

## Is a T-Tube Essential after Common Bile Duct Exploration

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Despite advancements in gallbladder surgery with introduction of endoscopic and laparoscopic techniques, many surgeons, especially in the developing world, still perform open cholecystectomy with common bile duct (CBD) exploration for choledocholithiasis. The purpose of this study is to show outcome patients of primary closure of common bile duct after open choledocholithotomy. It is a prospective study of 160 cases of them 120 female and 40 male. Study period was five years from January 2010 to December 2014. All operative procedure done by first author at three private institute such as Islamia General Hospital, Al Raji Clinic, Ideal Nursing Home in Mymensingh town and one government institute - Surgery Unit-2, Mymensingh Medical College Hospital, Bangladesh. Preoperative investigations, peroperative findings, surgical techniques and postoperative outcomes were recorded. Out of 160 patients 40 (25.0 %) were males and 120 (75.0%) were females with M:F ratio 1:3 and mean age 48.38 years, median age 48.00 years and SD 12.060. Seventy six percent patients were found to be in the age group 35-50 years among total range of age 24-71 years. Bile leakage was 5.63% who were treated conservatively. Mean duration of hospital stay was 4.95 days. Minimum risk of bile leakage, less duration of hospital stay and less postoperative complications in cases of primary closure of common bile duct after choledocholithotomy, in a limited resource setting, there is still a role for open common bile duct exploration and primary closure without the necessity of T-tubes and stents as evidenced by good perioperative patient outcome.

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**Key words:** Choledocholithiasis, open surgery, primary closure, T-tube.

### Introduction

Gallstone disease occurs in three to twenty percent of the world population and about 15% of people with gallstone disease develop stones in the common bile duct (CBD)<sup>1</sup> (Fig.1). Duct stones may occur many years after cholecystectomy or be related to the development of new pathology, infection in biliary tree or infestation with *Ascaris lumbricoides* in Bangladesh. Any obstruction to the flow of bile can give rise to stasis with

the formation of stones within the duct.<sup>1,2</sup> The patients may be asymptomatic but usually presented with pain, jaundice and fever. The patient is ill looking and feels unwell. There may be tenderness in the epigastrium and right hypochondrium. Most of the patients found jaundiced and anaemic. The goal of treatment is to relieve the obstruction and necessitates surgical intervention. In cases of cholelithiasis and choledocholithiasis (smaller stones) combined laparoscopic cholecystectomy and endoscopic retrograde

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cholangio-pancreatography (ERCP) is suggested and surgery for larger stone or when ERCP fails. Surgery for common bile duct stones is choledocholithotomy may be either open or laparoscopic.

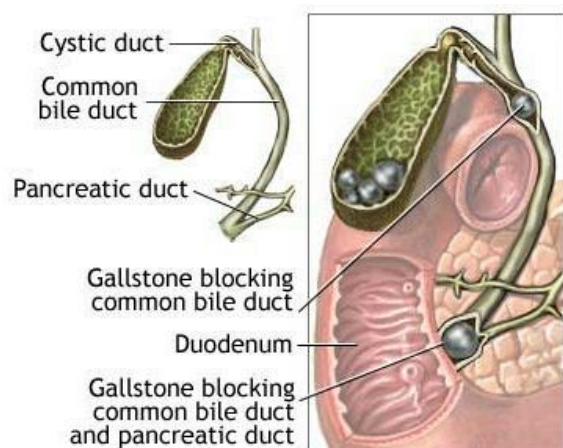


Fig.1. Cholelithiasis and choledocholithiasis (both proximal and distal common bile duct)

After CBD exploration, stones are removed; the choice lies between primary duct closure and T-tube drainage.<sup>3</sup> Primary closure is the procedure of choice following exploration of common bile duct. In 1917, Halstead first reported primary closure of common bile duct, draining the biliary tree through the cystic duct remnant.<sup>8</sup> The purpose of using T-tube drainage after open common bile duct exploration are post-operative drainage of the bile duct to reduce oedema and intraluminal pressure of common bile duct to visualize and extract retained bile duct stones.<sup>4</sup> Insertion of a T-tube increases postoperative morbidity, psychological trauma, prolonged hospital stay, increases bed occupancy, hospital patient load and thus economic burden. Although it was thought that T-tube has definitive role after CBD clearance, some authors found no significant difference in the morbidity or mortality between primary closure and T-tube drainage,<sup>3,5</sup> others found higher morbidity in terms of biliary infection,

discomfort from tube, delayed hospital discharge.<sup>6,7</sup>

Objectives of the study was to establish removal of primary common bile duct stone and primary closure common bile duct with a drain tube in right sub-hepatic region is safe for patients and better option for surgeons CBD closure without T-tube drainage.

### Methods

This was a five years study conducted from January 2010 to December 2014 at three private institute such as Islamia General Hospital, Al Raji Clinic, Ideal Nursing Home, of Mymensingh and Surgery unit-2, Department of surgery of Mymensingh Medical college Hospital, Bangladesh. A total 160 patients were explored for common bile duct stones with baseline investigations which includes blood for TC, DC, Hb%, ESR; Chest X-Ray P/A view, ECG, Serum bilirubin, HBS Ag test, Prothrombin time, Serum creatinine, Blood Grouping and Rh typing, Ultrasonography of whole abdomen special attention to Hepatobiliary system (Diameter common bile duct, number and location duct stones). Patients with malignancy, renal failure, recurrent common bile duct stone and other severe co-morbidities were excluded from this study.

All patients operated under general anaesthesia and abdomen open through upper right paramedian incision. Cholecystectomy was done in every case. Common bile duct and pancreas were palpated. Optimal duodenal mobilization done. Supraduodenal portion of common bile duct identified and confirmed. Common bile duct opened longitudinally between stay sutures (Fig.2). Some floating stones emerge with the first rush of bile in multiple choledocholithiasis and those retrieved. A gentle attempt was made to milk any palpable stones towards the choledochotomy incision, from where they

were removed using gallstone forceps (e.g. Desjardin's forceps). Common bile duct flashed with normal saline. Plain rubber catheter and rigid bougies of optimal sizes were used both proximal common bile duct, right and left hepatic ducts; distal CBD clearance. This procedure was done repeatedly until satisfactory clearance. Common bile duct closed by interrupted suture with 3/0 chromic catgut. Abdomen was closed by layers with a drain tube placed in subhepatic area. All patients were closely monitored postoperatively about biliary leakage, peritonitis, urine output, jaundice as well as wound sepsis. Patients were discharged from hospitals on fourth or fifth postoperative day with the previously placed drain tube and with the advice of come back after tenth postoperative day, Wound and drain were checked in next visit. All stitches and drain tube were removed.



Fig.2. Choledochotomy The supra-duodenal common bile duct is exposed and opened longitudinally between stay suture.

## Results

Out of 160 patients 40 (25.0%) were males and 120 (75.0%) were females and, mean age 48.38 years, median age 48.00 years, SD 12.060. Male female ratio 1:3. Seventy six percent of patients were found to be in the age group 35-50 years among total range of age 24-71 years. In all patients cholecystectomy was done along with common bile duct exploration. In all cases common bile duct were closed primarily with absorbable suture without T-tube and drain tube was placed in every patients.

Complication like biliary leakage was seen in 9 patients with primary closure which were managed only by keeping previously placed subhepatic drain for further few days. As many as 10 patients developed wound infection and managed by regular dressing and secondary repair of wound, five patients developed urinary tract infection, and 3 patients developed respiratory tract infection, and managed accordingly. Three patients found retained stone within common bile duct and send for ERCP stone extraction in more specialized center at Dhaka, Bangladesh. No patient was expired in this study. No patient was reopened for any reason.

Table I: Operative findings (n=160)

Common bile contents-	Number of patients (percentage)
Multiple calculi	110 (68.75 %)
Single stone	30 (18.75%)
Sludge with granular materials	15 (9.375%)
No calculus	5 (3.125 %)
Common bile duct diameter	
<1.2 cm	60 (37.5 %)
>1.2 cm	100 (62.5 %)

Table II: Postoperative complications (n= 160)

Complications	Number of patients	Frequency
Wound infection	10	6.25 %
Prolonged (>72 hours) bile leakage	9	5.625%
Respiratory tract infection	5	3.125%
Urinary tract infection	3	1.875%
Retained stone	3	1.875%
Renal function impairment	2	1.25%
Subphrenic abscess	0	0.00%
Total	32	20.00%

### Discussion

Primary closure of common bile duct following choledochotomy is a well known surgical procedure. Postoperative cholangiography for detection of retained calculi is not possible after primary closure and this is considered as a disadvantage. Primary closure is safe, less expensive, fewer postoperative complications, and shorter hospital stay compared choledochorrhaphy using T- tube drainage of bile duct. To accomplish a safe primary choledochorrhaphy, four strict criteria stressed by Mayo in 1923, Mirizzi in 1942 and Edwards in 1952, must be met. These four requirements for a safe and successful primary closure of common bile duct are patent Vater's ampulla, complete removal of all intraductal calculi, absence of pancreatic pathology and meticulous suture of the duct. In order to complete these criteria, most authors routinely use intraoperative cholangiography and choledochoscopy, but in this study there was no such type of facilities. We depend on repeated palpation of common bile duct, repeated washout with normal saline and frequent patency test by bougies and plain rubber catheter of optimal sizes. Before primary closure of common bile duct we completely satisfied about duct clearance to avoid complications like retained calculi, biliary leakage and peritonitis, low morbidity

and mortality and obtain excellent long term results. Although recently, laparoscopic cholecystectomy and common bile duct exploration as well as endoscopic sphincterotomy and removal of stone became popular, but our setting open cholecystectomy followed by exploration of common bile duct and primary closure is considered more attractive in terms of cost-effectiveness. Endoscopic sphincterotomy represents the gold standard in treating patients with retained or recurrent calculi after cholecystectomy with or without common bile duct exploration and patients with toxic cholangitis or acute calculous pancreatitis.

### Conclusion

Primary closure of common bile duct do not increase the risk of bile leakage after the operation. Postoperative hospital stay is shorter and hospital expenses were lower. Additionally, with primary closure could definitely avoid T-tube related complications. Therefore, conclude that primary closure of common bile duct without external drainage after choledochotomy is feasible, safe, and cost-effective alternative to to endoscopic or laparoscopic removal of intraductal calculi. We can therefore safely suggest primary closure of common bile duct without the use of T-tube after verification of ductal clearance in hospitals lacking the required experience or equipment to perform to endoscopic sphincterotomy or laparoscopic exploration of common bile duct. T-tube is not essential after common bile duct exploration.

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