e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(12); 2962-2965

Original Research Article

Primary Closure after Laparoscopic Common Bile Duct Exploration: A Prospective Study of Safety and Efficacy at a Tertiary Centre

Manmeet Singh[1], Darshanjit Singh Walia[2], Anand Singla[3], Shivam Sethi[4], Anita Mishra[5]

[1]Junior Resident, Department of General Surgery, GMC & Rajindra Hospital, Patiala, Punjab, India
[2]Professor, Department of General Surgery, GMC & Rajindra Hospital, Patiala, Punjab, India
[3]Assistant Professor, Department of General Surgery, GMC & Rajindra Hospital, Patiala, Punjab, India
[4]Junior Resident, Department of General Surgery, GMC & Rajindra Hospital, Patiala, Punjab, India
[5]Junior Resident, Department of General Surgery, GMC & Rajindra Hospital, Patiala, Punjab, India

Received: 01-09-2025 Revised: 15-10-2025 / Accepted: 21-11-2025
Corresponding author: Dr. Darshanjit Singh Walia
Conflict of interest: Nil

Abstract

Introduction: Choledocholithiasis complicates 10–15% of gallstone cases and may result in serious complications. While endoscopic retrograde cholangiopancreatography (ERCP) remains standard, laparoscopic common bile duct exploration (LCBDE) with primary closure (PC) offers a single-stage approach with reduced morbidity.

Patients and Methods: This prospective observational study was conducted at Rajindra Hospital, Patiala from 2023 to 2025. Thirty patients with confirmed choledocholithiasis and a CBD diameter >8 mm underwent LCBDE with primary closure. Demographic and perioperative data were collected and analyzed.

Results: The mean age was 53.8 ±10.7 years; 56.7% were female. Multiple stones were noted in 70%. Mean operative time was 113.2 ±1.8 minutes, mean hospital stay was 6.1 ±1.6 days. Bile leak occurred in 1 patient (3.3%) which was managed conservatively and 2 patients (6.7%) had remnant stones requiring reoperation. No biliary strictures were seen during follow-up.

Conclusion: LCBDE with primary closure is a safe, effective alternative to T-tube drainage in selected patients. It reduces postoperative morbidity and shortens recovery time.

Keywords: Choledocholithiasis, Laparoscopy, Bile duct stones, Primary closure, minimally invasive surgery.

Introduction

Choledocholithiasis, or the presence of stones within the common bile duct (CBD), affects 10–15% of patients with cholelithiasis. [1] Its clinical spectrum ranges from incidental findings to severe complications such as cholangitis or pancreatitis. With the advent of improved imaging, particularly magnetic resonance cholangiopancreatography (MRCP), diagnostic accuracy has significantly increased. [6]

The conventional two-stage management—ERCP followed by laparoscopic cholecystectomy—is effective but carries risks of pancreatitis, bleeding, and incomplete clearance. [7] Laparoscopic common bile duct exploration (LCBDE) enables a single-stage management and avoids post-ERCP complications. [5] Traditionally, T-tube drainage has been employed after LCBDE to allow for bile drainage and postoperative cholangiography. However, complications such as bile leakage, tract infections, patient discomfort and prolonged recovery have prompted a shift toward primary closure (PC) of the CBD, particularly when ductal clearance is confirmed and the duct is dilated. [2,3]

This study evaluates the safety and efficacy of PC following LCBDE in a tertiary care setting.

Patients and Methods

This prospective observational study was conducted in the Department of General Surgery at Government Medical College and Rajindra Hospital, Patiala (2023–2025). All procedures were performed by experienced laparoscopic surgeons with proficiency in biliary surgery. Ethical clearance was obtained, and informed consent was taken.

Eligibility Criteria

The study enrolled patients aged 18 years and above who had radiologically confirmed choledocholithiasis, as detected by either magnetic resonance cholangiopancreatography (MRCP) or ultrasonography, and a common bile duct (CBD)

diameter exceeding 8 mm. Individuals presenting with acute cholangitis, suspected malignancy of the biliary tract, gallbladder perforation, or those who did not provide informed consent were excluded from the study.

Procedure

A standard four-port laparoscopic approach was used. The CBD was exposed and opened longitudinally. Stones were extracted using Dormia baskets or Fogarty catheters under choledochoscopic guidance. After confirming clearance and distal patency, the duct was closed primarily with absorbable sutures. A closed drain was placed.

Follow-up: Patients were reviewed at 1, 3, and 6 months postoperatively for signs of bile leak, stricture, or recurrent stones.

Statistical Analysis

Data were analyzed using SPSS v29. Continuous variables were expressed as mean ±SD; categorical variables as frequencies and percentages.

Results

This prospective study included 30 patients diagnosed with choledocholithiasis who underwent laparoscopic common bile duct exploration (LCBDE) followed by primary closure of the CBD. The average age of participants was 53.8 ±10.7 years, with a female predominance (56.7%). Most patients (36.67%) were above 60 years, while 33.33% were aged between 51–60 years. The mean body mass index (BMI) was 24.9 ±2.3 kg/m². Coexisting medical conditions were noted in 60% of the cases, with hypertension being the most frequent (36.7%), followed by diabetes (10%).

Table 1: Demographic Profile of Patients

Variable	Value
Mean Age (years)	53.8 ± 10.7
Age Range (years)	30–72
Sex - Male	13 (43.3%)
Sex - Female	17 (56.7%)
Mean BMI (kg/m²)	24.9 ± 2.3

Preoperative assessment categorized 40% of patients as ASA Grade I and 60% as ASA Grade II.

The predominant symptom at presentation was right upper quadrant abdominal pain (76.7%), followed by jaundice in 66.7% of cases.

Intraoperative findings revealed chronic cholecystitis in 66.7% and acute cholecystitis in 33.3% of patients. The average diameter of the common bile duct was 12.1 ±2.3 mm. Multiple CBD stones were present in 70% of cases, while the remainder had solitary stones. All cases were confirmed preoperatively using magnetic resonance cholangiopancreatography (MRCP). The mean operative duration was 113.2 ±1.8 minutes. Choledochoscopy was routinely employed to confirm complete stone clearance and distal patency prior to ductal closure. A closed suction drain was inserted in all patients. The average postoperative hospital stay was 6.1 ±1.6 days, and the mean duration for drain removal was 4.2 ±1.1 days.

Table 2: Preoperative and Intraoperative Findings

Parameter	Value
CBD Diameter (mm)	12.1 ± 2.3
Multiple CBD Stones	21 (70.0%)
Single CBD Stone	9 (30.0%)
Chronic Cholecystitis	20 (66.7%)
Acute Cholecystitis	10 (33.3%)
Choledochoscopy Used	30 (100%)

Complication rates were low. One patient (3.3%) developed a bile leak, which was managed conservatively.

Two patients (6.7%) were found to have retained stones, necessitating reoperation. Importantly, no instances of postoperative biliary stricture were recorded during the 6-month follow-up.

All procedures were completed laparoscopically without conversion to open surgery, and there were no mortalities.

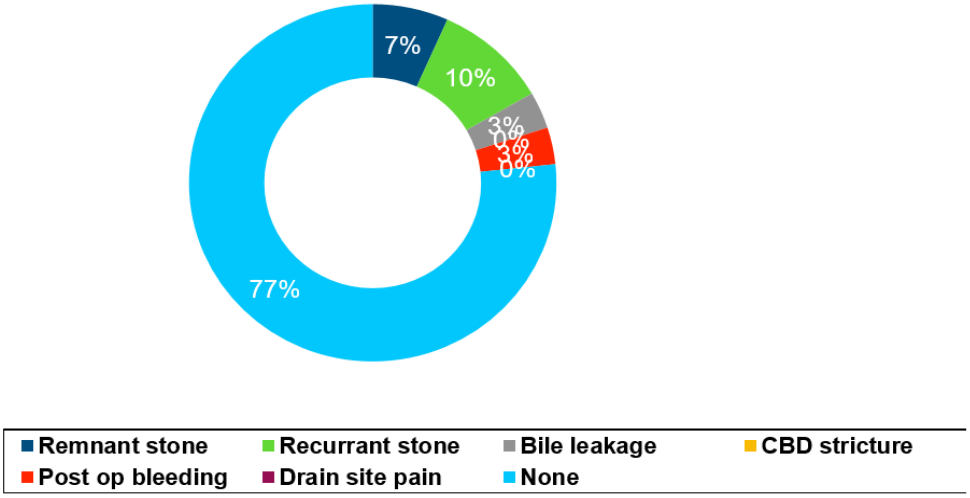

Fig 1: Complications in post-op patients

Discussion

Our study demonstrates that primary closure (PC) of the CBD following LCBDE is a safe and effective alternative to T-tube drainage. The low incidence of bile leak (3.3%) and absence of biliary stricture align with international data.[1,3], validating PC as a viable approach in appropriately selected cases.

Compared to T-tubes, PC reduces the risk of infection, bile peritonitis, and prolonged drainage, while improving patient comfort and shortening hospital stay. [2,4] These outcomes are especially meaningful in settings with resource constraints and high surgical burden. Success depends on key factors: adequate ductal diameter, complete ductal clearance (confirmed via choledochoscopy), and absence of sepsis or malignancy. In our study, despite a high proportion of multiple stones and chronic inflammation, operative outcomes remained favorable—echoing outcomes from De Silva et al. and Ma et al. [4,5]

Table 3: Comparison with Other Published Studies

Study	No. of Patients	CBD Diameter (mm)	Complication Rate (%)	Bile Leak (%)	Retained Stones (%)
Present Study	30	12.1 ± 2.3	10	3.3	6.7
Wang Y et al. (2022)	116	11.8 ± 2.5	12.9	4.3	6
Ma Z et al. (2022)	152	12.3 ± 2.1	15.1	3.9	7.2
De Silva S et al. (2023)	204	11.9 ± 2.8	13.7	5.1	5.8
Wu X et al. (2012)	237	12.0 ± 3.0	16.4	5.5	6.5

This study supports the shift toward single-stage laparoscopic management of choledocholithiasis, which avoids complications of post-ERCP pancreatitis and delays in definitive surgery. [6,7]

While limited by sample size and single-center design, the prospective design and use of intraoperative choledochoscopy enhance validity. Larger studies with longer follow-up are needed. [3]

Conclusion

From this study, we conclude that laparoscopic common bile duct exploration with primary closure is a safe, feasible, and effective alternative to T-tube drainage in appropriately selected patients.

This single-stage approach results in reduced postoperative morbidity, shorter hospital stay, and improved overall patient outcomes.

Declarations

Ethics Approval and Consent to Participate: Approved by Institutional Ethics Committee, Government Medical College and Rajindra Hospital, Patiala. All patients provided written informed consent.

Authors 'Contributions: Dr. Manmeet Singh: Conceptualization, Data Collection, Drafting.

References

1. Wu X, et al. Laparoscopic common bile duct exploration with primary closure vs. T-tube drainage: a meta-analysis. Surg Endosc. 2012;26(1):1–9.
2. Zhang HW, et al. Comparison of primary closure and T-tube drainage after LCBDE. Hepatobiliary Pancreat Dis Int. 2014;13(2):189–94.

3. Wang Y, et al. Efficacy of LCBDE with primary closure for acute cholangitis. Surg Endosc. 2022;36(7):5432–9.
4. Ma Z, et al. LCBDE in patients with challenging biliary stones: a retrospective study. BMC Surg. 2022; 22:176.
5. De Silva S, et al. Long-term outcomes following LCBDE and ERCP: a comparative study. HPB. 2023;25(1):23–9.
6. Martin DJ, Vernon DR, Toouli J. Surgical versus endoscopic treatment of bile duct stones. Cochrane Database Syst Rev. 2006;(2): CD003327.
7. Tranter SE, Thompson MH. Comparison of endoscopic sphincterotomy and laparoscopic exploration. Br J Surg. 2002;89(12):1495–500.