ORIGINAL ARTICLE

LCBDE a better Procedure than ERCP in cases of Common Bile Duct Diameter >10 mm

G. D. Yadav*, Kaustubh Gupta, Vigya Shukla, Mohit Bhagchandani

Department of General Surgery, GSVM Medical College, Kanpur, Uttar Pradesh, India

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ABSTRACT

Background: Choledocholithiasis and cholelithiasis are commonly diagnosed problem in adults in 4th-5th decade of life. Patients present with chief complaints of abdominal pain, nausea, vomiting, jaundice, where abdominal pain is the most common.

Methods: This prospective study was conducted in Department of General Surgery, G.S.V.M medical college, kanpur, India from January 1st 2018 to January 1st 2022. All the patients with choledocholithiasis, with stone diameter more than 10mm were included in the study.

Results: Success rate of stone clearance was same in both LCBDE and ERCP. With stone size more than 10mm was not able to retrieve by ERCP, so LCBDE was preferred. Hospital stay was more in LCBDE(4-5 days) ,as compared to ERCP(2 days), but when ERCP was accomapanied by cholecystectomy stay increased to 6 days. Complication rate of wound infection ,bilke leak are more in LCBDE group while in ERCP group pancreatitis, duodenal perforation and hemorrhage are more.

Conclusion: ERCP along with laparoscopic cholecystectomy gives patients the burden of two procedures ,hence more complication rate ,more postoperative stay ,twice exposure to anesthetic procedures and more costlier than LCBDE. Limitation in removal of stone more than 10mm in size, for which LCBDE is needed. With the improvement in laparoscopic technique and increasing expertise ,surgeons are comfortable with laparoscopic techniques of CBD surgery. A single procedure which could be performed by minimally invasive technique ,was an attractive proposition compared with multiple intervention. LCBDE with laparoscopic cholecystectomy becoming choice of treatment in expert hands.

Keywords: LCBDE, ERCP, Choledocholithiasis, Minimally invasive surgery, Jaundice, Supraduodenal choledochotomy.

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INTRODUCTION

Choledocholithiasis (Common Bile duct stones) and cholelithiasis are commonly diagnosed problems in adults in the 4–5th decade of life. Total 10–15% cases of cholelithiasis are associated with common bile duct stones.[1] Choledocholithiasis are generally silent and seen in upto 10% of patients undergoing biliary imaging. Primary common duct stones arise de novo in bile duct and are generally brown pigment stones, a combination of precipitated bile pigments and cholesterol. Brown pigment stones are associated with bacterial infections where free bilirubin is formed by hydrolyzing enzymes released by bacteria and then precipitates. Brown pigment stones are more common in the Asian population. Secondary common duct stones pass from the gallbladder into bile duct. Secondary stones are common in western countries. Retained stones are secondary stones found in the bile duct within 2 years of cholecystectomy and occur in 1 to 2% of patients. Choledocholithiasis represents a significant danger to patients as it can lead to biliary colic, obstructive jaundice, cholangitis or pancreatitis. Various treatment modalities available for a diagnosed case of common bile duct stone are Endoscopic retrograde cholangiopancreatography accompanied with sphincterotomy with or without stone extraction/stenting, Laparoscopic CBD exploration with stone extraction, open CBD exploration or other biliary drainage procedures.

With the growing expertise of surgeons in various lucrative minimally invasive techniques targeted to achieve cure with least discomfort in terms of morbidity, mortality, cost-effectiveness, the hassle-free utilization of endoscopy over laparoscopy is debated over in the management of common bile duct stones.

CLINICAL FEATURES

Recurrent abdominal pain was most common presenting complaints with nausea, vomiting and jaundice (Table 1). The average duration of complaint was 6.5 months.

*Author for Correspondence: yadavgd71@gmail.com

METHODS

The current prospective study was conducted by the Department of General Surgery, GSVM Medical College, Kanpur, India.

In this study patients with common bile duct stone diagnosed preoperatively by radiological evidence confirmed by clinical laboratory investigations are chosen for either ERCP or LCBDE from 1st Jan 2018 to 1st January 2022.

Inclusion Criteria

- Patient age more than 18 years old.
- Radiological evidence of CBD stones with cholelithiasis.
- Patients with CBD diameter more than 10mm.

Exclusion Criteria

- Patients less than 18 years of age.
- CBD of diameter less than 10 mm.
- Clinical or radiological evidence of cirrhosis.
- CBD stone with carcinoma of GB or having major cardiovascular or renal diseases.

Clinical data, including a detailed history, clinical examination, and laboratory investigations which included liver function tests for total bilirubin, conjugated bilirubin, alkaline phosphatase, hepatic transaminases SGOT and SGPT, total serum proteins and serum albumin, were done. Other relevant investigations were also considered, such as hemoglobin count, total leukocyte count, prothrombin time, international normalized ratio and blood urea, creatinine, and electrolytes.

USG of the abdomen was done in all patients when they presented in the out-patient department or in the emergency with complaints suggestive of cholecystitis or obstructive jaundice. By this any abnormality of the gallbladder, CBD, liver, or pancreas was detected.

During the study period a total of 107 patients visited this tertiary care centre whose data was analyzed. On the basis of CBD diameter, a division into group 1 and group 2 is done. Group 1 has a CBD diameter of more than 10mm, and group 2 has a CBD diameter of less than 10 mm. Group 2 are excluded from the study. In the group, 1 total patient were 70, with CBD diameter more than 10, and were divided into subgroups A and B with 35 patients each, on the basis of surgical management of CBD stone. Group A, which included 35 patients, were subjected to LCBDE and group B which included 35 patients, were subjected to ERCP (Table 2).

After collecting data was compiled, analyses were done using SPSS v13.0 for Windows. The results were expressed using appropriate statistical methods. The present trial is to compare both procedures in terms of success rate, mortality, morbidity, cost-effectiveness and patient acceptance.

Procedure

During ERCP endoscope introduced through mouth opening under sedation with patient in left lateral or semi prone position upto 2nd part of duodenum. With a side-viewing endoscope, bile duct opening, i.e., papilla, is identified as a small hole with surrounding induration. Through the operating channel of endoscope guidewire is introduced upto the duodenum, then the papillary opening,it is advanced into the biliary duct over guide wire. The bile duct then cannulated and dye injected, then X-rays taken to look for biliary tree anatomy or CBD stone as filling defect. Then a papillotome is introduced and papilla cut longitudinally, then stone extractor is used to retrieve the CBD stone. In case of multiple large stones, not extracted by above method CBD stone crushed or lithotripsy done by mechanical, laser method and then stone is removed and again dye injected and X -rays taken to look for residual stones. After satisfactory results ,the endoscope was taken out and the patient kept in the recovery room under observation till the sedative drugs effects were resolved.

Ercp Sphincterotomy Stone Extraction

Patients with radiological evidence of CBD stone with CBD diameter more than 10mm with or without GB stone were planned for laparoscopic CBD exploration in the same sitting of laparoscopic cholecystectomy.

During LCBDE, supraduodenal choledochotomy is done at most dilated part of CBD or over the stone. Then the choledochotomy wound extended along CBD upto 1 to 2 cm by laparoscopic scissors. All biliary sludge and small stones were flushed with saline. In case of large stone or impacted stone not removed by flushing, stones are removed by stone extractors. Then a rigid nephroscope or ureteroscope introduced through choledochotomy proximally and distally into bile duct to ensure clearance from duct.

After thorough exploration of bile duct and removal of CBD calculi a watertight closure of CBD was accomplished using a continuous or interrupted vicryl suture of no 3-0 or 4-0 absorbable sutures.

Then GB removed from GB fossa after clipping the cystic duct and artery. Drain was placed in GB fossa.

Laparoscopic choledochotomy. A longitudinal supraduodenal choledochotomy was made using microscissors The length of incision was based on size of stone.

Types of Outcomes

Primary Outcome

- Perioperative morbidity and mortality within 30 days of the procedure require readmission.
- Mortality at maximal follow-up.
- Bile leak requiring reoperation.

Secondary Outcomes

- Operating time.
- Hospital stay.
- Conversion rate.
- Requiring 2nd operation.
- Complications like wound infection, stent migration leading to obstructions, persistent biliary fistula, residual stone, septicemia, and subphrenic abscess in case of LCBDE are common.

Pancreatitis, cholangitis, duodenal perforation and hemorrhage are complications in case of ERCP.

Table 1: Clinical features of choledocholithiasis

S. no.	*Clinical Feature*	*No.of Cases*	*Percentage (%)*
1.	Biliary Colic	57	53.3
2.	Jaundice At Admission	67	62.6
3.	Pruritus	40	37.3
4.	Flatulent Dyspepsia	50	46.7

Table 2: Radiological features

Usg Finding	*No Of Cases*		
	Single Stone	*Multiple Stone*	*Total*
Cbd Stone With Cholelithiasis	53	54	107
Diameter Of Cbd >10mm	33	37	70
Diameter Of Cbd <10mm	20	10	30

Table 3: Effectiveness of procedures

Procedure	*Total No.*	*Stone Cleared*	*Percentage (%)*
Ercp	35	31	88
Lcbde	35	32	91.4

Table 4: Average length of hospital stay

Procedure	*Mean Stay*
Ercp With Laparoscopic Cholecystectomy	6-7 Days
Lcbde	4-5 Days

Table 5: Complication rate

Complication	*Lcbde (Primary Closure)*	*Ercp*
Wound Infection	12	-
Bile Leak	6	
Biliary Peritonitis	-	
Subphrenic Abscess	-	
Septicemia	-	
Acute Pancreatitis	-	2
Duodenal Perforation	1	-
Hemorrhage	-	-

RESULTS

In our study 35 patients were subjected to LCBDE and stone clearance occurred in 32 (91.4%) patients and among 35 patients subjected to ERCP stone clearance occurred in 31 (88.5%) patients with p value 0.88, i.e., there is no significant difference in two groups. But it was found that among the LCBDE group, in 3 patients, conversion to open procedure has occurred due to extensive adhesions around CBD. In ERCP group, failure of stone clearance occurred in 4 patients due to a Stone size more than 10 mm, which were difficult to retrieve even after dilation of the sphincter and CBD exploration is needed in later dates (Table 3).

In the ERCP group, the mean stay in hospital was 2 days, but this value increased to 7 days in cases developing pancreatitis as a complication, which was managed conservatively (Table 4). In LCBDE group wound infection occurred in 12 patients, bile leak in 6 patients. The complication developed in 14 patients (13.4%), with a significant *p-value* 0.023. Postoperative hospital stay was 2 days (2–7 days) and 5(3–9) days in ERCP and LCBDE groups respectively, But if ERCP was followed by laparoscopic cholecystectomy this hospital stay has increased to 6 days (Table 4). Mean operative time in the ERCP group was 39 minute. But in the LCBDE group this time increased to 124 minutes, with a significant difference, *p-value* of 0.009.

Complication in Ercp vs Lcbde

The success rate of stone clearance was not significantly different in both groups. But with a stone size more than 10 mm it was unable to retrieve stone by ERCP, so LCBDE preferred when stone size reached 10 mm or more.

The operative time was significantly low in the ERCP group with little risk of anesthetic procedure as it is done under sedation, but in case of ERCP another procedure of cholecystectomy is needed which predisposes it to another anesthetic procedure burden.

Morbidity like wound infection, bile leak are higher in the laparoscopic group, whereas these are never found in the ERCP group. In ERCP serious complications like pancreatitis, duodenal perforation, and hemorrhage can occur.

The postoperative stay and return of work were in favor of the ERCP group but there is always a need for a second procedure like cholecystectomy, which increased total stay in the hospital to 6–7 days (Table 5).

Average Length of Hospital Stay

ERCP along with laparoscopic cholecystectomy gives patients the burden of two procedures,hence more complications, more postoperative stay ,twice exposure to anesthetic procedures,and more costlier than LACBD due to two procedures being performed , limitation in removal of stone more than 10 mm in size,which need LACBD and statistically increasing the likelihood of complications due to two procedures. Complications in ERCP like pancreatitis and duodenal perforations, are more severe as compared to complications in LCBDE (Table 4).

With the quantum improvement in laparoscopic techniques and increasing expertise, surgeons were comfortable with the laparoscopic techniques of CBD surgery. A single procedure (both for gallstones and CBD stones) which could be performed by minimally invasive technique, was an attractive proposition compared with multiple interventions with risk in endoscopy followed by laparoscopic cholecystectomy. However, laparoscopic CBD surgery is time-consuming and requires patience and expertise with frequent use of laparoscopic techniques, increasing expertise in laparoscopic procedure with high success rate and no need for second procedure LCBDE with laparoscopic cholecystectomy becoming the treatment of choice in expert hands.

CONCLUSION

A prospective study has been done with 107 patients having CBD stones demonstrated preoperatively by USG whole abdomen. Total 35 patients among these were subjected to LCBDE and 35 patients were subjected to ERCP.

The postoperative hospital stay was significantly more in the ERCP group with more anesthetic procedure complications as patients had been exposed to two procedures of ERCP followed by laparoscopic cholecystectomy. . Morbidity like wound infection, bile leak are higher in the laparoscopic group, which were absent in ERCP, but Serious complications like pancreatitis, duodenal perforation, hemorrhage, occurs in ERCP (Table 5).

ERCP along with laparoscopic cholecystectomy gives patients the burden of two procedures, hence more complications, more postoperative stay, twice exposure to anesthetic procedures,an d more costlier than LACBD due to two procedures being performed , limitation in removal of stone more than 10mm in size, for which LACBD is needed and statistically increasing the likelihood of complications due to two procedures. Severe complications in ERCP like pancreatitis and duodenal perforations, are more common as compared to complications in LCBDE.

With the improvement in laparoscopic technique and increasing expertise, surgeons were comfortable with laparoscopic techniques of CBD surgery. A single procedure (both for gall stone and CBD stone), which could be performed by minimally invasive technique, was an attractive proposition compared with multiple interventions. However, laparoscopic CBD surgery is time-consuming and requires patience and expertise with frequent use of laparoscopic technique, increasing expertise in laparoscopic procedures with high success rate and no need for second procedure LCBDE with lap cholecystectomy becoming choice of treatment in expert hands.

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