Original Article

Trends and Outcomes of the Management of Common Bile Duct Stones at KIST Medical College Teaching Hospital

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Abstract

Introduction: Common bile duct (CBD) stones are found in 10% to 15% of patient having cholelithiasis. Various surgical methods including endoscopic, laparoscopic and open surgical techniques are practiced but there is no consensus on the management. This cross-sectional study aims to analyze the demographics and trends un management of CBD stones at KIST Medical College.

Methods: Patient undergoing CBD stone management from 15 June 2021 to 31 December 2023 were included in the study. Different treatment methods applied and outcomes were analyzed.

Results: Fifty-one patients were included in the study with 18 (25.3 %) males and 33 (64.7%) females. Abdominal pain was the most common symptom. Laparoscopic cholecystectomy(LC) with intraoperative(io)-ERCP was done in 30 (58.8%) patients, while LC + Laparoscopic CBD exploration(LCBDE) was done in 11 (21.6 %) and Endoscopic Retrograde Cholangiopancreatography(ERCP) only was done in 10 (19.6%) patients. The significant difference was observed in the length of hospital stay [5.03 ± 2.13 vs 6.36 ± 2.29, p=0.046] and the number of days the drain was kept [2.20 ±0.45 vs 4 ± 1.90, p=0.037] both favoring LC + io-ERCP group. Stone clearance, post-operative complications and operative time were comparable between the two groups.

Conclusion: Single-stage management of cholelithiasis and choledocholithiasis is feasible at our center. Both LC with io-ERCP and LC + LCBDE can be performed selectively with acceptable and comparable outcomes.

Keywords: Choledocholithiasis; ERCP; Laparoscopic CBD exploration; Laparoscopic cholecystectomy.

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Introduction

Common Bile duct (CBD) stones or choledocholithiasis is a common condition. It occurs in up to 10 to 15 % of patients who have gallstone disease. It is responsible for significant morbidity and mortality.[1,2]

There is no consensus on the management strategies for concomitant gall stones and CBD stones. Various methods are used and each procedure has its proponents. Both single-stage and two-stage strategies are practiced at the different centers which include either a two-stage procedure with endoscopic retrograde cholangiopancreatography (ERCP) followed by laparoscopic cholecystectomy (LC) or single-stage LC with intraoperative-ERCP (io-ERCP) and laparoscopic cholecystectomy and laparoscopic common bile duct exploration (LCBDE).[3,4] We offer a single-stage management strategy whenever feasible. We perform both single-stage LC with LCBDE and LC with intraoperative ERCP. This cross-sectional study aims to analyze the demographics and find out the management trends of common bile duct stones at KIST Medical College Teaching Hospital.

Methods

This is a cross-sectional study of hospital data of the patients who had undergone treatment for CBD stones at KIST Medical College Teaching Hospital. The study was conducted at the Department of Surgical Gastroenterology, KIST Medical College & Teaching Hospital, Imadole, Lalitpur.

Patients who had undergone management of CBD stones from 15 June 2021 to 31 December 2023 were included in the study. Patients with cirrhosis, portal hypertension, suspicion of hepatobiliary malignancy, pregnancy and age less than 18 years were excluded from the study.

After approval from Institutional review board of KIST Medical College, hospital records of the patients who had undergone management of CBD stones at the Department of Surgical Gastroenterology, KIST Medical College & Teaching Hospital, Imadole, Lalitpur were studied and data was collected in a pre-designed proforma.

Categorical variables were expressed as frequencies in terms of percentage and continuous variables were expressed as mean±SD. Mann-Whitney test was used to compare means and Fischer exact test was used to compare categorical variables. p-value of <0.05 was considered statistically significant. A statistical software GNU pspp 2.0.1 was used for data entry, data processing, and data analysis.

Table 1. Baseline characteristics

Mean Age (years)		50.49 ± 16.49
Sex	Male	18 (35.3%)
	Female	33 (64.7%)
Symptoms	Pain Abdomen	49 (96.1%)
	Jaundice	12 (23.5 %)
	Fever	6 (11.7 %)
	Incidental	1 (1.96 %)
Previous Intervention		7 (13.7 %)
	ERCP	3 (5.88 %)
	ERCP + Laparoscopic Cholecystectomy	1 (1.96 %)
	Laparoscopic Cholecystectomy	3 (5.88 %)

Results

Fifty-one patients were treated for choledocholithiasis at our department during the study period. The mean age of the patients was 50.65 ± 16.49 years (Range 18–79 years). There were 18 (25.3%) male and 33 (64.7%) female patients (**Table 1**).

Forty-seven patients had cholelithiasis with choledocholithiasis and four patients with choledocholithiasis had already undergone cholecystectomy in the past. The most common symptom was abdominal pain present in 49(96.1%) of patients whereas one (1.96%) patient presented with incidental findings of choledocholithiasis (**Table 1**). Seven patients had previous intervention out of which three presented with retained stone after cholecystectomy and one patient presented with choledocholithiasis who had undergone both ERCP and laparoscopic cholecystectomy (**Table 1**).

Table 2. Baseline parameters

	Mean	Range
TLC (gm/dl)	8674.71	4000 -14760
Total Bilirubin (mg/dl)	2.24	0.20 - 15.70
Direct Bilirubin (mg/dl)	1.41	0.10 - 12.70
AST (U/L)	103.12	12 - 640
ALT (U/L)	152.47	10 - 884
ALP (U/L)	233.20	68 - 1106

Laparoscopic cholecystectomy with io-ERCP was the most commonly done procedure, done in 30(58.8%) patients, while LC + LCBDE was done in 11(21.6%) patients and ERCP only was done in 10(19.6%) patients (**Figure 1**). **Table 3** shows the reasons for performing only ERCP.

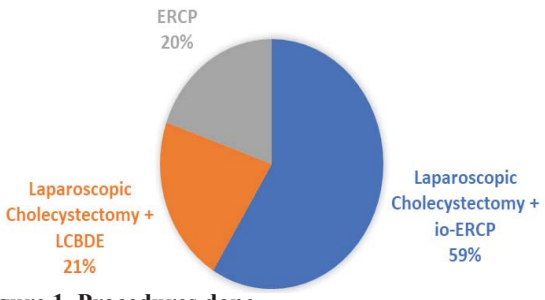

Figure 1. Procedures done

Table 3. Reasons for only ERCP

Cholangitis	5 (50%)
Retained stone post cholecystectomy	4 (40 %)
Logistic problems	1 (10 %)

We compared the outcomes of LC + io-ERCP and LC + LCBDE. Drain was placed selectively on the discretion of the operative surgeons based upon the condition of gall bladder (e.g. Inflamed and Edematous gallbladder, gall bladder adherent to the cystic plate, friable cystic duct) in the LC + io- ERCP group whereas it was placed in all patients in the LC + LCBDE; group difference was statistically significant [5(16.7 %) vs 11 (100 %), p=0.000]. Other significant difference was observed in the length of hospital stay [5.03 ± 2.13 vs 6.36 ± 2.29, p=0.046] and the number of days the drain was kept [2.20 ± 0.45 vs 4 ± 1.90, p=0.037] both favoring LC + io-ERCP group. Stone clearance, post-operative complications and operative time were comparable between the two groups.

Table 5. Comparisons of outcomes of LC + io-ERCP and LC + LCBDE

Outcomes	ERCP + LC	LC + LCBDE	P value
Stone Clearance	29 (96.7 %)	11 (100%)	1.000*
Acute Pancreatitis	1(3.3%)	0(0%)	1.000*
Biliary Leak	0 (0%)	1 (9.1%)	0.268*
Drain Placed	5(16.7 %)	11 (100%)	0.000*
Superficial Surgical Site Infection	1(3.3%)	1 (9.1%)	0.470*
Operative Time (in minutes)	159.50 ± 41.12	162 ± 44.4	0.820#
Length of Hospital Stay (In days)	5.03 ± 2.13	6.36 ± 2.29	0.046#
The drain removed on post day	2.20 ± 0.45	4 ± 1.90	0.037#

*Fischer Exact Test, # Man- Whitney Test

Discussion

Laparoscopic cholecystectomy is the treatment of choice in patients with gallstone disease.[5] The preferred treatment of isolated CBD stones especially in post cholecystectomy state is endoscopic retrograde cholangiopancreatography (ERCP) and stone clearance because it avoids another major operation. However, when gall stones are present concomitantly with CBD stones, a consensus on optimal management does not exist. This has led to a range of therapeutic strategies which includes open cholecystectomy with CBD exploration, ERCP followed by laparoscopic cholecystectomy, laparoscopic cholecystectomy followed by ERCP, single-stage laparoscopic cholecystectomy with laparoscopic CBD exploration and laparoscopic cholecystectomy with intra-operative ERCP.[3,4] Our preferred approaches are laparoscopic cholecystectomy with laparoscopic CBD exploration and laparoscopic cholecystectomy with intra-operative ERCP selectively whenever feasible. These single-stage management are done only in a few centers in our country despite being a one time solution for this disease condition and having several advantages. In 2017 we reported 50 cases of single-stage management of concomitant cholelithiasis and choledocholithiasis concluding that single-stage management with LC and ERCP is feasible in our setup.[6] Pokharel et al published a paper comparing open cholecystectomy with CBD exploration with single-setting ERCP and LC and reported that the single-stage ERCP with LC is feasible and had fewer complications than open cholecystectomy with CBD exploration.[7] Yadav et al compared single-stage LC + LCBDE with two-stage LC + ERCP. They reported that stone clearance was complete in the LC + LCBDE group and complications were higher in the LC + ERCP group.[8]

Our result showed that laparoscopic cholecystectomy with io-ERCP was the most common procedure followed by LC with LCBDE in patients presenting with concomitant cholelithiasis and choledocholithiasis. About 80% of the patients received single-stage management for this condition. A staged approach was only used whenever single-stage management was not feasible. We select the patients based on the clinical, radiological, and laboratory parameters. After history taking and clinical examination, the diagnosis is confirmed by ultrasound of the abdomen. We do MRCP if ultrasound does not show CBD stones but there is suspicion on a clinical basis and deranged liver function test. We go for LC with io-ERCP when the CBD stones sizes are small and the CBD diameter is less than 10 mm. Patients with large stones in CBD, dilated CBD, impacted stones, intrahepatic stones, and failed ERCP go for LC with laparoscopic CBDE. ERCP only is done for patients with cholangitis and patients with co-morbid illness who need pre-operative optimization.

Single-stage management of concomitant gall stones and CBD stones provides a one-stop solution to the patient. Other benefits include a single session of anesthesia, a lesser number of hospital admissions, and procedures with similar outcomes that may be overall cost-effective.[9–12] Despite these advantages, single-stage treatment is not offered to patients at most centers. This is because of a lack of equipment, lack of expert endoscopists and laparoscopic surgeons, lack of training in both ERCP and laparoscopic CBD procedures, time constraints, etc. Similar is the scenario in the developed world as well. A study from the United States studied nationwide trends in the management of CBD stones from 1998 to 2013. They found that 96.9% were treated with ERCP+LC and 3.1% were treated with LCBDE+LC. The overall use of CBDE decreased from 39.8% of admissions in 1998 to 8.5% in 2013 (P < 0.001). A similar decrease was also seen for open CBDE (30.6% vs 5.5%; P <0 .001) and laparoscopic CBDE (9.2% vs 3.0%; P < 0.001) independently. They highlighted the decline of CBDE and expressed their concerns that this decline may result in a risk of CBDE disappearing from the surgical

armamentarium despite having potential benefits.[4] A survey among surgeons in the United Stated for management revealed that 86% preferred pre-operative ERCP.[13]

ERCP followed by laparoscopic cholecystectomy has the advantage of having a CBD stone clearance rate of up to 93–96% and being an endoscopic procedure for CBD stone clearance. Disadvantages of this approach are that it requires two different anesthesia sessions, may destroy the sphincter of Oddi, morbidity up to 15% which includes post-ERCP pancreatitis, perforation, hemorrhage, cardiopulmonary complications, etc., and mortality up to 1%.[14–16]

Laparoscopic cholecystectomy with laparoscopic CBD exploration has advantages of having similar CBD stone clearance as ERCP with similar morbidity and mortality along with other advantages such as shorter hospital stay, preservation of sphincter of Oddi, and more cost-effectiveness.[17–20] However, it is an advanced laparoscopic procedure that requires logistics, training, and a dedicated team.[19,21]

With the advancement of both endoscopic and laparoscopic techniques, combining ERCP with laparoscopic cholecystectomy is feasible. Several studies have looked into the feasibility and safety of this combined procedure.[9,11] When compared to single-stage laparoscopic cholecystectomy with LCBDE, it has comparable surgical time, surgical success rate, postoperative complications, mortality rates, retained CBD stones, and postoperative length of stay.[10,12]

This study also shows no significant difference in outcomes except for drain placement and the number of days the drain was kept. This difference is obvious because CBD exploration involves choledochotomy and suturing of the CBD. Hence, a drain is placed in almost all cases to drain bile if it leaks from the CBD suture line. In our study, all patients who underwent CBD exploration had a drain placed per-operatively and only 5(16.7%) of patients who underwent LC with io-ERCP had a drain placed. The duration of the drain kept was also longer as in the LC + LCBDE group (0.37± 0.85 Vs 4 ± 1.90, p = 0.005). LCBDE avoided post-ERCP pancreatitis whereas ERCP avoided post-operative bile leak.

Ricci et al compared the efficacy and safety of four surgical approaches [preoperative endoscopic retrograde cholangiopancreatography (PreERCP) plus laparoscopic cholecystectomy (LC); LC with laparoscopic common bile duct exploration (LCDBE); LC plus intraoperative endoscopic retrograde cholangiopancreatography (IntraERCP); and LC plus postoperative ERCP (PostERCP)] to gallstones with CBD stone in a systemic review and metanalysis which included 2849 patients. The combined LC and IntraERCP approach was found to be the safest and appears to be the most successful. Laparoscopic cholecystectomy plus LBCDE appears to reduce the risk of acute pancreatitis but may be associated with a higher risk of biliary leak. The most commonly practiced approach PreERCP and LC lagged behind both the single-stage approaches in terms of safety and efficacy.[3] We also encountered a bile leak in one (9.1%) patient in LCBDE. Along with this drain was placed in all patients with LC with LCBDE and for longer duration as compared to selective drain placement in patients who underwent LC with io-ERCP. The length of hospital stay was longer for LC with LCBDE group (5.03 ± 2.13 vs 6.36 ± 2.29, p=0.046).

This study has certain limitations. This is a single-center experience; the results may not be generalized.

Conclusion

Single-stage management of cholelithiasis and choledocholithiasis is feasible at our center. Both LC with io-ERCP and LC + LCBDE can be performed selectively with acceptable and comparable outcomes.

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