

Research Article

A study of open surgical approach for common bile duct stones

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ABSTRACT

Background: Common bile duct stones (CBDS) occur in 3-14 % of all the patients for whom cholecystectomy is performed. In this study we are presenting the experience of dealing with common bile duct stones by open surgical methods. The objective of the study was to study the open surgical approach for common bile duct stones.

Methods: The study comprised of 162 cases admitted in surgical & medical wards at Osmania General Hospital and MRIMS, Hyderabad during the period from March 2010 to September 2015. Out of the 162 common bile duct calculi 100 cases were treated non-surgically and 62 cases were subjected to surgery.

Results: Out of 62 cases 45 cases (72.5%) were subjected to open cholecystectomy, CBD exploration and T-tube drainage. In 10 cases (16.1%) patients underwent choledochoduodenostomy and in one case choledochojejunostomy was performed. In 4 cases (6.4%) associated with choledochal cyst, hepaticojejunostomy was done, combined with excision of the cyst. Other 2 cases were of Mirizzi's syndrome.

Conclusions: Out of the 62 cases one died of cholangitis and rest of the patients survived. Our follow-up period varied from 1 year to 5 years.

Keywords: Common bile duct (CBD) exploration, T-tube drainage, Cholecystectomy, Choledochoduodenostomy, Hepaticojejunostomy

INTRODUCTION

Common bile duct stones (CBDS) are one of the medical conditions that may require surgical intervention. It is very important to distinguish between primary and secondary stones. Primary stones are formed in CBD and biliary tree itself and secondary stones are from gallbladder¹ (gallstones) that pass through cystic duct to CBD. CBDS account for nearly 3-14.7%^{2,3} of all cases for whom cholecystectomies are performed. There are various modalities of treatment (medical & surgical) and competing technologies and approaches for diagnosing and managing CBDS. Laboratory tests like LFT^{4,5} can be used to screen CBDS and elevated serum bilirubin, alkaline phosphatase reflect biliary obstruction although they are not highly sensitive for CBDS. Trans abdominal Ultrasonogram⁶ is sensitive in detecting CBDS in 25-63% and it has 95% specificity. ERCP is often described as a gold standard for detection of CBDS. It has sensitivity of

92-95%^{7,8} and specificity of 90-98%. Endoscopic Ultrasonogram is also highly specific. MRCP is an accurate non invasive diagnostic modality. It has overall specificity of 97% for demonstrating CBDS. The main options for treatment are pre/post operative ERCP with endoscopic sphincterotomy (ES). There are other options for CBDS such as electro hydraulic lithotripsy (EHL), extra corporeal shock wave lithotripsy (ESWL), dissolving solutions and laser lithotripsy.

Several randomized control studies showed superior outcomes for standard open surgical procedures as compared to endoscopic (ERCP/ES) treatment for CBDS. Although the success rate for stone clearance for isolated ERCP treatment is up to 87-97%. Another 25% of these patients require two or more ERCPS. This method is associated with morbidity and mortality rate of 5-11% and 0.7-1.2% respectively. The complications of ERCP include bleeding, duodenal perforation, cholangitis,

pancreatitis and bile duct injury. Moreover ERCP is technically not possible in 3-10% of the cases.

Endoscopic balloon dilatation of papillae has been advocated as an alternative method to ES.⁹ The procedure is easier with less of bleeding and less of disruption of function of sphincter of Oddi in comparison to ES. However endoscopic biliary drainage is less successful than ES and hence it is reserved for those with coagulopathy and who are at risk of infection.

It is always important to ensure adequate biliary drainage in patients with CBDS (stones not yet extracted). Short term biliary stenting followed by ES or surgical treatment is advocated. Surgical treatment of CBDS can be done either by laparoscopic common bile duct exploration (LCBDE) or by open surgical methods with T-tube drainage. When LCBDE and post operative ERCP fail, the surgeon must use the open approach.

Martin et al reported open surgery more successful with a lesser mortality than ES.¹⁰ There are generally few options for open exploration; one of the commonly practising options is exploration of the CBD, T-tube drainage combined with cholecystectomy. Other options are choledochoenterostomy or sphincterotomy.

Surgeons experience dictates the preference of operation. Choledochoenterostomy for CBDS is usually reserved for CBD greater than 2 cm in diameter. Choledochoenterostomy is most commonly performed as a side to side choledocho duodenostomy, usually in a setting of dilated CBD with multiple stones. These patients usually have good long term results without recurrence of jaundice or cholangitis. The alternative operation is transaction choledocho duodenostomy (where the transected bile duct is anastomosed end to side with Second part of duodenum). This carries excellent results. Another option is choledocho jejunostomy with Roux-en-Y loop.

Rarely some cases of CBDS are associated with choledochal cysts where hepaticojejunostomy is preferred after excision of cyst. In Mirizzi's syndrome cholecystectomy is always done with CBD exploration and CBD drainage and sometimes hepatico jejunostomy is required.

Today management of CBDS is a complicated procedure. USG and ERCP are the routine diagnostic modalities in most of the centers. The other non invasive modalities are MRCP or CT.

LCBDE (transcystic/transductal) is a standard method for the treatment of CBDS in most centers. Pre and post operative ERCP with ES can be used as alternative method. In centers where technical knowhow and equipment paucity are encountered, open procedures yield good and excellent long term results. One should not forget that open approach is the final option when

other modalities fail. Electro hydraulic lithotripsy, extracorporeal shockwave lithotripsy, laser lithotripsy and dissolving solutions have special indications.

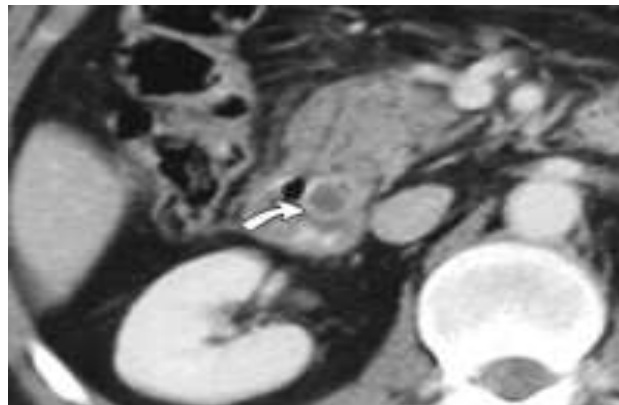


Figure 1: 50 year old man with stone in distal CBD presenting as rim sign on CECT.

METHODS

Type of study: Hospital based prospective study.

Study population: Known cases of common bile duct stone patients.

Sample size: During study period, 162 cases were admitted in the surgery and medical ward out of which 62 were operated.

Ethical considerations: Institutional Ethics Committee permission was obtained. Informed consent was taken from each and every patient after explaining them about the nature of study.

Inclusion criteria

- 1 Diagnosed cases of common bile duct stone which could not be treated by medical approach.
- 2 Patients willing to participate in the study.
- 3 No other serious health problems.

Exclusion criteria

- 1 Patients not willing to give consent for the participation in the study.
- 2 Patients with severe cardio pulmonary disease.
- 3 Patients with diagnosis other than CBDS.

The present study aims at analyzing the results of patients who underwent open surgical procedures. Patients with CBD calculi admitted in surgical wards at Osmania General Hospital & MRIMS, during the period from March 2010 to September 2015 were included in the study. Out of 162 cases of CBDS admitted, 100 cases were managed successfully with non surgical ERCP/ ES and stenting. The focus of this study is on patients who underwent open surgical procedures. Nearly 38.2 % of

the cases (62 out of 162 cases) underwent open surgical procedures.

Initially detailed history was recorded in the pre designed questionnaire. Thorough clinical examination was carried out and recorded. All necessary investigations were done which were required for the patients.

Statistical analysis

The data was entered in the Microsoft Excel Worksheet and analyzed using proportions.

RESULTS

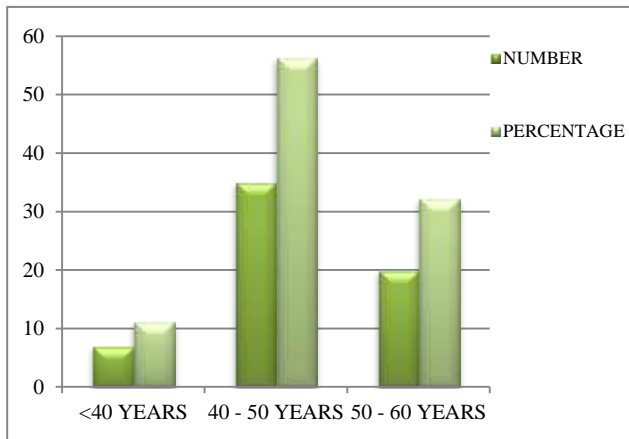


Figure 2: Age distribution.

In this surgical group, 80.6% (50 cases) of the cases were females and rests were males' i.e., 19.4% and majority of cases belonged to 40-50 yrs age group (56.4%). Next in frequency was age between 50-60 yrs (32.2%).

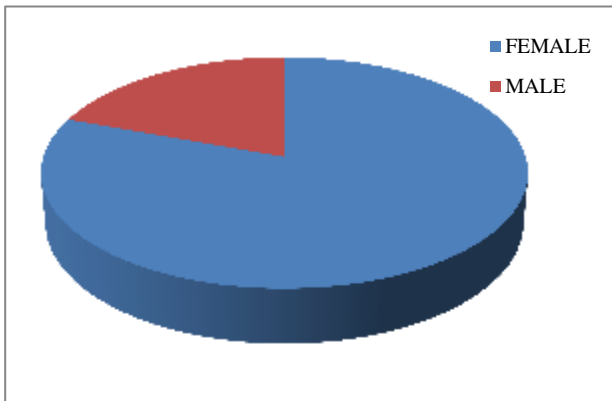


Figure 3: Sex wise distribution of study subjects.

Most cases presented with jaundice 90.3% and 85.4% (53 cases) of these cases presented with colicky pain. 50% of these cases had fever. 100% of these patients had pruritis. Nausea and vomiting were noticed in 85.4% (53 cases) of these cases. Tenderness in right hypochondrium was

elicited in 90.3% of these cases. In 8.06% of these cases (5 cases) had nodular liver suggesting cirrhosis.

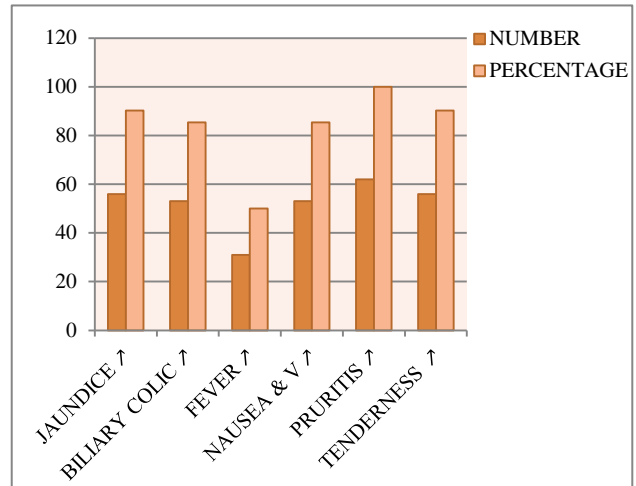


Figure 4: Distribution of study subjects as per clinical features.

The workup included liver function tests, USG, ERCP and in few cases MRCP. LFT showed variable results. 56 (90.3%) cases had elevated alkaline phosphatase, direct bilirubin was elevated in 54 cases (87.09%) and serum gamma glutamyl transpeptidase (GGT) were raised in 50 cases (80.64%). In 100% of the cases (62) ERCP was specific in making a diagnosis. MRCP was done only in fewer cases (6 cases), the reason being it is more expensive. In this study all the cases where MRCP was done showed 100% specificity for CBDS.

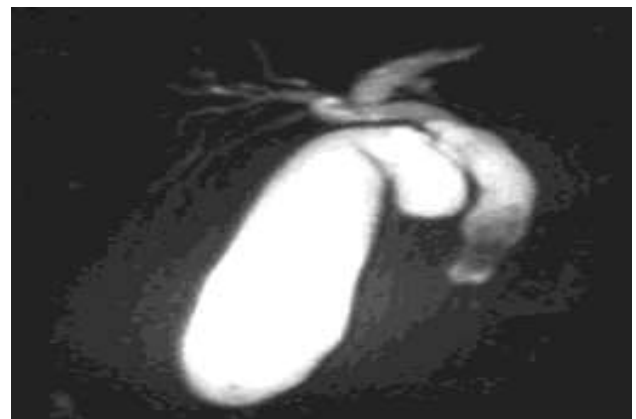


Figure 5: MRCP shows stones in fundus of gallbladder, stone in distal CBD with dilatation.

USG of the abdomen was done in all 62 cases. In 61 cases (98.38%) yielded positive result.

Totally 62 cases of CBDS were treated surgically. In 45 cases (72.5%) cholecystectomy, CBD exploration and T-tube drainage was done. In 10 cases (16.1%) Choledochoduodenostomy was done.

In four cases (6.4%) associated with choledochal cyst, excision of the cyst was done and this was followed by hepatico jejunostomy. In 2 of our cases Mirrizi's syndrome was noted. In one case without fistula, cholecystectomy, CBD exploration and T – tube drainage was done. In other case with Mirrizi's syndrome had cholecysto duodenal fistula. In this case subtotal cholecystectomy with drainage of fistula (Malecot's catheter) and 6 weeks later hepatico- jejunostomy was done.

61 (98.38%) out of 62 patients survived. One patient died due to postop cholangitis. One case had Subhepatic abscess which was treated by drainage. One case was associated with duodenal stenosis and additional vagotomy/GJ was done. In this series one case of extra hepatic portal hypertension was encountered, which was treated with spleno-renal shunt prior to definitive surgery.

DISCUSSION

CBDS are one of the medical conditions which may necessitate surgical intervention. In the study 38.2% of the cases (62 out of 162) underwent surgical procedures. This is considered higher than what is quoted in the literature i.e.: 3-14.7%.^{2,3} The probable reason may be failure of ERCP and Endoscopic sphincterotomy due to non – availability of the standard equipment and initial difficulties in learning curve. All the cases in the present study underwent open surgical method in view of the lack of laparoscopic equipment with additional gadgets.

Symptoms and signs of CBDS are highly variable. It can range from patients being completely asymptomatic to complications such as cholangitis or pancreatitis. The prevalence of asymptomatic CBDS ranges between 5.2 - 12% as per study done by Rooseland and T.B. Glomsaker.¹¹ In this study all the patients were symptomatic. The commonest symptoms were pruritis and jaundice. Cholangitis and pancreatitis are two serious complications. One of the cases died of cholangitis. In cholangitis the classic symptoms of Charcot's triad may

be encountered. Similar symptoms were noticed in the present study.

LFT is used to screen CBDS. Elevated serum direct bilirubin and alkaline phosphatase typically indicates biliary obstruction but these are neither highly sensitive nor highly specific for CBDS. Our study also supports the same [87.09% (elevated direct bilirubin), 90.3% (elevated alkaline phosphatase)]. In the literature ultra sonogram of abdomen is specific in 95% of the cases as reported by M. Sugiyoma and Y. Atomi study.¹² In this present series there was 98.38% specificity in diagnosing CBDS with ultrasonogram of abdomen.

Table 1: Diagnostic methods.

Diagnostic test	Number	%
1. LFT		
A) alkaline phosphatase	56	90.30
B) direct bilirubin	54	87.09
C) GGT	50	80.64
2. USG abdomen	61	98.38
3. ERCP	62	100.00
4. MRCP*	6	100.00

* Done in only 6 cases

ERCP is often described as gold standard, today it is more often a therapeutic modality and its sensitivity ranges between 92-95% in detecting CBDS, specificity of 90-98%. This correlates well with present study. Recent Meta analysis of 67 published controlled trials shows that MRCP has overall sensitivity of 95% and specificity of 97% for demonstrating CBDS. But major disadvantages of MRCP are lower spatial resolution, availability, claustrophobia and inability to evaluate patients with pacemakers. In India economics constraints also dictate performing this specific test. In all the cases in the present study where MRCP was done (6) it yielded 100% positive results. Three of these cases had hypersensitive reaction to the dye and other three patients had associated pancreatitis and hence MRCP was preferred in these cases.

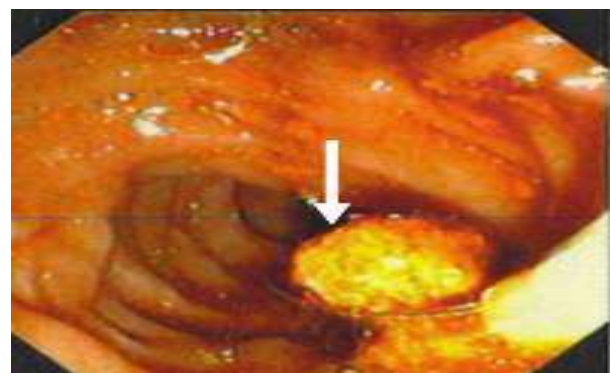


Figure 6: Wire basket introduced after sphincterotomy to extract stone and release stagnant bile into duodenum (blue arrow), a large cholesterol stone in the duodenum after basketing (white arrow).

Table 2: Operative procedures.

Operative procedures	Number	%
1. Cholecystectomy + CBD exploration & T-tube drainage	45	72.5
2. Choledochoduodenostomy	10	16.1
3. Choledochojejunostomy	1	1.61
4. Hepaticojejunostomy	5	8.06

When LCBDE and post operative ERCP fail, the surgeon must use open approach for surgery. Martin et al¹⁰ reported open surgery as being more successful and a lower mortality than ERCP in CBDS. In the present series all the cases were approached by open method. CBD exploration with T-tube drainage and cholecystectomy was the method employed in most of the cases. The advantage with this method is definite removal of stones and least complications. When CBD greater than 2 cm in diameter, the option is choledocho enterostomy and was done in 11 cases. In choledocho duodenostomy side to side anastomosis was done and in none of these cases the sump syndrome was observed. Recurrence of CBDS after endoscopic sphincterotomy is reported in a good number of cases (6-21%) resulting from denovo primary stone formation or recurrent secondary migration of stones from gallbladder.



Figure 7: Intra operative photograph showing open common bile duct.

Hence surgery was the only option in such situations. Post operative complications rate is lowest with surgery vis-à-vis endoscopic methods. In the present study one patient died due to cholangitis. The results are comparable with most other studies.

CONCLUSION

Management of CBDS is a complicated procedure for the treating surgeon. Ultra sonogram and ERCP are the routine diagnostic methods. The recommended procedures for patients with CBDS are ERCP combined with Endoscopic Sphincterotomy. Open surgical

approach remains as a final option when other modalities have failed and open method produces good results. Other newer methods like electro hydraulic lithotripsy, laser lithotripsy, extracorporeal shockwave lithotripsy and dissolving solutions have special indications in selected cases and more clinical trials are required in this area.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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