

# The Clinical Spectrum of Choledocholithiasis with Special Reference to Different Surgical Management

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## ABSTRACT

**Background:** Gallstone diseases are one of the most common biliary pathology. Prevalence of gallstone is 10-14% in adult population of eastern world. About 3-14.7% of cholelithiasis may be associated with common bile duct stones.

The aim of this study is to study the clinical spectrum of choledocholithiasis and to study the various surgical methods available of the disease. This study also aims primarily to compare t tube closure of CBD with primary closure of CBD in terms of complication and hospital stay.

**Materials and Methods:** This is a retrospective study carried out in the department of surgery of Guwahati medical college. This study includes 110 patients who underwent various types of surgeries for choledochotomy. Stones in the CBD were detected on the basis of preoperative USG and MRCP.

**Results:** The mean age of patients was 46.37±10.7 years and pain was the most common presenting symptom. Pain abdomen was present in 72 patients at the time of diagnosis. Jaundice was present in 42 patients where as fever was present in 30 patients. Open choledochotomy with t tube closure was done in majority of patients. Out of 110 patients 17 patients had developed various complications. Mean hospital stay of patients underwent surgery for choledochotomy is found to be 8.69 days. Mean hospital stay in primary closure is 5.86 days as compare to 10.16 days in t tube closure

**Conclusions:** MRCP is more sensitive than USG and there is no significant difference between primary closure and T tube closure in terms of complication but primary closure is way better than t tube closure in terms of hospital stay.

**Key words:** Gallstone diseases, choledocholithiasis, gallstone, surgical management, choledochotomy.

## BACKGROUND

Gallstone diseases are one of the most common biliary pathology. Prevalence of gallstone is 10-14% in adult population of eastern world. About 3-14.7% patients of cholelithiasis may be associated with common bile duct stones. <sup>(1)</sup> The vast majority of ductal stones is formed within the gallbladder and migrates down the cystic duct to the common bile duct. These are classified as secondary common bile duct stones, in contrast to the primary stones that form in the bile ducts. <sup>[2]</sup> The gallbladder stones are concomitantly found in 67% of

CBD stone cases, whereas the prevalence of CBD stone in gallbladder stone cases is 15%. <sup>(1)</sup> Women are three times more likely to have gallstone disease as compare to men. <sup>(2)</sup> Most of the patient of choledocholithiasis presented with pain as a presenting complains. Jaundice is the second most important presenting complains among the patients. A very small number of patients may be present with complications of obstructive biliary pathology like cholangitis and biliary pancreatitis. Liver function test is used to screen for common bile duct stones. <sup>(3,4)</sup> Elevated serum

bilirubin and alkaline phosphatase typically reflect biliary obstruction but these are neither sensitive nor specific for CBD stones. <sup>(5)</sup> Common bile duct stones may be diagnosed preoperatively by ultrasonography MRCP ERCP in different situations.

Many modes of surgical treatment of CBD stones has been developed but best treatment for CBD stones has yet to be established. The factors that determine the optimal approach include variables such as disease status, patient demographics, availability of endoscopic radiological and surgical expertise and health care economics. Type of surgical procedure is also depends on the diameter of CBD, number and size of stones in the CBD and anatomical characterization. The prime modalities of treatment of common bile duct stones are ERCP extraction, laparoscopic or open surgical duct clearance. When endoscopic technique failed or not feasible for the patient choledochotomy is the best mode of treatment either by open approach or laparoscopically. The controversy lies in here how to suture the CBD, T tube closure has been widely used but recently primary closure has become increasingly popular as a main option. <sup>(6)</sup>

This study aims to study the clinical spectrum of CBD stone with various methods of surgical treatment primarily t tube closure and primary closure of CBD in terms of complication and hospital stay.

## **MATERIALS AND METHODS**

This was a prospective study conducted in the department of surgery of Guwahati medical college and hospital from July 2017 to June 2018. The study was approved by hospital ethics committee.

Present study included 110 patients who were subjected to surgical treatment of choledocholithiasis and the patients who underwent endoscopic extraction of stones were excluded. Before the procedure fully informed consent were taken. The patients were diagnosed on the basis of presenting symptom of pain in the right

hypochondrium, jaundice and fever. All the patients underwent various biochemical tests like LFT, total leucocyte count, prothrombin time and INR. Ultrasonographic findings like presence of CBD stone, dilated CBD and IHBR were taken into account. All the patients underwent MRCP for the confirmation of the diagnosis and for the anatomical evaluation of CBD before operation.

Patients excluded from the study were those who underwent non surgical methods of CBD stones like ERCP, patients with comorbid conditions like hepatic and renal failure and bleeding disorders.

### **Surgical procedure:**

All the surgeries were done by consultant and under general anesthesia. Open choledochotomy with primary closure or with t tube insertion is done. Some of the patients underwent choledochoduodenostomy and choledochojejunostomy on the basis of number of stones and diameter of CBD. In open choledochotomy the anterior aspect of the CBD is exposed and the two stay sutures by 3-0 catgut are placed on either side of the midpoint of the planned longitudinal incision. Common bile duct, right and left hepatic duct are explored using Desjardin forceps and calculi removed. After removal of stones two options are available first is primary closure and second is closure over t tube. Primary closure was done by 4-0/3-0tube is inserted into CBD. T tube is fixed by using 3-0 absorbable suture at the end. All the patients of lap choledochotomy have undergone primary closure of the CBD.

**Statistical Analysis:** All data were entered into the database and were analysed by means of statistical package of social science (SPSS) software using appropriate statistical tests like Fischer's exact test or unpaired t test as and when needed. A P value of less than 0.05 was considered significant.

## **RESULTS**

### **Patients' demographics**

The study comprised 110 patients. Age distribution in the present study was found to be from 19 yrs to 73 yrs .the mean age of patients was 46.37±10.7 years out of 110 patients, 73 patients were female and 37 patients were male the ratio of male: female was 1: 1.97.

symptoms	Number of patients	Percentage
Asymptomatic	23	20.09%
Pain	72	65.45%
Fever	30	27.27%
Jaundice	42	38.18%
Cholangitis	13	11.81%
Pancreatitis	06	5.45%

**Table 01: frequency and percentage of patients according to the symptoms**

Laboratory findings	Normal	Abnormal
Total bilirubin	68	42
Alkaline phosphatase	10	110
Creatine	104	06
Prothombin time	108	02
Total leucocyte count	91	19

**Table 2: laboratory findings in patients**

### Clinical profile and laboratory investigation of patients.

Pain abdomen was present in 72 patients at the time of diagnosis. Jaundice was present in 42 patients where as fever was present in 30 patients .out of 110 patients 19 patients were presented with complications obstructive billiopathy, 13 patients had symptoms of cholangitis whereas 06 patients had symptoms of biliary pancreatitis. Percentage distribution of presenting symptoms among the patients is shown in table 1. Routine blood

investigation and ultrasonography finding are shown in table 2 and table 3 respectively.

**Radiological findings:** ultrasonography finding of the patient is shown in table 3. Out of 110 patients 101 had CBD stones in their USG, remaining 9 patients showed other signs of CBD stones like dilated CBD and dilated intrahepatic biliary radical in their usg. All 110 patients were undergone MRCP for the confirmation of diagnosis. MRCP findings are shown in table no 4

USG Findings	Number of patients	percentage
gb sludge/stones	84	76.36%
Absence Of Gb Stone	3	2.72%
Post Cholecystectomy Status	23	20.90%
Dilated IHBR	74	67.20%
Dilated CBD	99	90.00%
CBD Stones/Sludge	101	91.81%

**Table 03 :USG Findings**

MRCP Finding	Number Of Patients	Percentage (%)
Gall-Bladder Stone	84	76.36
Post-Cholecystectomy	23	20.90
Absence Of Gb Stone	3	2.72
Dilated CBD (>6 mm)	110	100
Stone In CBD	110	100
Hepatic Duct Stone	5	4.54

**Table 4 : MRCP Findings**

**Operative procedure:** as shown in table no 5 most of the patient have undergone open choledochotomy with t tube closure. Frequency and percentage of patient on the basis of type of surgery is shown in table no 5 .

Types Of Surgery	Number Of Patients	Percentage (%)
Open cholecystectomy + choledocholithotomy with t-tube	64	58.18%
Open cholecystectomy + choledocholithotomy with primary closure	13	11.81%
Open choledocholithotomy with t-tube	14	12.72%
Choledochoduodenostomy	12	10.90%
Lap cholecystectomy + choledocholithotomy with primary closure	5	4.54%
Choledochojejunostomy	2	1.81%

**Table 5 frequency and percentage of patients according to type of surgery**

**Post operative complications:** frequency and percentage of patients on the basis of post operative complications is shown in table no 6. On comparing the post op complications between t tube insertion and primary closure after choledochotomy is found to be insignificant as shown in table no 7.

Complications	Number Of Patients	Percentage (%)
SSI	4	3.63
Bile Leak	5	4.54
LRTI	3	2.72
Retained Stone	3	2.72
Hemorrhage	1	0.9
Cholangitis	1	0.9
Overall Morbidity	17	15.56

**Table 6 : frequency and percentage of patient according to the complications**

COMPLICATION	Primary closure	T tube insertion	Two tailed p value
Bile leak	1	3	1.00(ns)
Retained stone	0	3	0.97(ns)
SSI	1	2	0.532(ns)
cholangitis	0	1	1.00(ns)
LRTI	0	2	1.00(ns)
total	2	12	0.72(ns)

**Table 7: comparison of complications between t tube and primary closure of CBD**

**Hospital stay:** Mean hospital stay of patients underwent surgery for choledochotomy is found to be 8.69 days as

shown in table no 8. On comparing the hospital stay in patients of t tube closure and primary closure was found to be statistically significant as shown in table no8

Duration of hospital stay(days)	Number of patients	Percentage
UPTO 8	33	30
9-14	69	62.72%
15-20	7	6.36%
>21	1	0.9%
Mean = 8.69±3.23		

**Table 08 : duration of hospital stay**

Hospital Stay	Primary Closure	T Tube Closure	Two tailed P VALUE	Significance
Average days	5.86±4.00	10.16±2.22	0.0001	Extremely significant

**Table 09 : comparison of hospital stay between primary closure and t tube closure**

## DISCUSSION

Choledocholithiasis is most important complication of cholelithiasis that appears during the natural entity of this disease. In the present study mean age of presentation was 46.37± 10.07 which is similar to the study done in the past by Kaufman et al <sup>(7)</sup> in 1989 (55 years ±7 years). Male to female ratio found out to be 1: 1.97 similar to study done in the past by Barkun <sup>(8)</sup> et al in 1994 (1:2.1). Pain abdomen (65.45%) was the most common presenting symptom in the present study followed by jaundice (38.18%) and fever (27.27%). Very less number of patients presented with complication of choledocholithiasis that is cholangitis (11.81%) and pancreatitis (5.45%). The presenting symptoms of our study is similar to the studies of Prat et al <sup>(9)</sup> and Tozatii et al. <sup>(10)</sup>

Ultrasound was used as first investigation in all the patients suspecting of choledocholithiasis on the basis of laboratory findings. 90% of the patients have biliary dilatation in the USG. The sensitivity of ultrasonography for detecting biliary dilatation as reported in various studies varies from 55 to 91%. <sup>(11)</sup> MRCP was used for the confirmation of diagnosis in all the patients. In the present study accuracy of MRCP found out to be 100%. Most of the large studies have reported that MRCP has sensitivity ranged from 81-100%

and accuracy ranged from 89 -100% for the diagnosis of choledocholithiasis. <sup>(12,13)</sup>

In the present study type of surgery has been selected on the basis of number, size of CBD stones and diameter of the CBD. Majority of the patients have undergone open choledocholithotomy either with t tube drainage (58.18%) or by primary closure (11.81%) of the CBD. Choledochoduodostomy was done due to multiple stones with dilated CBD and impacted stone in duodenal papilla in 10.90% patients. LCBDE with primary closure was done in 4.54% patients. Post operative morbidity in the present study is 15.56% which is similar to the study done in the past by J.P. Neptolemos <sup>(14)</sup> (25.5%). There is no statistical difference in t tube drainage (15.38%) and primary closure (11.4%) of CBD after choledochotomy in terms of complication. The p value found out to be more than 0.05. The results of present study is in agreement with the studies of Zhang et al <sup>(15)</sup> and Gurusamy et al. <sup>(16)</sup>

The mean hospital stay duration in the present study is 8.69± 3.23 days. The difference of hospital stay in between primary closure (5.84± 4.00 days) and t tube drainage (10.16± 2.22 days) find out to be statistically significant with p value of 0.001 however hospital stay in Zhanget al (P= 5.1 days, T tube = 8.4 days) and Gurusamy et al (Primary = 9.12 days, t tube = 13.84 days)

have been recorded which is in agreement with our study.

There was no mortality in our series as compared to Mc sherry (1989)-0.6-4% [17] and Girard et al (2000) 0.3-1.6%. However no mortality in open CBD exploration (Pappas et al, 1990) [18] and endoscopic (Shival, 1989), [19] laparoscopic CBD exploration (Petelin, 1993) [20] have been recorded which is in agreement with our study.

## CONCLUSION

1. Choledocholithiasis is more common in middle aged patients
2. CBD stones are more common in females as compare to males
3. MRCP is more accurate than ultrasonography for the detection of CBD stones.
4. No significant difference in primary closure and t tube drainage in terms of complication
5. Primary closure is way better than t tube drainage in terms of hospital stay, morbidity and complication in selected cases.
6. Laparoscopic procedure is though established procedure in terms of CBD exploration but it is not gaining much more popularity.
7. ERCP extraction of CBD stones is reserved for selected patients.
8. Choledochoduodenostomy is a good operation in dilated CBD and selected patients.
9. Choledochojejunostomy is also an alternate operation of CBD stone in selected patients.

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