



OBSERVATIONAL STUDY ON CHOLEDOCHODUODENOSTOMY AND T-TUBE DRAINAGE IN CHOLEDOCHOLITHIASIS PATIENTS WITH RISK FACTORS OF POST-OPERATIVE MISSED STONE

General Surgery

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KEYWORDS

INTRODUCTION

Cholelithiasis means stones in bile duct it is estimated that choledocholithiasis is present in 1-15% of patients with cholelithiasis and 29.7% patients with post cholecystectomy patients. Common bile duct stones (CBDS) is still challenging to surgeon despite advances in surgery which is commonly performed in conjunction with cholecystectomy. In patients with symptomatic cholelithiasis the incidence of CBDS varies widely between 5% and 33% according to age⁽¹⁻³⁾. CBDS can either be primary (originating within the CBD) or secondary (originating in the gallbladder) and pass into the CBD through cystic duct or bile duct stones within intrahepatic biliary tree, termed primary hepatolithiasis, and may also lead to secondary choledocholithiasis⁴. Abdominal sonography and magnetic resonance cholangiopancreatography (MRCP) are the most common non-invasive pre-operative imaging modalities for detection of CBDS⁵.

CBDS are present in approximately 5% of the patients undergoing elective cholecystectomy and 10% of patients presenting with acute cholecystitis. If CBD stones are diagnosed pre-operatively, several different treatment modalities can be utilized for CBDS removal. Although the CBDS may be silent, the development of symptoms is potentially serious; biliary colic, obstructive jaundice, ascending cholangitis, acute pancreatitis and elevated bilirubin, alkaline phosphatase are all associated with serious morbidity and at times, mortality which need immediate attention⁶.

When endoscopic retrograde cholangiopancreatography (ERCP) fails or non availability of laparoscopic exploration of CBD, open exploration of the CBD is the gold standard. After opening the bile duct stone removed with closure of CBD with or without T Tube insertion⁷. Both techniques are safe and successful with post op complications that may occur such as missing or residual stones in CBD, stasis and ascending cholangitis. These can be corrected with ERCP but if ERCP fails secondary surgery will be required¹⁰. This has technical difficulty with increased mortality and morbidity.

In this study our main objective is to evaluate efficacy of Choledochoduodenostomy versus T-tube drainage in patients with CBD stones in risk factors of post-operative missed stone (multiple CBD stones or marked CBD dilatation >15 mm)

MATERIAL AND METHODS

This was an observational study conducted from June 2019 to June 2022 at Department of general surgery, silchar medical college and hospital, Assam, India the study population consist of all the patients who underwent either choledochoduodenostomy or T tube drainage procedure for CBD stone.

In these patients CBD stone was diagnosed preoperatively by clinical features, abdominal ultrasound, and magnetic resonance cholangiopancreatography. And abdominal CT was done to exclude pancreatic pathology. T tube cholangiogram was done 10- 14 days post operatively.

Inclusion criteria:-

Patients diagnosed with choledocholithiasis
Patients aged 12 to 70 years
CBD diameter $\square > \square 0.8$ cm and $\square < \square 2.5$ cm
Patients who give consent for the study

Exclusion criteria:-

Patients with acute suppurative cholangitis, acute pancreatitis, hepatolithiasis, biliary neoplasm, biliary malformation, distal CBD stricture

Sample Size:-

Sample size was calculated considering prevalence of 27.9% according to (Spataro, Joseph MD1; Tolaymat, Mazen MD2; Kistler, Charles A. MD1; Jacobs, Michael BS3; Fitch, Jeffrey BS4; Ahmed, Monjur MD1. Prevalence and Risk Factors for Choledocholithiasis After Cholecystectomy: 72. American Journal of Gastroenterology (112: p S32-S33, October 2017.)

We found 81 patients are needed. The study was started with a target of 81 patients for the possible loss of patients and data during the study and finally 90 patients were analysed. The study included 90 patients in two surgical groups. group I included 48 patients who underwent CND exploration with T tube insertion and group II included 42 patients who underwent choledochoduodenal anastomosis.

The data were analysed 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 method:-

In General anaesthesia and supine position. Nasogastric tube introduced for gastrointestinal tract decompression and then removed postoperatively. The incision for all patients was Kocher incision. Then cholecystectomy with exploration 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 given over CBD 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 with normal saline was done. Gentle probing of CBD by 4-6 mm dilator was done for group I patients were T tube with size ranged from 12-14 Fr 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. Tube drain was put intraperitoneally, removed after one week.

RESULTS

Age and sex wise distribution:-

From June 2019 to June 2022, 90 patients with choledocholithiasis underwent T – tube insertion or Choldochoduodenostomy for CBD stone.

Age ranged between 25 and 75 years with a mean age of 43.6 years. Group I included 48 (53.3%) patients and Group II included 42 (46.6%) patients. Majority of them are female with female to male ratio 2:1 (table 1 and fig 1)

Table 1: Demographic details of both groups.

Criteria	Group I	Group II
Mean age(in years)	42.3	44.9
Male	16	14
Female	32	28
Total	48	42

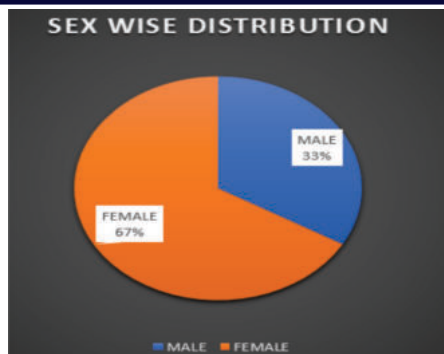


Fig-1 Clinical, sonographic and laboratory data analysis: -

On analysing clinical, sonographic and laboratory data it was found that majority of patients have abdominal pain and jaundice, some patients also presented with cholangitis with no significant difference between two groups.

Mean CBD diameter was 10.75 mm and most of patients have abnormal LFT values with no significant difference between two groups.

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

Criteria	Group I		Group II		P value
	Frequency	%	Frequency	%	
Abdominal pain	40	83.3	38	90.4	0.41
Jaundice	32	66.6	33	78.5	0.61
Mean CBD diameter (mm)	11.2		10.3		0.88
Cholangitis	10	20.8	8	19.0	0.32
Abnormal LFT	42	87.5	38	90.4	0.30

Intraoperative characteristics:-

In all the 90 patients complete CBD clearance was obtained. Mean operative time in group I was 94 min which was statistically significantly lower than group II that was 102 min, p value <0.05

Table 3: Intraoperative characteristics

Criteria	Group I		Group II		P value
	Frequency	%	Frequency	%	
Complete CBD clearance	48	100	42	100	1
Mean Operative time (min)	94		102		0.04

Postoperative analysis:-

Post operative period in group I, 45 patients were normal and 3 patients developed bile leak in drain site which stopped in post op day 5 in 2 patient and in post op day 7 in 1 patient.

In group II 29 patients were normal but 13 patients developed bile leak in drain site which was managed conservatively and it stopped in post op day 7 in 9 patients and in post day 10 in 2 patients and in post op day 14 in 1 patient. (P value <0.05 that is statistically significant).

In group I, 5 patients developed missed CBD stone discovered on postop T-Tube cholangiogram and needed reoperation. In group II no residual stone discovered. (P value <0.05 is statistically significant).

In both groups, 4 patients developed cholangitis which resolved on conservative management. (p value >0.05 is statistically insignificant). Choledochoduodenostomy significantly decreased the prevalence of CBD stone and bile leak was significantly lower in patients with T Tube insertion.

Table 4: Postoperative complications in both groups

Criteria	Group I		Group II		P value
	Frequency	%	Frequency	%	
Bile leak	3	6.0	13	30.9	0.02
Residual stone	5	10.4	0	0	0.01
Biliary peritonitis	0	0	0	0	
Cholangitis	2	4.1	2	4.7	0.78
Wound infection	5	10.4	3	7.1	0.61

DISCUSSION

The commonest post op complication after Choledocholithiasis is residual stone that is problem to both patient and surgeon. Lot of discussion has been done earlier around residual bile duct stones after CBD exploration and stone extraction¹¹. In a study of 59 individuals, 14.8% had residual stones following CBD exploration and stone extraction, while 14.8% had residual stones after open CBD exploration with T tube drainage¹². Harold et al., report 11% leftover stones during CBD stone exploration¹³.

Lygidakis et al., colleagues found 20.0% residual stones following traditional CBD investigation and T tube insertion. 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 after choledocopy, cholangiography and T tube drainage the ideal method for doing open exploration of bile duct is unclear, and the following criteria must be covered which are removal of all bile duct stones with mud irrigation and performing proper biliary drainage to avoid bile stasis. Missed or residual stone in bile duct can lead to ascending cholangitis¹⁴.

Our study showed that, in group I (T Tube insertion) 10.4% had residual stone which is lower than earlier studies probably due short postop follow up period. Prospective analysis of our patients showed risk factor attributed to missed or residual Bile Duct stones were present in most of patients. This is agreed with Moreaux et al., which concluded that the post-operative complications increased with presence of marked CBD dilatation or multiple stones¹⁵.

In presence of multiple CBD stones, complete bile duct clearance is doubtful, so, missed or residual bile duct stones incidence will increase. Intraoperative choledochoscopy should be strongly recommended as a routine procedure during CBD exploration to confirm the clearance of CBD, which could significantly lower the risk of residual stones postoperatively¹⁶. In our hospital Intraop cholangiogram was not available.

In our study choledochoduodenostomy procedure showed significant reduction in the incidence of residual CBD stones. Post operatively by comparison 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 mainly due to inadequate bile drainage and choledochoduodenostomy will also provide effective and safe bile drainage¹⁷. The most important draw backs of choledochoduodenostomy are ascending cholangitis and sump syndrome. Food reflux in stoma site can occur early or late. Our study showed 2 patients who developed cholangitis who were managed conservatively. This is not frequent in most of the previous studies. most probable cause could be stoma stenosis, marked dilatation of bile duct would this complication. In case of pain, rigor, fatigue and diarrhoea will point towards sump syndrome, which is due to presence of debris or stones in the lower part of bile duct leading to ascending cholangitis and diarrhoea. This problem was not seen in our study which may due to short term follow up and similar problems could not be identified by many authors.

It seems problem is due to inadequate drainage of bile and choledochoduodenostomy will provides an effective and safe biliary drainage.

CONCLUSION

From this study, it can be considered that choledochoduodenostomy is effective and safe procedure for significant reduction of missed or residual bile duct stone incidence when compared with biliary drainage using T tube insertion.

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