



A CLINICAL STUDY IN COMPLICATIONS OF CHOLEDOCHOLITHOTOMY

Dr. Kritarth Mohan^{1*}, Dr Nabajyoti Das², Dr Mituban Gogoi³, Dr Sorbeswar Bhuyan⁴

¹Resident, Department of General Surgery, Assam Medical College and Hospital, Assam.

²Assistant Professor, Department of General Surgery, Assam Medical College and Hospital, Assam.

³Associate Professor, Department of General Surgery, Tinsukia Medical College and Hospital, Assam.

⁴Professor, Department of General Surgery, Assam Medical College and Hospital, Assam.

Corresponding Author*: Dr. Kritarth Mohan, Resident, Department of General Surgery, Assam Medical College and Hospital, Assam.

Email ID: mohankritarth@gmail.com

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ABSTRACT

Background: Choledocholithiasis is a common and potentially serious complication of gallstone disease, often causing biliary obstruction, cholangitis, pancreatitis, and sepsis. Although endoscopic management is the preferred treatment, common bile duct exploration (choledocholithotomy) remains essential in cases of failed endoscopic clearance, large or impacted stones, altered anatomy, and complex biliary disease. However, postoperative complications remain a significant concern.

Objective: To assess the incidence and pattern of postoperative complications following common bile duct exploration for choledocholithiasis and to identify associated risk factors in adult patients at a tertiary care centre.

Methods: This prospective observational study was conducted in the Department of Surgery, Assam Medical College and Hospital, from 27th September 2024 to 26th September 2025. Sixty adult patients diagnosed with choledocholithiasis and undergoing common bile duct exploration were included. Data regarding demographic profile, clinical presentation, laboratory and imaging findings, operative details, postoperative complications, and hospital stay were collected and analyzed statistically.

Results: Most patients were middle-aged, with a female predominance, and abdominal pain was the most common presenting symptom. Choledocholithotomy with T-tube drainage was the most frequently performed procedure. The common postoperative complications observed were wound infection, bile leak, and cholangitis. Complication rates were higher in patients with preoperative cholangitis, jaundice, and comorbidities such as diabetes and hypertension.

Conclusion: Common bile duct exploration remains a safe and effective treatment for choledocholithiasis, especially in complicated cases. Careful patient selection, meticulous surgical technique, and appropriate perioperative management are essential to reduce postoperative morbidity and improve outcomes.

KEYWORDS: Choledocholithiasis, Choledocholithotomy, Common Bile Duct Exploration, Postoperative Complications, T-tube Drainage, Cholangitis.

Introduction

Disorders of the hepatobiliary system are common worldwide, with gallstone disease being a major cause of morbidity. Among the various complications of cholelithiasis,

choledocholithiasis, defined as the presence of gallstones in the common bile duct (CBD), is particularly significant due to its potential to cause serious complications. The incidence of choledocholithiasis is reported to be 10–15% in patients with gallbladder stones and increases with advancing age,

recurrent biliary symptoms, and prior biliary interventions.

Choledocholithiasis may be classified as primary or secondary depending on the site of stone formation. Primary CBD stones originate within the bile duct and are more common in Asian populations. They are commonly associated with biliary stasis and infection caused by benign biliary strictures, primary sclerosing cholangitis, choledochal cysts, or parasitic infestation. Secondary CBD stones are more common overall and usually migrate from the gallbladder into the bile duct.

The management of choledocholithiasis has evolved significantly over recent decades. Endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy is widely accepted as the first-line treatment due to its minimally invasive nature and high success rate. However, choledocholithotomy, involving surgical exploration and removal of CBD stones, remains important in resource-limited settings, failed endoscopic clearance, large or impacted stones, altered surgical anatomy, and associated biliary pathologies requiring surgical intervention.

Historically, open common bile duct exploration with T-tube drainage was considered the standard treatment, allowing direct stone removal and postoperative biliary decompression. Although laparoscopic choledocholithotomy has emerged as an effective alternative with comparable stone clearance rates, the procedure remains technically demanding and requires surgical expertise.

Despite advancements in surgical techniques and perioperative care, choledocholithotomy is still associated with significant complications. Early complications include bile leakage, hemorrhage, wound infection, cholangitis, pancreatitis, septicemia, electrolyte imbalance, and pulmonary complications. Late complications include biliary stricture, recurrent stone formation, chronic cholangitis, and T-tube related complications such as persistent biliary fistula and bile peritonitis. Postoperative outcomes are influenced by patient factors such as age, comorbidities, nutritional status, disease severity, and surgical factors including operative duration, method of CBD closure, and surgeon experience.

This study aims to evaluate the complications following choledocholithotomy and identify the risk factors associated with them, thereby contributing to improved surgical outcomes and better patient care.

Aims and Objectives Research Question

What are the complications following Common bile duct exploration for choledocholithiasis in adults who come to the Department of General Surgery at Assam Medical College and Hospital, Dibrugarh?

Aim

- To investigate the types of complications associated with choledocholithotomy.

- To identify risk factors for complications in patients undergoing various procedures for Choledocholithotomy.

Objectives

- To determine and investigate the complications associated with different procedures to treat choledocholithiasis.

This Study was carried out in the General Surgery Department, AMCH, Dibrugarh among patients diagnosed with choledocholithiasis and undergoing common bile duct exploration (choledocholithotomy).

Materials and Methods

This prospective observational study was conducted in the Department of General Surgery, Assam Medical College and Hospital, from 27th September 2024 to 26th September 2025. The study included patients diagnosed with choledocholithiasis who underwent common bile duct exploration (choledocholithotomy).

Study Population

All eligible patients admitted to the Department of General Surgery with choledocholithiasis and undergoing choledocholithotomy during the study period.

Sample Size

A sample size of 60 was calculated at 95% confidence level with 10% margin of error.

Inclusion Criteria

- Patients aged ≥ 18 years
- Confirmed choledocholithiasis by ultrasonography, MRCP, or intraoperative findings
- Patients undergoing open or laparoscopic CBD exploration
- Patients providing informed consent

Exclusion Criteria

- Patients < 18 years
- Malignant biliary obstruction
- Patients undergoing ERCP alone
- Conservatively managed choledocholithiasis
- Patients unwilling to participate or lost to follow-up

Ethical Clearance

Approval was obtained from the Institutional Ethics Committee (Human), Assam Medical College and Hospital.

Method of Study

Detailed demographic data, clinical history, physical examination findings, and relevant personal history were recorded. Presenting complaints such as abdominal pain, jaundice, fever, vomiting, duration of symptoms, recurrent biliary colic, previous cholangitis/pancreatitis, and prior biliary procedures were noted.

Laboratory investigations included complete blood count,

liver function tests, kidney function tests, serum electrolytes, and coagulation profile. Radiological evaluation included abdominal ultrasonography and MRCP where indicated to assess gallstones, CBD diameter, stone number, size, and location.

Operative details recorded included type of surgery (open/laparoscopic), intraoperative findings, CBD diameter, stone characteristics, presence of pus or sludge, stone extraction method, CBD closure technique (T-tube, primary closure, or internal stenting), and duration of surgery.

Postoperative monitoring included daily clinical assessment, drain output monitoring, duration of hospital stay, and documentation of early (within 30 days) and late complications (>30 days). Follow-up visits assessed clinical status, late complications, and need for re-intervention.

Data Collection

Written informed consent was obtained. Clinical findings and investigation details were recorded using a structured proforma.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics and Microsoft Excel. Continuous variables were expressed as mean $\pm$ SD or median (IQR), while categorical variables were expressed as frequencies and percentages. Chi-square/Fisher's exact test, independent t-test/Mann-Whitney U test, and ANOVA/Kruskal-Wallis test were used as appropriate. Binary logistic regression identified risk factors for complications. A p-value <0.05 was considered statistically significant.

Results

Table 1: Age wise distribution of study participants

Age Group (in years)	Number (n)	Percentage (%)
Upto 30	6	10.00
31–40	11	18.33
41–50	18	30.00
51–60	17	28.33
>60	8	13.33
TOTAL	60	100.00
Mean $\pm$ S.D.	47.60 $\pm$ 11.76 years	
Range	22–72 years	
Median	48.5 years	

Most of the patients were in the 41–50 years age group (18, 30%), followed by 51–60 years (17, 28.33%). Patients aged 31–40 years constituted 11 (18.33%), while 8 (13.33%) were above 60 years. The least number of patients were up to 30 years of age (6, 10%). The mean age of the patients was 47.60 $\pm$ 11.76 years, with a median of 48.5 years and a range of 22–72 years.

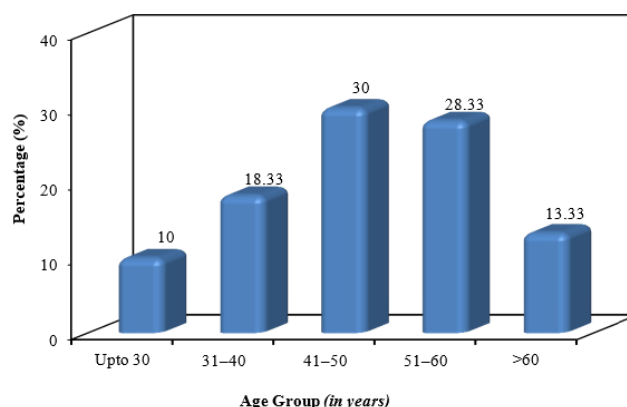


Figure 1. Age wise distribution of study participants

Table 2: Gender-wise distribution of study participants

Gender	Number (n)	Percentage (%)
Male	20	33
Female	40	67
Total	60	100.00
Ratio (Male : Female)	1 : 2	

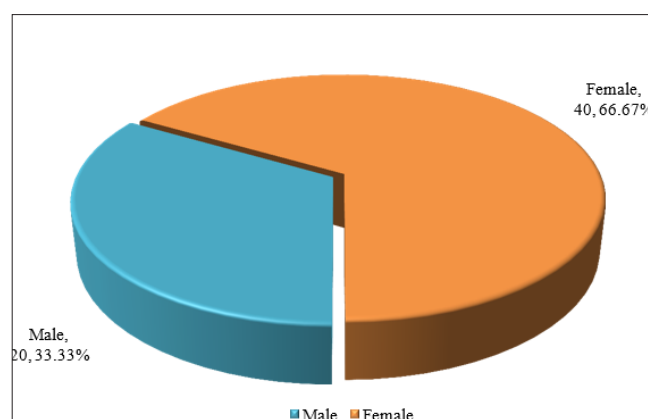


Figure 2. Gender-wise distribution of study participants

Out of the total 60 patients, the majority were females (40, 66.67%), while males constituted 20 (33.33%). The female to male ratio was 2:1.

Table 3: Distribution of Clinical Presentation

Clinical Presentation	Number (n = 60)	Percentage (%)
Abdominal Pain	54	90.00
Jaundice	39	65
Fever	24	40
Charcot's Triad	15	25
Asymptomatic	3	5

Abdominal pain was the most common clinical presentation seen in 54 patients (90%), followed by jaundice in 39 patients (65%). Fever and Charcot's triad were observed in 24 patients each (40%). A small proportion of patients were asymptomatic (3, 5 %).

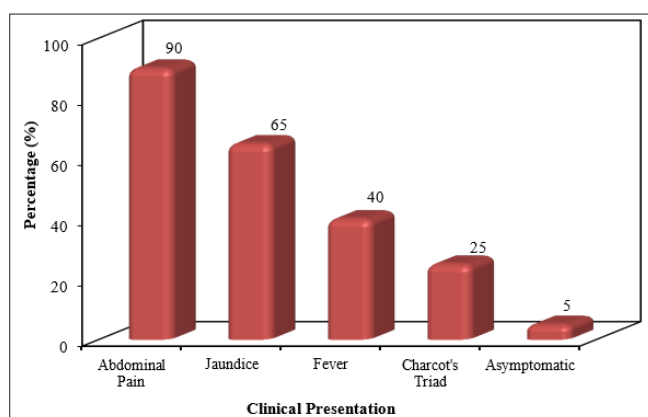


Figure 3. Distribution of Clinical Presentation

Table 4: Direct Bilirubin (Conjugated Bilirubin)

Direct Bilirubin (mg/dl)	Number (n)	Percentage (%)
≤ 0.3	11	18.33
> 0.3	49	81.67
TOTAL	60	100.00

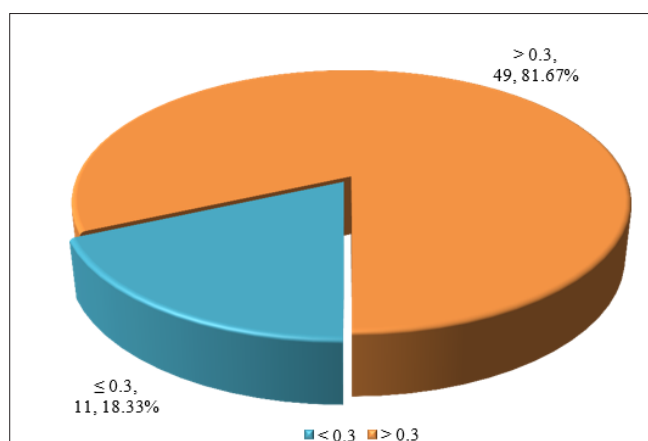


Figure 4. Direct Bilirubin (Conjugated Bilirubin)

Direct bilirubin level ≤ 0.3 mg/dl was observed in 11 patients (18.33%), while the majority of patients had levels > 0.3 mg/dl (49, 81.67%).

Table 5: Post-operative Duration of Hospital Stay

Procedure	Number of Patients	Mean Post-operative Stay (days) (Mean $\pm$ S.D.)	Range (days)
OCBDE + T-tube drainage	41	12.1 $\pm$ 2.8	8–18
Choledochoduodenostomy	12	8.6 $\pm$ 1.7	6–12
Laparoscopic CBD Exploration (LCBDE)	7	7.2 $\pm$ 1.2	5–8
Total	60	10.9 $\pm$ 3.0	5–18

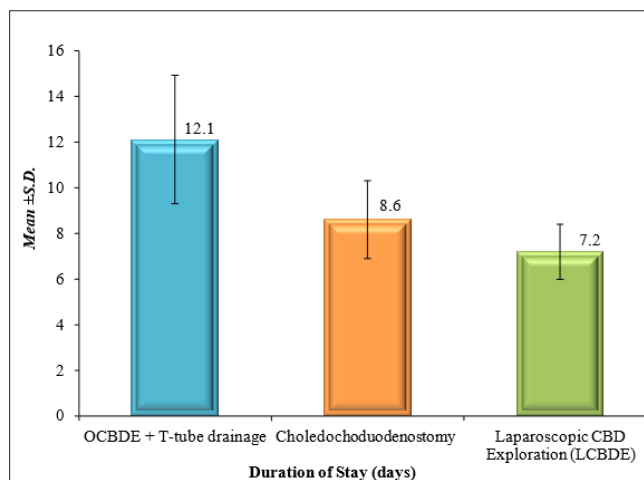


Figure 5. Post-operative Duration of Hospital Stay



Figure 6. Showing Common Bile Duct

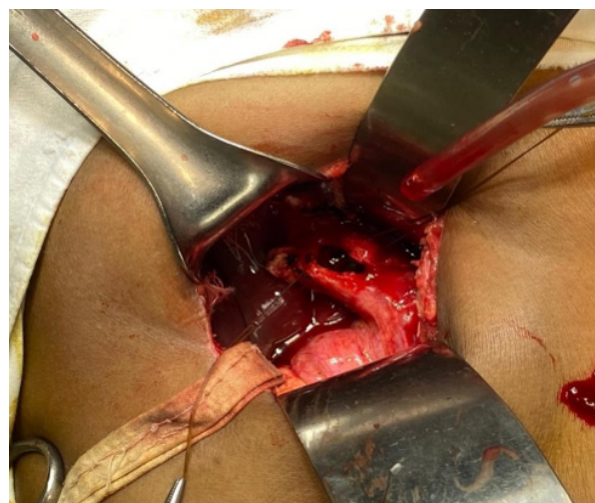


Figure 6. Showing Common Bile Duct

The majority of patients underwent OCBDE with T-tube drainage (41 cases), which was associated with the longest mean post-operative hospital stay of 12.1 ± 2.8 days, ranging from 8 to 18 days. In comparison, patients who underwent choledochoduodenostomy (12 cases) had a shorter mean

hospital stay of 8.6 ± 1.7 days, with a range of 6 to 12 days. The shortest hospital stay was observed in patients who underwent laparoscopic CBD exploration (7 cases), with a mean duration of 7.2 ± 1.2 days and a range of 5 to 8 days. Overall, minimally invasive procedures were associated with reduced post-operative hospital stay compared to open procedures.

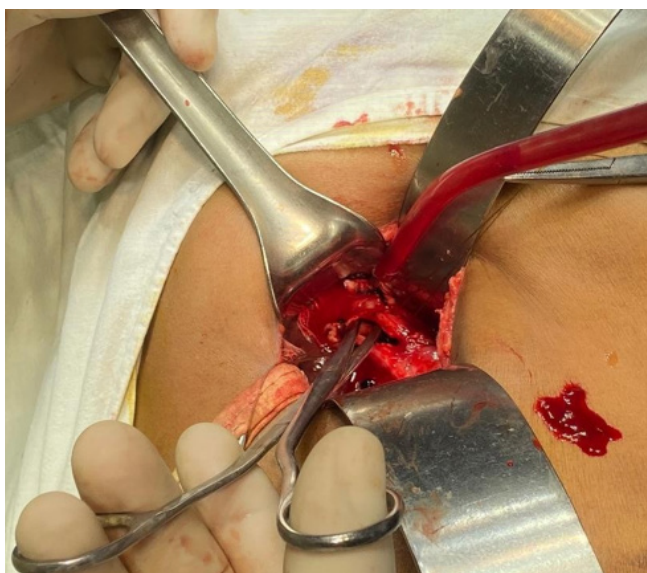


Figure 8. Showing Common Bile Duct Exploration with Desjardins Gall Stone Holding Forceps

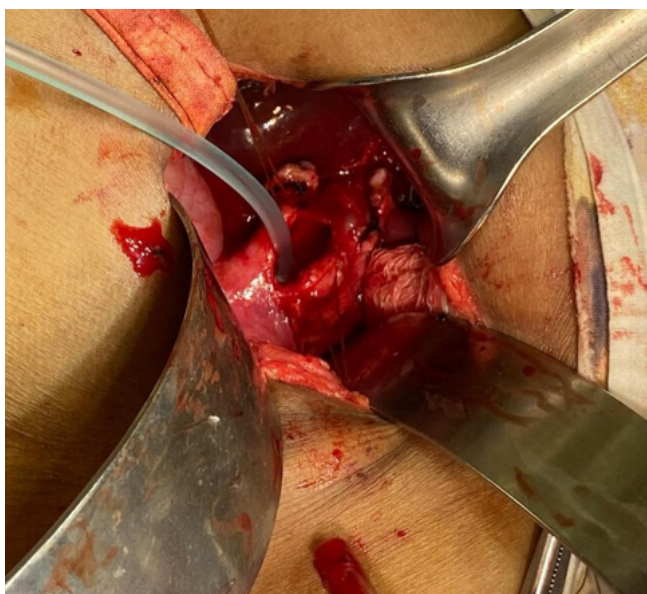


Figure 9. Showing T Tube Placement Inside CBD

Discussion

The present study included 60 patients with choledocholithiasis who underwent choledocholithotomy. The mean age was 47.60 ± 11.76 years, with the majority belonging to the 41–50 years age group, indicating that middle-aged individuals are more commonly affected. This finding is comparable with studies by Ghazal et al. and Aleknaite et al.

A clear female predominance was observed, with females constituting 66.67% of cases and a female-to-male ratio of nearly 2:1, consistent with the known higher prevalence of gallstone disease in females.

The most common presenting symptom was abdominal pain (90%), followed by jaundice (65%) and fever (40%). Charcot's triad was present in 25% of patients. These findings are comparable to previous studies, where abdominal pain was the predominant clinical presentation.

Ultrasonography served as the primary diagnostic modality, while MRCP provided additional confirmation in selected cases, proving valuable for preoperative assessment and surgical planning.

The mean hospital stay was 13.08 ± 3.09 days. Patients undergoing open CBD exploration with T-tube drainage had longer postoperative stay compared with laparoscopic procedures, highlighting the advantages of minimally invasive surgery in reducing hospitalization.

Preoperative jaundice (56.7%) and cholangitis (26.7%) were common and were associated with higher postoperative morbidity. Nearly half of the patients had comorbidities, with hypertension and diabetes mellitus being the most frequent.

The most common postoperative complication was wound infection (11.67%), followed by bile leak (8.33%) and cholangitis (5%). Serious complications such as hemorrhage, septicemia, biliary peritonitis, pancreatitis, and pneumonia were uncommon.

Overall, the complication profile observed was comparable to previous studies, indicating that choledocholithotomy remains a safe and effective procedure when performed with proper surgical technique, timely intervention, and adequate postoperative care.

Conclusion

This study shows that common bile duct exploration remains a safe and effective treatment for choledocholithiasis, especially in complicated cases, failed endoscopic clearance, or associated biliary pathology. Open choledocholithotomy with T-tube drainage provides effective stone clearance but carries higher risks of postoperative complications such as bile leak, wound infection, and cholangitis. Laparoscopic common bile duct exploration offers lower morbidity and shorter hospital stay. Patients with comorbidities and preoperative jaundice or cholangitis had higher complication rates. Proper patient selection, surgical expertise, and meticulous perioperative care are essential to optimize outcomes and improve patient recovery.

Conflict of Interest

There are no conflicts of interest.

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