

Original Research Article

Choledochoduodenostomy versus T-tube drainage in patients have stones in common bile duct with risk factors of post-operative missed stones

Mohamed M. Ali*, Mena Zarif Helmy, Emad Gomaa

Department of General Surgery, Sohag University, Sohag, Egypt

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***Correspondence:**

Dr. Mohamed M. Ali,

E-mail: mohamed.mahmoud@yahoo.com

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ABSTRACT

Background: Residual or missed stones of common bile duct (CBD) and ascending cholangitis after CBD exploration are major biliary surgery problems. Repeated biliary tract interventions for correction of complications are catastrophic on both patients and surgeons.

Methods: This is a prospective study of 83 patients which compares two methods for surgical management of CBD stones between June 2016 to May 2018. Group I included 43 patients who were managed by CBD exploration followed by insertion of T tube, the risk factors of the incidence of missed retained stone in CBD were multiple stones in CBD and hugely dilated CBD (>15 mm). The second method was choledochoduodenal anastomosis for patients having the same previous risk factors (Group II) which included 40 patients. Postoperative follow up was for 12 to 18 months.

Results: In group I, 7 patients developed residual stones in CBD, reoperation was required for 3 of them and endoscopic retrograde cholangiopancreatography with sphincterotomy for another remaining 4 patients, while in the other group (group II) 2 patients suffered from ascending cholangitis and are managed conservatively. No missed or residual CBD stones were developed and no patients need reoperation.

Conclusions: With choledochoduodenostomy in patients with multiple CBD stones or markedly dilated CBD the incidence of missed or retained stones in CBD was reduced.

Keywords: T-tube, Missed stones, CBD exploration

INTRODUCTION

Choledocholithiasis means bile duct containing stones it is estimated that choledocholithiasis are present in anywhere from 1-15% of patients with cholelithiasis. Gallstones may pass into common bile duct (CBD) commonly from gall bladder through the cystic duct. The stones are called secondary bile duct stones within intrahepatic biliary tree, termed primary hepatolithiasis, and may lead to choledocholithiasis.¹ Its usual presentations are biliary colic with jaundice, gallstone

pancreatitis ascending cholangitis and elevated bilirubin, alkaline phosphatase.²

The diagnosis is usually suspected through clinical evaluation confirmed by laboratory investigations, ultrasound, magnetic resonance cholangiopancreatography (MRCP) or endoscopic retrograde cholangiopancreatography (ERCP) (diagnostic and therapeutic), options of treatment include open surgery, laparoscopic cholecystectomy with laparoscopic exploration of CBD, stone extraction by ERCP and

laparoscopic cholecystectomy or laparoscopic cholecystectomy with postoperative ERCP and sphincterotomy according to availability and experiences.³

Open exploration of CBD is considered a standard method following ERCP failure or absence of availability of laparoscopic exploration of CBD it means stone extraction from bile duct after its opening, then CBD closure with or without T tube insertion.⁴ Although the effectiveness and safety of both methods, post-operative problems may occur that include residual or missed stones in CBD or stasis and ascending cholangitis. These problems may be corrected by ERCP but if it failed, reoperation is then necessary. This has technical surgical difficulties with added mortality and prolonged morbidity. So surgeon's aims to avoid the need for secondary surgical intervention on the biliary tract with all its problems post-operative complications are suspected if risk factors as multiple bile duct stones or marked bile duct dilatation (>15 mm) are present.⁵

The aim of the study was the comparison between results of choledochoduodenostomy versus T-tube drainage in open exploration of CBD.

METHODS

This is a prospective study conducted in Sohag University Hospital which tried to compare methods of open CBD exploration during the period from June 2016 to May 2018. Preoperative diagnosis was settled upon a delicate history and accurate physical examination. Investigations included laboratory (liver function tests, prothrombin time, hepatitis markers, blood urea, Creat, fasting blood sugar and full blood count), radiological (abdominal ultrasound and MRCP was done in all patients, abdominal CT scan was done only to exclude pancreatic pathology. Post-operative tubal cholangiogram was done in all patients having T tube 7-10 days post operatively. This study included 83 patients which compares two surgical groups. Group I included 43 patients managed with bile duct exploration followed by insertion of a T tube, the risk factors of the incidence of missed or retained stones in the CBD were multiple stones and hugely dilated CBD (>15 mm). The second strategy was choledochoduodenal anastomosis in patients with the same previous risk factors, (Group II) which included 40 patients, and then the incidence of residual or missed CBD stones was compared. Exploration of CBD followed by insertion of a T tube had an average operative time of 1 hour and 38 minutes while it was 1 hour and 47 minutes in case of choledochoduodenostomy which are shown in the next Figures 1 to 4. Follow up period was one to one and half years.

Statistical analysis

The data were analyzed by SPSS data base with application of Chi-square test and proportion comparison,

$p < 0.01 - 0.05$ and 95% confidence interval to be significant.

Operative technique

General anaesthesia, supine position. Urinary catheterization was done for all patients for assessment of the urinary output. Introduction of nasogastric tube for gastrointestinal tract decompression and then removed postoperatively. The incision for all patients was Kocher incision. Then exploration of both gall bladder, CBD for stones was done. Intraoperative cholangiogram was not available in our hospital. Then two stay suture in the bile duct after needle aspiration, longitudinal incision of the CBD was done in its supraduodenal part followed by forceps extraction of stones and the bile duct was milked for large or impacted stones from downward toward the choledochotomy opening, then irrigation of CBD was done. Gentle brobing of CBD by 4-6 mm dilator was done for group II patients were used T tube with size ranged from 12-14 Fr that introduced through choledochotomy opening into the CBD in group II patients choledochoduodenal anastomosis was performed after clearance of bile duct from stones and duodenal mobilization. The technique was through one layer side to side anastomosis using vicryl 2/0 or 3/0 with round needle. Tubal drain was put intraperitoneally are removed after one week.



Figure 1: Dilated CBD.

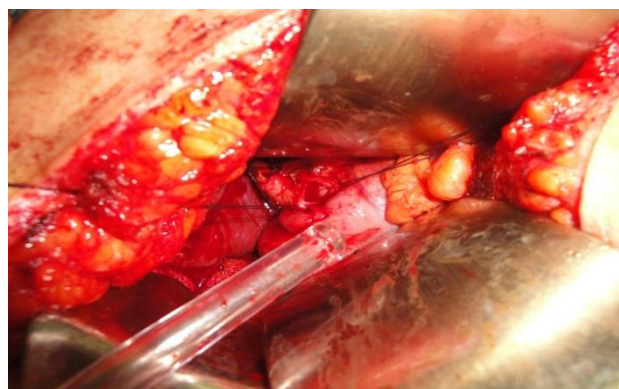


Figure 2: Stay suture in CBD with choledochotomy.



Figure 3: Choledochotomy with duodenotomy.

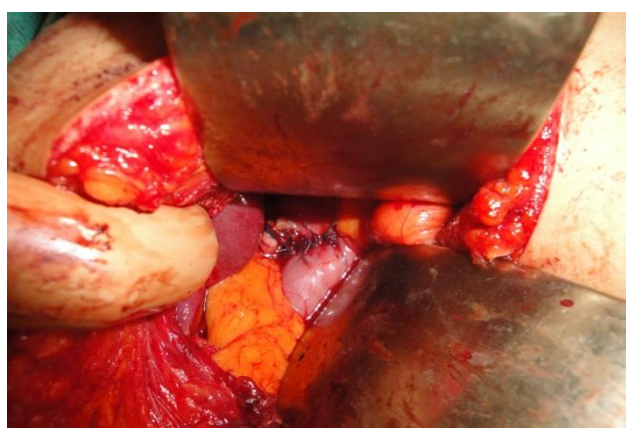


Figure 4: Choledochoduodenostomy.

RESULTS

Age ranged between 22 and 72 years with a mean of 53.4 years. Group I included 43 (52.4%) patients and Group II included 40 (48.1%) patients. The table 1 show

demographic criteria. Majority of them are female with 1.78 to 1 female to male ratio.

Table 1: Demographic criteria of both groups.

Criteria	Group I	Group II
Mean age (in years)	51.6	52.4
Female	27	25
Male	16	15
Total	43	40

Analysis of clinical, sonographic and laboratory data was done, Chi-square test was used for statistical analysis which showed that jaundice, dilated bile duct, abnormal pain and abnormal liver function tests are the main criteria without significant difference between group II patients as p value >0.01-0.5 ensure complication of both groups together.

Postoperatively, in Group I, 36 were well and 7 patients developed missed CBD stones, 2 of them were discovered on postoperative T-tube cholangiogram and needed reoperation, 2 after 5 months and treated by endoscopic sphincterotomy and 3 after 9 months, two of the them were treated by endoscopic sphincterotomy and in the third ERCP failed and treated by open exploration of CBD. In group II, 2 patients developed cholangitis which resolved on conservative treatment and no incidence of residual or missed CBD stones and no patients needed reoperation. Statistical analysis using test of comparison of proportions showed that the prevalence of residual CBD stones in group I were significantly higher than in group II choledochoduodenostomy decreased significantly the prevalence of CBD stones in p value <0.05 and 95% confidence interval. There were no significant differences in other complications between the two groups (Table 3).

Table 2: Clinical data, sonographic and laboratory results of two groups.

Criteria	Group I		Group II		P value
	Frequency	%	Frequency	%	
Abdominal pain	40	93.97	38	94.36	0.36
Jaundice	41	95.18	39	97.18	0.41
Cholangitis	12	28.9	11	26.76	0.44
HBsAg positive	0	0	1	1.28	0.56
HCV positive	3	6.9	2	5.0	0.31
Dilated CBD	41	95.8	38	95.77	0.53
CBD stones	35	81.16	34	85.91	0.36
Abnormal liver function tests	41	95.59	39	97.18	0.32

Table 3: Postoperative complications in both groups.

Complications	Types of drainage		P value
	Group I (43) (T-tube drainage)	Group II (40) (Choledochoduodenostomy)	
	N (%)	N (%)	
Wound infection	4 (9.3)	2 (5)	0.52
Cholangitis	2 (4.65)	2 (5)	0.87
Residual stones	7 (16.2)	0 (0)	0.01

The difference between two groups as regard other complications were not significant (Table 3).

DISCUSSION

Missed or residual stones in bile duct after its exploration is catastrophe on the patient and surgeon. There are lots of debates around residual bile duct stones after CBD exploration.¹⁰ Noted in 14.8% in a study included 59 patients with residual stones after CBD exploration and stone extraction, residual stones after open CBD exploration and insertion of T tube drainage.⁶ Harold et al quotes 11% residual stones after CBD exploration for stones.⁷

Lygidakis et al reported 20.0% residual stones after conventional CBD exploration and insertion of T tube. The risk of missed or residual stones in the bile duct will increase if complete clearance of stones from the CBD is not achieved. Even if choledocopy, cholangiography and T tube drainage were done the ideal method for doing open exploration of bile duct is unclear, and it must cover the following criteria which are removal of all bile duct stones with mud irrigation and performing proper biliary drainage to avoid stasis. Missed or residual stone in bile duct with ascending cholangitis.⁸

This study showed that, in group I, the prevalence of residual stones is 8.43% which is lower than earlier studies due probably short postoperative follow up period. Prospective analysis of our patients showed that the risk factors responsible for missed or residual bile duct stones incidence were present in most of cases. This is agreed with Moreaux et al, which concluded that the post-operative complications increased with presence of marked CBD dilatation or multiple stones.⁹

Bile duct clearance is doubtful in presence of multiple CBD stones, so, missed or residual bile duct stones incidence will increase.¹⁰

Prolonged cholestasis in markedly CBD dilatation (>15 m) predispose to damage of bile duct mucosa due to infection. Ending by improper biliary drainage and cholidocholithiasis.¹¹

In group II by cholidochoduodenal anastomosis as a drainage procedure in presence of previous risk factors, out of 83 patients, choledochoduodenostomy was carried out in 40 patients having the same previous risk factors. 2 patients only suffered from ascending cholangitis which resolved conservatively, no reoperation was needed as no patients developed missed stones. Statistically choledochoduodenostomy procedure showed significant reduction in the incidence of missed CBD stones. post operatively by comparison of proportion test p-value this agreed a study with Kamran et al, no missed CBD stones incidence in 54 patients managed by choledochoduodenal anastomosis. It seems that the problem is due to inadequate drainage of bile and addition of

choledochoduodenostomy will provides an effective and safe biliary drainage.¹² The drawback of our study was that infrequent performance of this drainage procedure as the endoscopic tools advanced and improved but choledochoduodenostomy is still required for some patients specially with the above mentioned risk factors or if the experience of laparoscopic management is not accessible, It cannot be applied for all patients. choledochoduodenal anastomosis has certain indications mostly if there is markedly dilated CBD>15 m to avoid stricture of the bile duct.¹³ The most important draw backs of choledochoduodenostomy are sump syndrome and ascending cholangitis. Food reflux can occur early or late. Our study showed 2 patients who were managed conservatively. It is not frequent in most of studies and the cause is commonly stoma stenosis, marked dilatation of bile duct will avoid this complication. Presence of pain, rigor, fatigue and diarrhea will diagnose sump syndrome, which is due to presence of debris, stones in the lower part of bile duct leads to ascending cholangitis and diarrhea. This problem was not seen in our study which may due to short term follow up and similar problems could not identified by many authors. Avoid stricture of the bile duct.^{14,15}

CONCLUSION

From this study, choledochoduodenostomy is considered effective and safe procedure for significant reduction of missed or residual bile duct stone incidence if it is compared with biliary drainage using T tube in presence of risk factors.

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