

# A Study of Clinical Outcome in 30 Patients of Common Bile Duct Stone

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## ABSTRACT

**Introduction:** Management of common bile duct stones (CBDS) presents a surgical challenge since it is the major cause of hepatobiliary morbidity and complications. The aim of the study was to evaluate the clinical outcome for CBD stone and evaluate the treatment modality.

**Material and Methods:** This retrospective study was done in 30 cases of Common bile duct stone for period of 1 year. All 30 patients included in the study were appropriately investigated by laboratory investigations, USG, CT scan and MRCP.

**Results:** Out of 30 patients included in the study, 26 had undergone successful ERCP and had successful clearance of CBD which were followed by Laparoscopic cholecystectomy. 2 patients had failed ERCP clearance, out of which 1 patient had undergone re-ERCP with successful clearance of the stone. The other 1 patient had to undergo Open CBD exploration followed by cholecystectomy. 2 patients with CBD stone greater than 2 cm had to undergo direct CBD exploration without undergoing ERCP

**Conclusion:** Appropriate identification of CBD stone size, location, number and CBD diameter associated with features of cholangitis, jaundice and pancreatitis is essential. It is a complicated procedure requiring a step-wise strategic approach. The gold standard for the removal of CBD stone is ERCP followed by laparoscopic cholecystectomy. Common bile duct exploration is considered in patients with failed clearance of CBD following ERCP OR CBD stone size > 2cm.

**Keywords:** ERCP, CBD stone Outcome, gb Stone, Obstructive Jaundice

## INTRODUCTION

Common bile duct stones are one of the medical conditions leading to surgical intervention. They may occur in 3%–14.7% of all patients for whom cholecystectomies are performed. There are multiple approaches for diagnosing Common Bile Duct Stone with regard to diagnostic performance characteristics, technical success, safety, and cost effectiveness. One of the main factors in the management is initially the detection of Common Bile Duct Stone, before, during, or after cholecystectomy. The main options for treatment are pre- or postoperative ERCP with endoscopic biliary sphincterotomy (EST), laparoscopic or open surgical bile duct clearance. There are other options for the treatment of Common Bile Duct Stone such as electrohydraulic lithotripsy (EHL), extracorporeal shockwave lithotripsy (ESWL), dissolving solutions, and laser lithotripsy. It is unlikely that one option will be appropriate for all clinical circumstances in all centers. Variables such as disease status, patient demographics, availability of endoscopic,

radiological and surgical expertise, and healthcare economics will all have significant influence on practice.

Gallstone disease is responsible for about 1.8 million ambulatory care visits and more than 700 000 cholecystectomies yearly.<sup>1</sup> Gallstone disease is the second most common reason for hospital admissions (with an estimated cost of US\$5.8 billion annually), although only 15% of people with gallstones have related symptoms.<sup>2</sup> Choledocholithiasis (stones in common bile duct) is one of the complications of cholelithiasis (gallstones). Stones in the common bile duct most commonly result from the passage of gallstones through the cystic duct into the common bile duct<sup>3</sup>. Less frequently, they may originate in the common bile duct itself. More than 1 in 10 patients (10%–18%) undergoing cholecystectomy for gallstones have concomitant common bile duct stones and up to 3.8% have symptoms related to common bile duct stones during the first year after cholecystectomy.<sup>4</sup>

Complications of common bile duct stone include<sup>5</sup>

- Obstructive jaundice
- Acute cholecystitis
- Acute Pancreatitis
- *Gallstone Ileus*
- Primary Sclerosing Cholangitis
- Biliary cirrhosis

Thus, the management of common bile duct becomes very crucial to prevent further complications. The management of patients with gallstone disease suspected of having stones in the common bile duct has three aims.<sup>6</sup>

- To evaluate the probability of stones in the common bile duct,
- To treat these stones when present, and
- To treat the stones in the gallbladder.

Study aimed to record various methods for detection of common bile duct stone, to study various sequale and local complications of choledocholithiasis and to compare the clinical outcomes of various treatment modalities for

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choledocholithiasis including pre-operative ERCP followed by cholecystectomy, post-operative ERCP following cholecystectomy and conservative management.

## MATERIAL AND METHODS

Retrospective Study was done in Department of General Surgery in a large teaching public health hospital for a period of one year on 30 Cases

### Inclusion criteria

- Patient presenting with
  1. Right upper quadrant pain
  2. Complain of Nausea and vomiting after fatty meal
- Patients who give informed consent

### Exclusion criteria

As such there is no exclusion criteria but in patients

- Those who do not give consent
- Patients with uncorrected coagulopathies.
- Are excluded from the study.

### Method

All the patients fulfilling the inclusion criteria were admitted. A detailed history of the symptoms like Right upper quadrant pain

1. Complain of
  - Jaundice
  - Fever
  - Right upper quadrant pain will be resorted to Ultrasonography (B Mode) for detecting Bile duct stones and gallstones.
  - Collection of blood for biochemical investigation was done for estimating: haemoglobin, total and differential counts, serum bilirubin, SGPT, Alkaline phosphatases, serum blood urea nitrogen, serum total proteins, serum creatinine, coagulation profile.
  - X-Ray chest and abdomen, will be done in all cases and findings will be noted.
  - Transabdominal ultrasonography will be done
  - MRCP (Magnetic retrograde cholangio pancreatography)
  - CECT Abdomen will be done to look for the common bile duct pathology.

A retrospective study was undertaken in 30 patients that have been detected with common bile duct calculi by USG or CECT abdomen, in which comparison of the outcome was done for those patients that have undergone pre-operative ERCP followed by Laparoscopic or Open cholecystectomy. These clinical outcomes were compared and conclusion was derived regarding the best treatment modality for common bile duct calculi.

## STATISTICAL ANALYSIS

The study data was analyzed with help of Microsoft Excel (2007) and Epi Info 7 software.

## RESULT

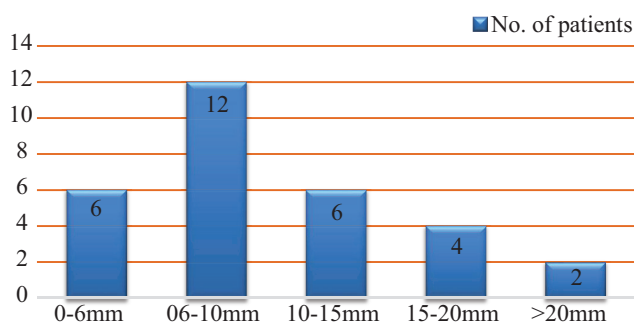
In this study 30 patients had been selected and following observations were made. In this study, out of 30 patients highest number of patients (16) were from age group of 51

CBD Stone size (mm)	No. of patients
0-6	4
6-10	12
10-15	6
15-20	4
>20	2

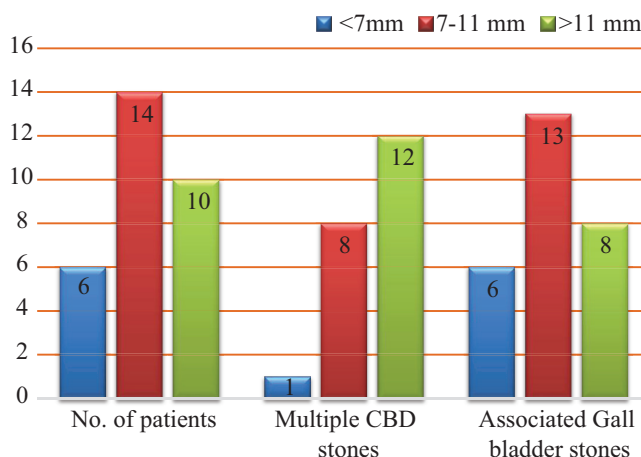
**Table-1:** Ultrasonographic findings regarding size of CBD Stone

Common bile duct diameter	No. of patients	Multiple CBD stones	Associated Gall bladder stones
<7mm	6	1	6
7-11 mm	14	8	13
>11 mm	10	12	8

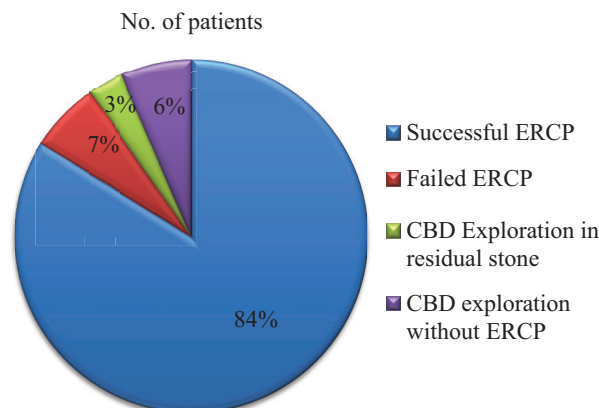
**Table-2:** USG findings regarding Common bile duct diameter



**Graph-1:** Ultrasonographic findings regarding size of CBD Stone



**Graph-2:** USG findings regarding Common bile duct diameter



**Graph-3:** Management of CBD stone

to 60 years. While there were 2 patients from 31-40 years group, 9 from 41-50 years and 3 from age group 61-70 years. Out of 30 patients 14 were male and 16 were females. Out of 30 patients, 21 patients presented with biliary colic that includes pain in right hypochondrium. 17 patients had jaundice which were associated with increased total bilirubin while 9 patients had associated cholangitis. 2 patients presented with features of pancreatitis.

Out of 30 patients, 28 patients had increased total bilirubin ranging from 4.2 to 18.3 mg/dl. Direct bilirubin also increased in 28 patients ranging from 3.8 to 16.9 mg/dl. While alkaline phosphatase increased in 26 patients ranging from 408 IU/L to 836 IU/L. Serum amylase levels increased in only 2 patients with maximum rise of 800 IU/L.

Out of 30 patients, 4 patients had CBD stone less than 6 mm size, 12 patients had CBD stone between 6 to 10 mm, 6 patients had between 10-15 mm, 4 patients between 15-20 mm and 2 patients had > 2 cm size CBD stone. 2 patients could not be detected by sonography and CT scan was done for the confirmation. So. The sensitivity of USG in detecting CBD stone comes out to be 93.33 and specificity about 100% (table-1).

Among the 30 patients, 1 patient with CBD diameter between 7-11 mm and 2 patients with CBD diameter > 11 mm did not have associated gall bladder stones, which arises the possibility of spontaneous passage of GB stone through the dilated Common bile duct (table-2, graph-1).

Out of 30 patients, 26 had successful clearance of CBD which were followed by Laparoscopic cholecystectomy. 2 patients had failed ERCP clearance, out of which 1 patient had undergone re-ERCP with successful clearance of the stone. The other 1 patient had to undergo Open CBD exploration followed by cholecystectomy. 2 patients with CBD stone greater than 2 cm had to undergo direct CBD exploration without undergoing ERCP (graph-2).

While doing MRCP, 6 patients had stone size less than 6 mm, while 12 patients were between 6-10 mm and 12 patients with CBD stone size greater than 10 mm. 25 patients had multiple CBD stone while 5 had single stone in common bile duct (graph-3).

Out of 30 patients included in the study, 3 patients operated by Open CBD exploration had surgical site infection with seroma formation and were treated conservatively. 2 patients had hemorrhage following laparoscopic cholecystectomy probably from cystic artery which were undergone re-Laparoscopy and hemostasis achieved. 1 patient had bile leakage probably from the clip applied to cystic duct and undergone re-Laparoscopy and closed successfully. 1 patient had residual CBD stone that was identified on re-ERCP and removed successfully by ERCP.

## DISCUSSION

The primary goal of treatment in choledocholithiasis is to achieve common bile ductal clearance with the fewest number of interventions, lowest cost and least morbidity. Bile duct stones are found in 7–20% of patients with symptomatic gallstones.<sup>9</sup> Treatment is essential because the presence of

stones in the bile duct is related to severe complications (jaundice, acute pancreatitis or acute cholangitis). Traditional surgical treatment comprises intra-operative cholangiography to detect the presence of bile duct calculi followed by choledocholithotomy and T-tube placement. For many years this procedure offered effective therapy and was associated with a morbidity rate of 10–15%, a mortality rate of <1% (in patients under 65 years) and a retained stone rate below 6%.<sup>9</sup>

This diagnostic and therapeutic approach to bile duct stones has been substantially modified over the last 25 years, along with technological advances in diagnostic imaging and in minimally invasive therapy: endoscopic retrograde cholangiopancreatography (ERCP), endoscopic sphincterotomy (ES), laparoscopic cholecystectomy (LC) and magnetic resonance cholangiography (MRCP). The most common treatment modality for CBD stone is ERCP, with duct cannulation and clearance rates reaching 98% in expert hands. The Surgical options have been limited mainly to larger CBD stones with occasional transcystic or transductal stone removal. The surgical removal of common bile duct stones, whether open or laparoscopic is usually reserved for patients in whom ERCP has failed.

In this study, evaluation was done based on the treatment protocol followed in our institution with the available facilities and along with certain limitations like lack of Cholangiography facility, Endoscopic shockwave lithotripsy and Endoscopic ultrasonography and expertise for the laparoscopic CBD Exploration.

In this study, out of 30 patients highest number of patients (16) were from age group of 51 to 60 years. While there were 2 patients from 31-40 years group, 9 from 41-50 years and 3 from age group 61-70 years. These findings are consistent with the study done by Ye Rim Chang et al<sup>11</sup> in 2013 and Do Hoo<sup>10</sup> et al in 2016 which suggested that majority of patients with CBD stone were from the age group of 50 to 70 years. The probable reason being cited is that in older patients CBD stone are usually due to migration of primary gall bladder stone at later age.

Out of 30 patients 14 were male and 16 were females. The number of female patients are higher which is consistent with the study done by Dr Ankit Chhoda<sup>12</sup> in 2017 and Henry Volzke et al<sup>13</sup> in 2005 which states that a significantly higher proportion of females compared to males were in the intermediate probability group for CBD stone and suggests that better sex stratification can help improve the positive and negative predictive values of (American Society for Gastrointestinal Endoscopy) ASGE risk stratification criteria and improve patient outcomes and reduce associated healthcare cost

Out of 30 patients, 21 patients presented with biliary colic that includes pain in right hypochondrium. 17 patients had jaundice which were associated with increased total bilirubin while 9 patients had associated cholangitis. 2 patients presented with features of pancreatitis. These findings are similar to study done by Majid A. Almadi et al<sup>14</sup> in 2012 and Joana Tozatti et al<sup>15</sup> in 2015 which suggested that the

best predictors of common bile duct stones in patients before cholecystectomy were features of cholangitis (right hypochondriac pain, jaundice and fever) and ultrasound evidence of stones in the common bile duct.

Out of 30 patients, 28 patients had increased total bilirubin ranging from 4.2 to 18.3 mg/dl. Direct bilirubin increased in 28 patients ranging from 3.8 to 16.9 mg / dl. While alkaline phosphatase increased in 26 patients ranging from 408 IU/L to 836 IU/L. Serum amylase levels increased in only 2 patients with maximum rise of 800 IU/L. These findings are consistent with study by Majid A. Almadi et al<sup>14</sup> in 2012 and Joana Tozatti<sup>15</sup> in 2015 who suggested that elevated alkaline phosphatase level and hyperamylasemia are modest predictors of CBD stone.

Out of 30 patients, on ultrasound 6 patients had CBD stone less than 6 mm size, 12 patients had CBD stone between 6 to 10 mm, 6 patients had between 10-15 mm, 4 patients between 15-20 mm and 2 patients had > 2 cm size CBD stone. 2 patients could not be detected by sonography and CT scan was done for the confirmation. In our study the sensitivity of USG in detecting CBD stone comes out to be 93.33% and specificity about 100%. According to study by Kurinchi Selvan Gurusamy et al<sup>16</sup> in 2015 and Barkun et al<sup>16</sup> in 2004, ultrasound had average sensitivity of 73% and specificity of 91% for Common bile duct stone. These results conflict with the present study. This discrepancy can be attributed by being the exam operator dependent and that technical difficulty may vary according to the patient body type.

Among the 30 patients, 1 patient with CBD diameter between 7-11 mm and 2 patients with CBD diameter > 11 mm did not have associated gall bladder stones, which arises the possibility of spontaneous passage of GB stone through the dilated Common bile duct. This shows sensitivity and specificity of about 93.3% and 100% respectively. According to Taha Ahmed M. Alkarboly et al 2016<sup>17</sup>, the sensitivity and specificity of detecting CBD stone while considering CBD diameter was 80% and 87.5% respectively which is consistent with the present study.

Out of 30 patients included in the study, 3 patients operated by Open CBD exploration had surgical site infection with seroma formation and were treated conservatively. 2 patients had hemorrhage following laparoscopic cholecystectomy probably from cystic artery which were undergone re-Laparoscopy and hemostasis achieved. 1 patient had bile leakage probably from the clip applied to cystic duct and undergone re-Laparoscopy and bile leakage stopped successfully. 1 patient had residual CBD stone that was identified on re-ERCP and removed successfully by ERCP. This complication rate is similar to study by David K. Warren et al in 2017 which showed average rate of wound infection of about 4.93%<sup>18</sup> and study by S Duca et al<sup>19</sup> in 2003 which indicates rate of hemorrhage about 2.3%, bile leakage in 0.5% and residual stone about 0.1% patients.

From above discussion, it becomes clear that for the management of CBD stone, first of all one has to undergo complete evaluation of bile duct anatomy, size

of the CBD stone, diameter of common bile duct along with the evaluation of co-morbidities like Pancreatitis and Cholangitis. This involves undergoing laboratory investigations, Ultrasonography CT scan, and MRCP For removal of the stone, one has to undergo ERCP followed by cholecystectomy. But there are multiple scenarios at this point. If the CBD stone is less than 2 cm size, one can undergo ERCP with complete clearance of CBD, followed by cholecystectomy. If there remains a residual CBD stone after ERCP, then another time ERCP is done for clearance of the stone. If there is still incomplete clearance of CBD stone, then one has to proceed for CBD exploration followed by Cholecystectomy. Another scenario is, if the CBD stone size is > 2 cm then one has to undergo CBD exploration directly without undergoing ERCP; followed by cholecystectomy.

There were multiple limitations of the present study including small sample size and selection bias. Also there were limitations in availability of some facilities like lack of Cholangiography facility, Endoscopic shockwave lithotripsy and Endoscopic ultrasonography and expertise for the laparoscopic CBD Exploration

Open exploration remains a safe approach and is the “gold standard” if ERCP fails. Similarly Laparoscopic clearance of stones from the common bile duct was found to be as effective as preoperative and postoperative ERCP. Another approach is the intra-operative ERCP during laparoscopic cholecystectomy. This was less costly than preoperative ERCP and resulted in decreased morbidity. But, may be logistically challenging and prolongs operative times.

## CONCLUSION

It can be concluded from this study that management of Common bile duct stone is a complicated procedure requiring a step-wise strategic approach.

For successful management of CBD stone patients, after appropriate investigations gold standard treatment is ERCP followed by laparoscopic cholecystectomy. While in patients with incomplete clearance of CBD stone after ERCP, Common bile duct exploration either laparoscopically or by open approach (as per the expertise available in the institution) should be preferred.

While in patients with CBD stone >2 cm size, direct CBD exploration is the preferred option. An integrated health care team including surgeons, gastroenterologists and radiologists can decrease patient morbidity, enhance cost-effectiveness and optimize patients' quality of life.

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