



ORIGINAL ARTICLE / *Interventional imaging*

Percutaneous management of residual bile duct stones through T-tube tract after cholecystectomy: A retrospective analysis of 89 patients

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KEYWORDS

Biliary calculi;
Common bile duct;
Cholecystectomy;
Stone extraction;
Percutaneous
procedure

Abstract

Purpose: The purpose of this study was to analyze the outcome of percutaneous management of residual common bile duct (CBD) stones in patients with surgically inserted T-tube in CBD after cholecystectomy.

Material and methods: Between April 2001 and August 2015, 89 patients (52 women, 37 men) with a mean age of 55.7 years \pm 18 (SD) (range, 22–88 years) underwent percutaneous sphincteroplasty and stone expulsion into the duodenum with a Fogarty balloon catheter through the T-tube tract for residual CBD stones. All patients had previously undergone open cholecystectomy with CBD exploration and T-tube insertion 7 to 60 days (mean, 14.4 days) before the procedure. Results of the procedure and complications were evaluated by a review of clinical notes, imaging and laboratory findings.

Results: The procedure was successful in 87/89 patients (97.7%). Complete CBD clearance was achieved in a first session in 86 patients (96.6%). One patient (1.1%) needed a second session. The procedure was unsuccessful in 2 patients (2.2%) due to inappropriate position of T-tube and stone impaction into the cystic duct remnant. Two complications (2.2%) including intra-abdominal bile collection and distal CBD stricture were observed after the procedure.

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Conclusion: Percutaneous CBD expulsion into the duodenum through the T-tube tract is a non-traumatic, effective and safe method for the treatment of residual CBD stones in patients who had cholecystectomy and T-tube insertion.

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Biliary lithiasis is a common problem in Eastern and Western countries. It affects 20% of the general population. Gallbladder stones are associated with common bile duct (CBD) stones in 15–20% of cases [1,2]. Although there is no consensus on the treatment of cholelithiasis with concomitant CBD stones, open surgery, laparoscopic surgery, and various endoscopic-laparoscopic protocols are available [2–5]. Open surgery is still preferred in selected cases in some institutions for the treatment of concomitant cholelithiasis and choledocholithiasis.

T-tube drainage is commonly performed after cholecystectomy and it provides biliary system decompression, opportunity for control cholangiography, and prevention of bile leak after surgery [1,3–7]. Residual bile duct stones after cholecystectomy are found in 2–5% of patients. Surgical or variety of non-surgical methods including endoscopic procedures and percutaneous techniques are available for management of residual CBD stones [5,8–22]. Most of bile ducts calculi can be treated by endoscopic techniques [11–16]. However, percutaneous treatment is a viable alternative, when endoscopic removal fails or when T-tube in place.

The purpose of this study was to analyze the outcome of the percutaneous management of residual CBD stones in patients with surgically inserted T-tube in CBD after cholecystectomy.

Materials and methods

Patients

Between April 2001 and August 2015, 89 patients were retrieved from the archives of our interventional radiology suite. There were 52 women and 37 men, with a mean age of 55.7 ± 18 (SD) years (age range, 22–88 years). All patients underwent percutaneous stone expulsion into the duodenum through the T-tube tract for residual CBD stones. The clinical files of all patients were analyzed for age, gender, length of postsurgical period, the size, number and location of the stones, and complications of the procedure. All patients in this study had undergone open cholecystectomy and CBD exploration with a T-tube insertion between 7 and 60 days (mean, 14.4 days) earlier. The diagnosis of residual CBD stones was achieved by T-tube cholangiography based on laboratory/clinical suspicion of the residual stone: 52/89 patients (58.4%) had a single stone (4–18 mm in size), 32/89 patients (36%) had 2 to 5 stones (4–15 mm in size), and 5/89 patients (5.6%) had 6 to 10 stones (4–8 mm in size).

Stones were located at proximal to the T-tube in 12/89 patients (13.5%), distal to T-tube in 69/89 patients (77.5%), and concomitant distal and proximal to the T-tube in 8/89 patients (9%). Concomitant CBD and cystic duct remnant stones were present in 3/89 patients (3.3%).

CBD extraction

All patients were monitored continuously during the procedure. Under standard sterile condition, initially, a T-tube cholangiography by using a nonionic contrast media (Iopromide, Ultravist 370[®], Schering, Berlin, Germany) was obtained to evaluate the size, number and location of the stones. Then, a 0.035-inch J-tipped guide-wire (Naklet Medical Company, Ankara, Turkey) was inserted into the duodenum, and a second identical guide-wire was also placed in the intrahepatic branches through the T-tube. The second guide-wire served as a safety wire, and was left in place during the procedure. T-tube was then removed over the guide-wires, and an 8-French (F), 21–23 cm long vascular sheath (Super Arrow-Flex sheath, Teleflex Medical Company, Athlone, Ireland) was advanced over the duodenal guide-wire. An angiographic balloon dilatation catheter (XXL, Boston Scientific/Medi-tech, Marlborough, MA, USA or OptiMed Medical Instruments GmbH, Ettlingen, Germany) was placed across the sphincter over the duodenal guide-wire. The balloon size was selected according to the transverse diameter of the largest stone, and ranged between 8–15 mm in diameter, and 4–6 cm in length. Sphincteroplasty was carried out until the waist disappears for 30 s. All stones were pushed into the duodenum with an over the wire Fogarty balloon catheter (Dispomedica, Hamburg, Germany) supported by the sheath (Fig. 1). The stones higher up the CBD above the T-tube entry site were managed by retrograde saline flushing performed through a vascular catheter inserted over the guide-wire past the stone, or via a small Fogarty balloon catheter passed beyond the stone, which was pulled down after inflating the balloon catheter to the size of the duct. In patients with concomitant CBD and cystic duct remnant stones, for removal of the cystic duct remnant stones, Fogarty balloon catheter was moved in the common hepatic duct adjunct to the cystic duct stump, stones were moved, and then pushed into the duodenum. After the procedure, an 8 F external biliary drainage catheter (Flexima, Boston Scientific, Marlborough, MA, USA) was placed into the common hepatic duct to decompress the biliary tree. In all patients, a cholangiography through the drainage catheter was obtained 2 to 5 days (mean 2.9 days)

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