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MANAGEMENT OF CBD STONES: CHOLEDOCHOTOMY WITH PRIMARY REPAIR WITH T-TUBE DRAINAGE VERSUS CHOLEDOCHODUODENOSTOMY

General Surgery

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ABSTRACT

INTRODUCTION : Gallstone disease , especially cholelithiasis with choledocholithiasi is very common problem in world. The surgical options for its management are choledochotomy with primary repair with T- tube drainage and choledochoduodenostomy.

METHODS : It is a retrospective study done in swami vivekanand subharti medical college from 2009-2019 and total 29 patients underwent CBD exploration out of which 14 patient underwent t- tube repair (Group A) and 15 patient underwent choledochodudenostomy (Group B) . We studied the indications for CBD exploration for these two surgeries and also compared the mean CBD diameter and its postoperative outcomes in both the groups .

RESULT : The mean age of patients in t-tube repair (Group A) was 42.06 yr and choledochoduodenostomy (Group B) was 42 yrs . On evaluation, in all surgery group (total n= 29) cholelithiasis and choledocholithiasis was detected in 18 patients (62.06%) , stricture was present in 5 patients (17.24%) , mirzzis in 4 patients (13.79%) , pancreatitis 2 patients (6.8%) , CBD stent in 2 patients (6.8%) . Choledochotomy was done in all 29 patients for removal of stones . Total 29 patients , 14 patients (48.27%) under went t-tube repair and 15 patients (51.72%) underwent choledochoduodenostomy . Postoperatively , no patient detected bile leak , sump syndrome and recurrence of CBD stones .

CONCLUSION : On comparison of two groups t- tube repair was done in 14 patients with mean CBD diameter of 8.82 +- 1.23 mm and choedochodudenostomy was done in 15 patients with mean CBD diameter 13.55+- 1.39 mm . The results were comparable as there was significant difference in the CBD diameter in between the two groups .

KEYWORDS

CHOLEDOCHOTOMY , T-TUBE DRAINAGE , CHOLEDOCHODUODENOSTOMY , MEAN CBD DIAMETER , CHOLEDOCHOLITHIASIS

INTRODUCTION :

Gallstone disease, especially cholelithiasis is very common problem in world. It is associated with choledocholithiasis, pancreatitis, cholangitis, hepatolithiasis benign and malignant disorders of periampullary region. Treatment of choledocholithiasis is endoscopic removal of stones (ERCP) and now a days advanced laparoscopic surgeries also in choice and gold standard treatment (1). However, there are various indications for open CBD exploration and sometimes surgical treatment is only option where advanced laparoscopic and endoscopic surgeries are not available. The surgical options are open choledochotomy with primary repair with T- tube drainage and choledochoduodenostomy for various disoders of CBD as well as periampullary disease.

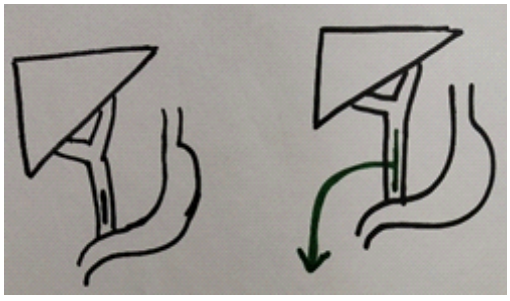

Fig 1 Choledochotomy + T –Tube Drainage

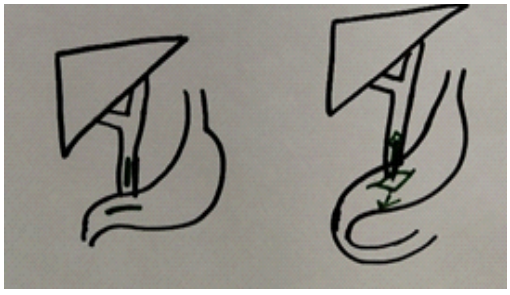

Fig 2 Choledochoduodenostomy

The aim of present study to compare the indications and results of choledochotomy with t- tube drainage with choledochoduodenostomy

METHODS :

It is retrospective study done in Swami Vivekananda Subharti medical college and data collected from all the CBD operations, Choldochotomy with t- tube drainage and choledochoduodenostomy from Jan 2009- Jan 2019 (10 yr) and we studied the indications for CBD exploration for these two surgeries with repect to CBD diameter and its postoperative outcomes.

We categorise the total patients into two groups Group (A) in which Choledochotomy with primary repair with t- tube was done and Group (B) in which choledochoduodenostomy was done. The total number of patients who underwent CBD exploration were 29 out of which 14 patient underwent t- tube repair and 15 patient choledochodudenostomy.

All the patients were subjected to baseline investigations which were included, hemogram, kidney function test, liver function test, coagulation profile, Abdominal ultrasound, MRCP

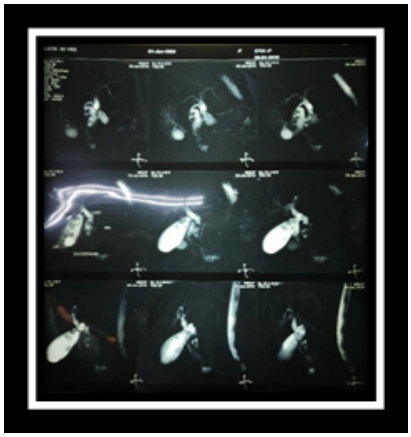

Fig 3 : MRCP in Cholelithiasis with choledocholithiasis

was indicated in patients with deranged LFT
All the patients underwent CBD exploration for CBDS stone removal, stones were removed using desjardine forceps. Bougies were used for know the patency of lower end of CBD to duodenum. CBDS were were flushed with normal saline. Complete biliary clearance was also detected with choledochoscopy.

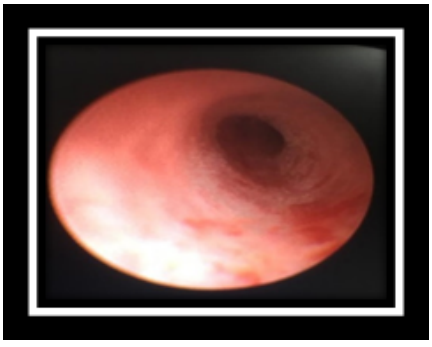

Fig 4 a Choledochoscopy

Fig 4b Choledochoscopy

CDD (Choledochoduodenostomy) was performed between the first part of duodenum supraduodenal part of CBD using side to side technique.

All the patients with t-tube drainage, t -tube cholangigram was done before removal of t-tube. Right subhepatic drain was placed in all the cases.

Fig 5 T-tube cholangiogram before removal of t- tube.

Patients were followed for variable period from 6 month to 2 year.
Statistical Analysis: We calculate the mean as well as standard deviation of CBD diameter in between the two groups using this formula.
$S = \sqrt{\sum} (X - X\,mean)2 \div n-1$
X = CBD Diameter
X mean = Mean CBD Diameter
N = Total number

These two were independent groups and we applied t-test (two paired hypothesis) with the p value significance of 0.05.

RESULT:
All the demographic criterion as mean age, and gender distribution was analysed in between the two groups and results were comparable (.Table 1)

TABLE 1 : Demographic criterion of both the groups

CRITERION	t-tube drainage (Group A)	CDD (Group B)
Mean Age	42.06(yr)	42(yr)
MALE	2 (14.28%)	4 (26.66%)
FEMALE	12 (85.71%)	11(73.33%)
Total	14	15

All the patients, clinical findings (Abdominal pain, jaundice, cholangitis, mirrizis, pancreatitis), ultrasound findings (dilated CBD, CBD stones, CBD stricture, laboratory findings as, Hb, TLC, LFT) were compared and results were comparable in between the two groups and there was not significant difference was present (Table 2),

Table 2: Clinical, Ulatrasonographic, And Laboratory Criterion Of Both The Groups

CRITERION	t-tube drainage (Group A)	CDD (Group B)
ABDOMINAL PAIN	10 (71.42 %)	13 (86.66 %)
JAUNDICE	2 (14.28%)	4 (26.66%)
CHOLAGITIS	2 (14.28%)	3 (20%)
DILATED CBD	12 (85.71 %)	15 (100%)
CBD STONES	8 (57.14 %)	10 (66.66%)
CBD STRICTURE	-	5 (33.33%)
ABNORMAL LIVER FUNCTION TEST	6 (42.85 %)	6 (40%)
MIRRIZI	4 (28.57%)	-
PANCERATITIS	2 (14.28%)	-
S/P ERCP	2 (14.28%)	-

TABLE 3 FINAL DIAGNOSIS IN PATIENTS

CALCULUS GROUP (CHOLELITHIASIS + CHOLEDOCHOLITHIASIS)	18 (62.06%)
STRICTURE	5 (17.24%)
OTHER PRESENTATION MIRRIZI PANCREATITIS S/P ERCP	 4 (13.79%) 2 (6.8%) 2 (6.8%)

Retrospective analysis of 29 patents was done on the basis of clinical, laboratory and imaging study (USG, MRCP) and diagnosis of cholelithiasis with choledocholithiasis was made in 18 patients (62.06%), stricture with dilated CBD was dignosed in 5 patients (17.24%), mirrizis was dignosed in 4 patients (13.79%), cholelthiasis with choledocholithiasis with pancreatisis was diagnosed in 2 patients (6.8%), S/P ERCP with CBD stent in situ with dilated CBD in 2 patients (6.8%).

TABLE 4 RETROSPECTIVE ANALYSIS

Diagnosis (number Of Patients)	SURGERY
Cholethiasis + Choledocholithiasis (6)	Cholecystectomy +choledochotomy + T-tube Drainage (42.85%)
Cholelithiasis + CBD Stent (2)	Cholecystectomy +choledochotomy +t –tube Drainage (14.28%)
Cholelithiasis +mirizzis Syndrome (4)	Cholecystectomy +choledochotomy +t –tube Drainage (28.57%)
Cholelithiasis + Choledocholithiasis + Pancreatitis (2)	Cholecystectomy +choledochotomy +t –tube Drainage (14.28%)
Cholelithisis + Choledocholithiasis (10)	Cholecystectomy +choledochotomy + Choledochodudenostomy (66.66%)
Cholelithisis + Cbd Stricture (5)	Cholecystectomy +choledochotomy + Choledochodudenostomy (33.33%)

Data were also caterorized in two groups on the basis of the two surgeries performed (Group A Choledochotomy with t-tube drainage and Group B choledochoduodenostomy) and CBD diameter was compared between the two groups.(table 4, 5)

TABLE 5 CBD Diameter is calculated and compared in between the two groups using standard deviation.

	GROUP (A) (n=14)	GROUP (B) (n= 15)
Mean CBD Diameter (mm)	8.82+-1.23	13.55+- 1.39

Standerd Deviation	4.45	5.21
Confidence Interval (range +-2 Sd)	6.39-11.24	10.81-16.27

T value is -2.52 and p value 0.01789
The results is significant at $p < 0.05$
Thus there was significant difference in the CBD diameter in between the two procedures

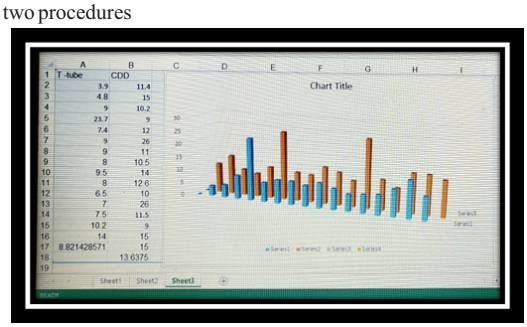

TABLE 6 : CBD Diameter in between the two groups.

Other results. : t –tube cholangiogram was done in all cases with CBD exploration with t- tube in situ before removal of t- tube after 4 weeks and than t- tube was removed. After t- tube removal bile leak detected in two cases. Patient were discharged from hospital after average 12-14 days.No patient of choledochoduodenostomy complained of sump syndrome.

DISCUSSION :
As this is the era of Endoscopy + ERCP and Laparoscopic CBD Exploration and CDD, open CBD exploration has decreased in frequency but there are varied indications for open CBD exploration for clearance of CBD stones and its closure either by t-tube or choledochoduodenostomy (2).In our study, CBD exploration and t-tube drainage was done in 14 patients (48.27%). Out of total 14 patients, 6 patient (42.85%) were of cholelithiasis with choledocholithiasis, 2 patients were of cholelithiasis with choledocholithiasis with pancreastitis, 2 patients (14.28%) were of s/p ERCP with CBD stent insitu, 4 patients (28.57%) were of mirizzis syndrome. (table 4)

In CBD exploration it was routine to drain CBD via t-tube to decompress the CBD and to provide access for postoperative cholangiogram. Various studies showed that t- tube drainage can be complicated by bile leak, excessive loss of fluid and electrolyle, sepsis, wound infection and t- tube removal is also complicated by bile leak, so primary closure has been advocated by surgeons (3). But in our study in only 2 patients bile leak occur postoperatively after t- tube removal that was managed conservatively.

There are various indications of choledochoduodenostomy, as lower CBD stricture, worm obstruction, papillary and ampullary stenosis, perivaterian diverticuli, but its implication in choledocholithiasis had very few studies (4,5,6). In our study, Choledochoduodenostomy was done in 10 patient (66.66%) of dilated CBD with multiple or single impacted stone and 5 patients (33.33%) of dilated CBD with CBD stricture. (Table 4)

Choledochodudenostomy is a procedure where permanent biliary drainage procedure is required. But its importance in choledocholithiasis has been studied and its relation to CBD diameter with repect to t-tube drainage was also compared (7). In our study, during cholecystectomy if difficulty in calots dissection occur because of mirizzis syndrome or missed stones, or CBD was found to be inflamed, than CBD exploration was advocated even CBD was not dilated 4-7 mm diameter.and t-tube was placed to know the bile flow to visualize the biliary tree after the surgery (table 6).

In our study, CDD was done where endoscopic managment was difficult and for multiple primary CBD stones, large impacted CBD stones in lower end of CBD with proximal diameter (9-25 mm), CBD stricture with proximal diameter 10-15 mm (3 patients) to prevent the recurrence of CBD stones. The optimal CBD diameter in various studies.

The optimal CBD diameter in the two operations varied in different studies . (Choledochotomy vs CDD) Rami etal (7) 10.6 $\pm$ 2.7 vs 14.5$\pm$ 2.8 ; in our study , 8.82$\pm$ 1.23 vs 13.55$\pm$ 1.39 .Thus the reults of our study similar to the results of other studies .

CDD is safe procedure with few complications as ascending cholangitis, sump syndrome, and alkaline reflux gastritis.

It was hypothesize in our study that ERCP + sphictrotomy can damage the lower end of CBD sphincter and as permanent drainage stoma was not been given in cases of recurrent and multiple CBD stones, where chances of cholangitis and pancreatitis is more. and it is also observed that in sphicterotomy procedure, sphincter damage can also cause the duodeno biliary reflux that can damage the CBD mucosa, so stricture formation, bacterial overgrowth, cholangitis, recurrent stones, or hepatic abscess is more.(8)

It has also been hypothesize that ERCP + sphicterotomy can cause pancreatitis and increase the inflammation, of CBD thus in our study intraoperatively bougies of varied sizes used to know the patency of lower end of CBD to duodenum and hydraulic flushing + choledochoscopy was also attempted in all the cases to clear the CBD and it was found that CDD is single stage procedure for CBD stone removal and gallstone removal is less time consuming permanenet biliary drainage procedure than in comparison 2 stage ERCP and stenting for removal of stone and cholecystectomy (9). In CDD as permanent drainage of bile was done through stoma ~2-2.5 cm thus, the two common complications of CDD, sump syndrome, stricture of stoma has not been noted in our study as size of stoma was kept in between 2-2.5cm.

As we all know that biliary infection is also a cause of stone formation and its recurrence, thus we compared the recurrence of stone in dilatd CBD with multiple stones along with t-tube drainage and choledochoduodenostomy and in our study no patient presented with recurrence of CBD stones.

Sphincter preservation and permanent drainage of bile from the dilated CBD is our main concern to prevent the recurrence of stone and to prevent the complication in already dilated and inflamed CBD.(10)

CONCLUSION :
This is the retrospective study done in subharti medical college from 2009-2019 to know the management of CBD stones with choledochotomy with t- tube repair (group A) versus choledochoduodenostomy (Group B). It was concluded that choledochotomy with primary repair with t- tube was done in 14 patient with dilated CBD filled with multiple stone, panceatitis, Mirizzis syndrome, pancreatitis, s/p ERCP > 6 month with CBD stent insitu with mean diameter of CBD 8.82 +- 1.23 mm and choedochodudenostomy was done in 15 patients with single large impacted stone (1-2 cm), CBD stricture with mean CBD diameter 13.55+_ 1.39 mm. The mean CBD diameter was compared in between the two procedures and T value is -2.52 and p value 0.01789. The results is significant at $p < 0.05$.

Thus there was significant difference in the CBD diameter in between the two procedures.(7)

Conflict of interest : Nil
Financial Support : Nil

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