Management Modalities of Choledocholithiasis: Endoscopic Retrograde Cholangiopancreatography Versus Open Common Bile Duct Exploration and Laparoscopic Cholecystectomy.

Apurva P. Vaidya, Prashant N. Mukadam**, Dhaval V. Patel*, Vineet V. Shukla*, Rushi R. Vansdadia**

Abstract

Background and Objective : Common bile duct stone typically requires surgical intervention, which primarily involves open CBD exploration + Laparoscopic cholecystectomy, endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic CBD exploration. Open CBD exploration has multiple complications, high mortality rate and long recovery time. **Methodology :** A total of 50 cases presenting as choledocholithiasis between July 2018 to August 2020 were taken for study. 1st group of 20 patients underwent open cholecystectomy with open CBD exploration. 2nd group of 20 patients underwent ERCP followed by interval (6 weeks) laparoscopic cholecystectomy. **Results :** ERCP found to be better when compared with open CBD exploration in terms of less post-operative complications (5% in ERCP vs 20% in Open CBD exploration) and less mean duration of hospital stay(5 days in ERCP vs 8 days in Open CBD exploration). **Interpretation and Conclusion :** For management of CBD stone patient, gold standard treatment is ERCP followed by Laparoscopic Cholecystectomy. While in patients with incomplete clearance of CBD stone after ERCP, CBD exploration either laparoscopically or by open approach should be preferred. While in patients with CBD stone greater than 2 cm size, direct open CBD exploration is the preferred option.

Keywords: CBD Stones, ERCP, Laparoscopic Cholecystectomy, Open CBD exploration.

Introduction:

Biliary obstruction, which is the impedance of bile flow from the liver to the small intestine, can occur at different levels within the biliary system. Choledocholithiasis is the presence of stone in common bile duct which is the major cause of biliary obstruction. In majority of cases, the stone in common bile duct are primarily formed in gallbladder and descend down into the common bile duct and in few cases, stone arise de novo in common bile duct. The incidence of choledocholithiasis is continuously rising in developing countries may be due to change in dietary habits, increasing awareness of health in people and improvements in the imaging technology.[1,2] Though they are seen in all age groups, it is the 'fat, fertile, flatulent, female of forty' that is most commonly affected. The incidence is also increase with age of the patient. [3]

Common bile duct stone typically requires surgical intervention, which primarily involves open choledochotomy (OCT), endoscopic sphincterotomy (EST), and laparoscopic CBD exploration. [4-6] Many studies show that the classical approach of OCT has a wide range of adverse events, with a reported incidence ranging from 14% to 36% and a high mortality rate of 1% to 2%. [7, 8] OCT also has long recovery time and can cause low gastrointestinal quality of life. [9] However, the latter two approaches (EST and laparoscopic CBD

* Resident Doctor,
** Professor, General Surgery Department, AMC MET Medical College, Maninagar, Ahmedabad, Gujarat, India – 380008
Correspondence : Dr. Apurva P. Vaidya
E-mail : apvaidya66@gmail.com

exploration) are increasingly used due to their low invasiveness. Accumulating evidence has confirmed the safety and efficacy of EST in the treatment of CBDS. [10, 11] Unfortunately, EST has also been associated with many long-term sequelae, including recurrent CBDS, post-endoscopic retrograde cholangiopan-creatography (ERCP) pancreatitis (PEP), acute cholangitis (AC), and malignant degeneration, and thus requires further intervention.[12, 13] Furthermore, the assessment of the relative advantages of these approaches is hindered by the fact that complications and mortality after OCT have declined with time.

Methods:

Patients presented with common bile duct stone, admitted under general surgery department at LG General Hospital, Maninagar, Ahmedabad were study participants. The current study was Observational Study with sample size of total 40 patients who were included in this study. All the patients were divided into two groups of 20 patients each. 1st group of 20 patients underwent open cholecystectomy with open common bile duct exploration in same operation. 2nd group of 20 patients underwent ERCP followed by interval (6 weeks) laparoscopic cholecystectomy.

Inclusion Criteria:

- Patient admitted with common bile duct stone/stones,
- From July 2018 to August 2020, in our college attached hospital. (AMC MET Medical college and Associated Sheth L. G. Hospital, Ahmedabad)

Exclusion Criteria:

- Patients having intra-hepatic duct stone/stones.
- Patients having biliary stricture.
- Patients having past history of cholecystectomy (residual stones).

Detailed history was elicited including operative risk factors, previous biliary surgeries and a thorough physical examination was done. Biochemical investigations were done in all patients preoperatively and postoperatively. Ultrasonography was performed in all patients with a clinical suspicion of CBD calculi. Dilatation of intra and extra hepatic biliary radicals was considered as an indirect evidence of CBD stones. Presence or absence of gall bladder stones or wall thickening was also noted. CT scan with MRCP was performed in patients in whom ultrasonography was not able to pick up stones in the CBD or detect dilatation of the biliary radicals. ERCP was done in 20 patients. If stones were found in ERCP, an endoscopic sphincterotomy was done in all patients and their retrieval was attempted. A CBD stent was inserted in all patients, which was to be removed after 6 weeks. Cholecystectomy was done and T-tube was placed in all patients who underwent open surgery.

Results:

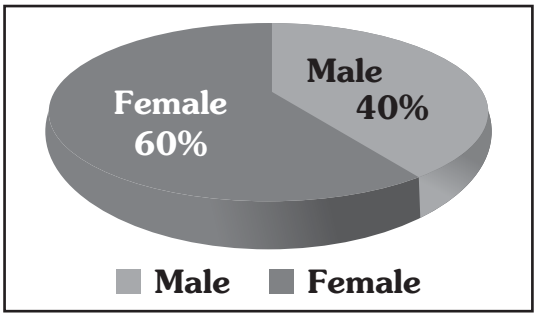
In this study, 40 patients of different age and sex and various presenting symptoms admitted at L. G. Hospital were observed for the study. The age at presentation of choledocholithiasis symptoms ranged from 28 years to 80 years. Most of the patients were present between 31-40 year of age 12 (30%), followed by between 51-60 year of age 9 (22.5%).

Table1: Number of patients of different age at time of presentation of symptoms.

Age in years	Number	Percentage
Less than 30	5	12.5
31 – 40	12	30
41 – 50	8	20
51 – 60	9	22.5
61 – 70	5	12.5
Above 70	1	2.5
Total	40	100

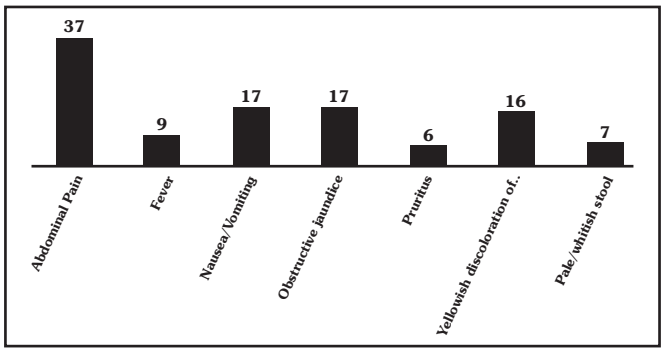
Of total, 24 patients (60%) were females and 16 patients (40%) were males, thus the female to male ratio of choledocholithiasis is 1.5:1.

Figure 1 : Gender distribution of study participants



Abdominal pain was a complaint in 37 patients (92.5%) which was colicky in nature and felt in the epigastrium and radiated to the right hypochondrium and to the right subscapular region, followed byobstructive jaundice and nausea/vomiting in17 patients (42.5%) of each, yellowish discoloration of urine in 16 patients (40%), fever in 9 patients (22.5%), pale/whitish stools in 7 (17.5%) and pruritus in 6 patients (15%).

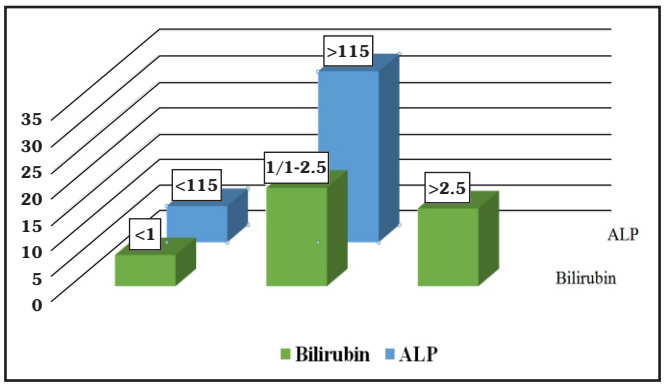
Figure 2 : Presence of different clinical symptoms in patients having choledocholithiasis



Serum Bilirubin was mild to moderately raised in 19 patients (47.5%) and markedly raised in 15 patients (37.5%).Serum Alkaline Phosphatase was raised(>115IU/L) in 33 patients (82.5%).

On ultrasonography, ductal dilatation was seen in 24 patients (60%) and CBD stone was seen in 29 patients (72.5%). 11 patients, in whom ultrasonography did not shows stone, underwent a CECT or MRCP of the abdomen in 9 and 2 patients

Figure 3 : Value of S. Bilirubin and ALP in patients studied



respectively and CBD stone found in all patients. 20 patients (50%) underwent open common bile duct exploration with cholecystectomy in whom 5 patients (25%) require intraoperative cholangiography. From 20 patients who underwent open CBD exploration and cholecystectomy, 1 patient (5%) developed bile leak, 1 patient (5%) developed wound infection, 1 patient (5%) acute renal failure and 1 patient (5%) developed pneumonia. From 20 patients who underwent ERCP and Lap cholecystectomy, 1 patient (5%) developed pneumonia.

Table 2: Post-operative complications in both strategies of management

Complication	Open CBD Exploration and Cholecystectomy		ERCP + Lap Cholecystectomy	
	Frequency	%	Frequency	%
Haemorrhage	0	0	0	0
Bile leak	1	5	0	0
Wound Infection	1	5	0	0
Acute Renal Failure	1	5	0	0
Pneumonia	1	5	1	5

Mean duration of hospital stay was 8 days in 20 patients who underwent open CBD exploration and cholecystectomy and 5 days in 20 patients who underwent ERCP + Lap Cholecystectomy.

Table 3: Duration of Hospital stay in days

Duration of Hospital stay (in days)	Open CBD Exploration with Cholecystectomy	ERCP + Lap Cholecystectomy
Min – Max	7-22	5-15
Mean duration of stay	8	5

Discussion:

A study of 40 patients with common bile duct stone was done at our hospital from June 2018 to November 2020.

There was a predominance of females over males. The group of individuals with 31-40 years of age were most susceptible to common bile duct stone diseases. Though CBD stones are seen in all age groups, it is the 'fat, fertile, flatulent, female of forty' that is most commonly affected. The incidence is also increase with age of the patient.[3] Abdominal pain, Jaundice and Nausea/Vomiting were more common presenting compliant as compared to Fever, Pruritus in patients having common bile duct stone in our study. Rubin et al reported that 50% of the patients with common bile duct stones had jaundice.[14]

Eminent elevation in conjugated bilirubin and alkaline phosphatase is seen in obstructive bile ductal disease which found in more than half of the patients in our study of common bile duct stone. Diagnostic sensitivity of ultrasonography for choledocholithiasis is 95 to 99% with a very low false positive and false negative rate.[15] Diagnostic sensitivity of ultrasonography for choledocholithiasis found in our study up to 72.5%.

CECT and MRCP is highly sensitive for diagnosis of common bile duct stone with almost 100% specificity[16] which found similar in our study. When ERCP was used as therapeutic modality, it was successful in all patients in our study which correlate with study which shows that ERCP stone extraction is successful in >85-90% cases.[15] Intraoperative cholangiography required in 5 patients (25%) of open common bile duct exploration in whom doubtful clearance of calculi. Rate of post-operative complication is high in open common bile exploration surgery (20%) compared to endoscopic and laparoscopic surgery (5%) [16] which is nearly similar to our study. Endoscopic and laparoscopic procedure has low morbidity, faster recovery and less hospital stay compared to open common bile duct exploration surgery[3] which co relates with the results of our study.

Conclusion:

Management of Common Bile Duct stone is a complex procedure requiring, thorough clinical assessment of the patients and also scientific, sound and frequent decision making. Ultrasonography and ERCP are routine diagnostic investigation modalities. Sometimes we can often choose from other low invasive modalities such as MRCP or CECT for diagnosis of common bile duct stones. For successful management of CBD stone patient, 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 facility available in the institute) should be preferred. While in patients with CBD stone greater than 2 cm size, direct open CBD exploration is the preferred option. An integrated health care team including surgeons, gastroenterologists and radiologists is very helpful in decreasing patient morbidity and yielding good results.

References:

1. Cushieri A. Disorder of the Biliary tract. In: Cushieri A, Steele RJC, Moosa AR, eds. Essential surgical practice, 4th ed. London: Butterworth Heinemann; 2002. P.375-454.
2. Cranley B, Logan H. Exploration of the common bile duct – the relevance of the clinical picture and importance of

preoperative cholangiography. Br J Surg 1980; 67:869-72.

3. Neoptolemos JP, Shaw DE et al, A multivariate analysis of preoperative risk factors in patients with Common Bile Duct Stone, Implications for treatment, Ann Surg, 1989; 209; 157-161.
4. Pitt HA. Role of open choledochotomy in the treatment of choledocholithiasis. Am J Surg. 1993;165:483–486.
5. Hanif F, Ahmed Z, Samie MA, Nassar AH. Laparoscopic transcystic bile duct exploration: the treatment of first choice for common bile duct stones. SurgEndosc. 2010;24: 1552–1556.
6. Kageoka M, Watanabe F, Maruyama Y, Nagata K, Ohata A, Noda Y, Miwa I, Ikeya K. Long-term prognosis of patients after endoscopic sphincterotomy for choledocholithiasis. Dig Endosc. 2009;21:170–175.
7. Zhu QD, Tao CL, Zhou MT, Yu ZP, Shi HQ, Zhang QY. Primary closure versus T-tube drainage after common bile duct exploration for choledocholithiasis. Langenbecks Arch Surg. 2011;396: 53–62.
8. Tham TC, Carr-Locke DL, Collins JS. Endoscopic sphincterotomy in the young patient: is there cause for concern? Gut. 1997;40: 697–700.
9. Liu F, Bai X, Duan GF, Tian WH, Li ZS, Song B. Comparative quality of life study between endoscopic sphincterotomy and surgical choledochotomy. World J Gastroenterol. 2014;20:8237–8243.
10. Sugiyama M, Atomi Y. Follow-up of more than 10 years after endoscopic sphincterotomy for choledocholithiasis in young patients. Br J Surg. 1998;85:917–921.
11. Costamagna G, Tringali A, Shah SK, Mutignani M, Zuccalà G, Perri V. Long-term follow-up of patients after endoscopic sphincterotomy for choledocholithiasis, and risk factors for recurrence. Endoscopy. 2002;34:273–279.
12. Freeman ML, Nelson DB, Sherman S, Haber GB, Herman ME, Dorsher PJ, Moore JP, Fennerty MB, Ryan ME, Shaw MJ, Lande JD, Pheley AM. Complications of endoscopic biliary sphincterotomy. N Engl J Med. 1996;335:909–918.
13. Prat F, Malak NA, Pelletier G, Buffet C, Fritsch J, Choury AD, Altman C, Liguory C, Etienne JP. Biliary symptoms and complications more than 8 years after endoscopic sphincterotomy for choledocholithiasis. Gastroenterology. 1996;110:894–899.
14. Rubin JR, Beal JM. Diagnosis of choledocholithiasis, Surg Gynaecol Obstet 1983;156:16-20.
15. Russell RCG. The gall bladder and the bile ducts. In: Russell RCG, Williams NS, Bullstrode CJK (editors). Bailey and Love's Short Practice of Surgery, 23rd ed, Arnold 2000; 54:966-986.
16. Sabiston's textbook of surgery, 19th edition, volume -2, chapter 55, page no 1488,1490.