a common bile duct exploration with a common bile duct drain [4,5]. There is not adequate information on the practice of primary closure following LCBDE in cases of endoscopically irretrievable stones in the literature. The purpose of this study was to present our early experience with primary closure of common bile duct, particularly in cases of unsuccessful ERCP and sphincterotomy.

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2. Methods

From January 2007 and June 2012, a total of 930 patients referred to our institution for management of bile duct stones by ERCP/EST were prospectively studied. We included 78 patients, who subjected to ERCP and sphincterotomy, but failed in endoscopic stone extraction. Data were collected prospectively (Table 1). The 78 patients with no previous operations, 35 male and 43 female, median age = 65 years (range = 43–90 years), were documented the presence of CBD stones and diameter of CBDs with preoperative ultrasonography and magnetic resonance cholangiopancreatography (MRCP). Comorbid conditions, presenting symptoms; reasons for failed endoscopic extraction; operative data containing: drains, length of stay, open conversions and complications were recorded and studied.

Endoscopic retrograde cholangiopancreatography (ERCP) was performed via a side viewing duodenoscope with a large accessory channel in a standard manner. Standard sphincterotomy and subsequent stone extraction with basket was performed in all the patients. Endoscopic sphincterotomy was failed due to the stones greater than 1.5 cm in diameter in 25 cases, impacted stones in 11 cases, remaining stones after multiple endoscopic attempts in 22 cases, multiple stones combining dilated bile duct (diameter > 1.5 cm) in 15 cases and tortuous ducts in 5 cases, respectively (Table 2). The diameter of the common bile duct ranged from 1.1 cm to 2.2 cm in the patients.

After ERCP/EST, the patients accepted antibiotics (Cefoxitin sodium 2 g/day and Ornidazole 1 g/day). Twelve hours after the process, laboratory testing for hemoglobin and amylase was performed. There were no obvious differences between pre and post ERCP/EST in the patients.

The following day, the patients underwent laparoscopic cholecystectomy and common bile duct exploration. Laparoscopic cholecystectomy was performed using a standard four-port technique with carbon dioxide pneumoperitoneum at 14 mmHg pressure. A 10-mm trocar was inserted in the umbilicus. Another 10-mm trocar was placed in the subxiphisternum. Two 5-mm trocars were placed on the right upper quadrant 2 cm below the costal margin along the anterior axillary and mid-clavicular lines, respectively. A 30° video-laparoscope (Stryker, USA) was used and placed through the umbilical trocar. We dissected the Calot's triangle, and double clipped the cystic artery. Gallbladder was left in situ and used for retraction until LCBDE was completed. The common bile duct was identified by touching the stones or needle aspiration of bile from the duct, and then was exposed directly: a longitudinal choledochotomy was made with curved microscissors in the supraduodenal part of the CBD. LCBDE was performed upon confirmation of CBDS based on

Table 1
Patient gender, comorbid conditions and clinical presentation.

Parameter	No. (%)
Gender	
Female	43 (55%)
Male	35 (45%)
Comorbidities	
Hypertension	8 (10%)
Diabetes mellitus	11 (14%)
COPD	2 (2.6%)
Overall comorbidity	15 (27%)
Presenting complaints	
Abdominal pain	70 (90%)
Jaundice	30 (38%)
Cholangitis	12 (15%)
Pancreatitis	6 (8%)
Cholecystitis	23 (30%)

Table 2
Reasons for failed endoscopic stone extraction.

Reasons	No. (%)
Stones greater than 1.5 cm in diameter	25 (32%)
Impacted stones	11 (14%)
Remaining stones after multiple endoscopic attempts	22 (28%)
Multiple stones combining dilated bile duct (diameter > 1.5 cm)	15 (19%)
Tortuous ducts	5 (6%)

the choledochoscope (Olympus, Tokyo, Japan). A Dormia retrieval basket was used in conjunction with the choledochoscope to clear the stones located. After all stones were extracted and clearance of the CBD was confirmed with choledochoscopy, common bile duct was closed using 4/0 vicryl with interrupted sutures. A nonsuction drain was placed in the gallbladder bed. It was removed when the drainage was less than 20 ml. No common bile duct drain was routinely used in all the CBD exploration patients. After LCBDE, the patients continued the course of antibiotics therapy. We stopped antibiotics on the second day after removal of the drain.

3. Results

The age of the patients ranged from 43 to 90 years (mean 65 years) and 43 of them were women. The patients with acute pancreatitis, cholangitis and jaundice were treated before the endoscopic operation correspondingly. 72 cases were underwent laparoscopic operation, and 6 cases was converted to an open operation due to impacted stones. Procedures included laparoscopic or open cholecystectomy, laparoscopic or open common bile duct exploration and primary duct closure at choledochotomy. The mean operative time was 145 min (range, 100–260 min), the mean postoperative hospital stay was 6 d (rang, 3–11 d) and mean time of nonsuction drainage was 5 d (rang, 2–9 d). The number of removed stones ranged from 1 to 8 and the diameter of the stones ranged from 1 to 3.0 cm. The nonsuction drain was removed when the drainage was less than 20 ml. There were no complications due to trocar placement. There were no mortality, postoperative bleeding, biliary peritonitis, biliary fistula, pancreatitis in any of the 78 cases. 13 cases had slight bile leaks (drainage less than 150 ml/day), among which 12 cases happened in the patients with laparoscopic operation. Bile leaks resolved spontaneously with the drain in position.

4. Follow-up

Postoperative ultrasonography was performed in the patient every 3 months. No patients experienced pancreatitis, or retained or recurrent stones anastomotic stricture and cholangitis during a mean follow-up period of 18 month.

5. Discussion

Common bile duct stones are commonly managed by ERCP/EST, followed by laparoscopic cholecystectomy in the past 20 years. ERCP/EST followed by stone extraction with a basket or balloon catheter represents standard endoscopic therapy for CBDS. Beyond any reasonable doubt, the process is an important preoperative adjunct in lots of patients with choledocholithiasis, especially for those patients with retained stones [6,7]. Successful endoscopic treatment is possible in most of patients and in experienced hands duct clearance can be achieved in over 90% [8–10], though more than 25% of the patients requires two or more ERCPs [8,11].

Previous operations, cholangitis, anatomic abnormalities, stone impaction, diameter of common bile duct and size of stones were

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