

**COMMON BILE DUCT EXPLORATION BY LAPROSCOPY: STENT DRAINAGE  
VERSUS T-TUBE DRAINAGE****\*Dr. Yeshwant Ganpatrao Kale**

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**ABSTRACT**

**Introduction:** It is estimated that 10-15% of the patients operated because of gallstone disease have associated choledocholithiasis important potential source of complications like acute pancreatitis, obstructive jaundice, cholangitis. Laparoscopic common bile duct exploration is a cost effective, efficient and minimally invasive method of treating choledocholithiasis. After common bile duct exploration to avoid bile leakage from site of choledochotomy postoperative T-tube drainage is a traditional and standard procedure and the available drainage options include T-tube placement, common bile duct (CBD) primary closure or primary closure plus placement of biliary stent. Long-term retention of T-tube is sometimes associated with risk of infection, bile leakage and an uncomfortable accessory for the patient. Biliary stent is recommended as it can be spontaneously removed in a reasonable time, without interventions and complications. For this reason the use of spontaneously removed biliary stent evaluation was done after Laparoscopic common bile duct exploration. **Material and Methods:** A total of 36 patients with choledocholithiasis were included in the study. They were placed in 2 groups in group I as stent drainage group and Group 2 as T-tube drainage group. Both groups were operated for LCBDE. Out of 36 patients operated, 18 were in group I (stent drainage group) and 18 were in Group 2 (T-tube drainage group). Demographic data of all the patients was collected. Under all aseptic precautions surgeries were performed by the surgeon under general anaesthesia. A total of four trochars were used for the procedure. T-tube was removed between days 14 and 21 postoperatively after. The biliary stent drainage tube gets expelled by defecation without any special intervention. **Results:** 18 patients were placed in the stent drainage group and 18 patients in the T-tube drainage group. No perioperative and postoperative mortality was noted in our study. In stent drainage group there were 10 male (55.6%) and 8 (44.4%) females, while in T-tube drainage group (n= 18) males 9 (50%) and females 9 (50%) were respectively. No statistically significant difference was observed in the male and female group. Statistically significant difference was observed in both the groups in term of operative findings and outcome (Table 3). Mean operation time in group I was  $105 \pm 24.2$  while in group II was  $124 \pm 34.5$  (P value  $< 0.005$ ). Blood loss during operation in Stent drainage Group (n=18) was  $25 \pm 3.5$  while in T-tube drainage group (n= 18) was  $36 \pm 4.2$  (P value  $< 0.005$ ). Average abdominal drainage tube removal was 3 days in Stent drainage group and 4 days in T-tube drainage group. Intestinal recovery time, postoperative bowel function recovery time was 2 days and 4 days in stent drainage group and T-tube drainage group respectively (P  $< 0.05$ ). Total hospital stay was 7 days in Stent drainage group and 10 days in T-tube drainage group. **Conclusion:** Primary closure of common bile duct with spontaneously removable biliary stent placement is safe and feasible after laparoscopic choledochotomy it has shown less surgical time, less bleeding and less intestinal complications.

**KEYWORDS:** It is estimated that 10-15% of the patients treating choledocholithiasis.**INTRODUCTION**

It is estimated that 10-15% of the patients operated because of gallstone disease have associated choledocholithiasis<sup>[1]</sup>, an important potential source of complications like acute pancreatitis, obstructive jaundice, cholangitis. In open cholecystectomy, the standard practice was single-stage resolution of cholelithiasis with associated common bile duct stones and in 1985 the first laparoscopic cholecystectomy to be performed.<sup>[2]</sup> It was generalization and acceptance as the gold standard technique in the treatment of common bile

duct stones. The next step came as a result of improvements in technology, surgical instruments and surgical technique, resulting in the onset of Laparoscopic common bile duct exploration (LCBDE).

Laparoscopic common bile duct exploration is a cost effective, efficient and minimally invasive method of treating choledocholithiasis. But now a days various options are now available which include Endoscopic Retrograde Cholangiopancreatography (ERCP), laparoscopic CBD exploration (LCBDE) or open CBD

exploration. However Laparoscopic CBD exploration has advantage of minimal access and cost effectiveness.<sup>[3,4]</sup> Laparoscopic bile duct exploration has been shown to be a safe and feasible method for treatment of extra-hepatic bile duct stones.<sup>[5]</sup> After common bile duct exploration to avoid bile leakage from site of choledochotomy postoperative T-tube drainage is a traditional and standard procedure and the available drainage options include T-tube placement, common bile duct (CBD) primary closure or primary closure plus placement of biliary stent. Long-term retention of T-tube is sometimes associated with risk of infection, bile leakage and an uncomfortable accessory for the patient.<sup>[6,7]</sup> Stenosis and recurrent cholangitis are the complications of primary closure.<sup>[8]</sup> Therefore biliary stent is recommended as it can be spontaneously removed in a reasonable time, without interventions and complications. For this reason the use of spontaneously removed biliary stent evaluation was done after Laparoscopic common bile duct exploration.

### MATERIAL AND METHODS

Present study was conducted in the CCM Medical College and Hospital in the Dept. of Surgery from Jan 2015 to Oct 2016. Written informed consent was taken from all the subjects included in the study. The study protocol was approved by the Institutional Ethics Committee.

A total of 36 patients with choledocholithiasis were included in the study. They were placed in 2 groups in group I as stent drainage group and Group 2 as T-tube drainage group. Both groups were operated for LCBDE. Out of 36 patients operated, 18 were in group I (stent drainage group) and 18 were in Group 2 (T-tube drainage group).

Demographic data of all the patients was collected including age, sex, comorbid conditions, and clinical symptoms. Surgical time, intraoperative blood loss,

bowel function recovery time, abdominal drainage time, length of hospital stay and bile leak was observed and noted in all the patients.

Under all aseptic precautions surgeries were performed by the surgeon under general anaesthesia. A total of four trochars were used for the procedure. The cystic artery and the cystic duct isolated and ligated. Artery was divided electro cautery, and the cystic duct was left intact. Common bile duct was incised on its anterior surface and choledochotomy performed with a longitudinal incision. Exploration of biliary tree was performed and stones were removed. Before choledochus closure, a T-tube or biliary stent drainage tube was placed in place. In the stent drainage group, a guide was inserted into CBD through choledochoscope and advanced across the papilla into duodenum, after that the stent was advanced into the duodenum and the guide removed. Choledochoscope was used to confirm the correct positioning of the stent and choledochotomy was closed.<sup>[9]</sup> In the T-tube drainage group, the T-tube was placed in the CBD. Then the cystic duct was divided in both cases and cholecystectomy completed. A subhepatic drainage tube was placed for all patients, which was removed after 2 to 4 days. T-tube was removed between days 14 and 21 postoperatively after. The biliary stent drainage tube gets expelled by defecation without any special intervention.

Data was entered in the Excel Sheet and evaluated. All statistical analyses were performed using SPSS software. Data on continuous variables are presented as mean±standard deviation.

### RESULTS

18 patients were placed in the stent drainage group and 18 patients in the T-tube drainage group. No perioperative and postoperative mortality was noted in our study.

**Table 1: Patients characteristics.**

	GROUP I	GROUP II
	Stent Drainage Group (n=18)	T- tube drainage group (n= 18)
Male	10 (55.6%)	9 (50%)
Female	8(44.4%)	9 (50%)
Mean Age in years± SD	60.23 ± 18.14	61.44 ± 15.14
Mean CBD Diameter ± SD	9.8 ± 7.34	10.1 ± 9.33

In stent drainage group there were 10 male (55.6%) and 8 (44.4%) females, while in T- tube drainage group (n= 18) males 9 (50%) and females 9 (50%) were

respectively. No statistically significant difference was observed in the male and female group.

**Table 2: Co-morbid conditions associated.**

	GROUP I	GROUP II
	Stent Drainage Group (n=18)	T- tube drainage group (n= 18)
Hypertension	2 (11.1%)	1(5.6%)
Diabetes	2 (11.1%)	3 (16.7%)
Jaundice	1 (5.6%)	2 (11.1%)

In stent drainage group 2(11.1%) patients each were having hypertension and Diabetes as a comorbid condition while 1(5.6%) patient was suffering from jaundice. In T- tube drainage group 1(5.6%) patient with

hypertension, 3(16.7%) patients with diabetes and 2(11.1%) patients with jaundice were observed. No statistically significant difference was observed in both the groups.

**Table 3: Operative findings and outcome in both the groups.**

Parameters	GROUP I	GROUP II	P value
	Stent drainage Group (n=18)	T- tube drainage group (n= 18)	
Operation time in minutes	105± 24.2	124±34.5	<0.005
Blood loss during operation in ml	25±3.5	36±4.2	<0.005
Abdominal drainage tube removal in days	3	4	<0.005
Intestinal recovery in days	2	4	<0.005
Total hospital stay	7	10	<0.005

Statistically significant difference was observed in both the groups in term of operative findings and outcome (Table 3). Mean operation time in group I was 105± 24.2 while in group II was 124±34.5 (P value <0.005). Blood loss during operation in Stent drainage Group (n=18) was 25±3.5 while in T- tube drainage group (n= 18) was 36±4.2 (P value <0.005). Average abdominal drainage tube removal was 3 days in Stent drainage group and 4 days in T tube drainage group. Intestinal recovery time, postoperative bowel function recovery time was 2 days and 4 days in stent drainage group and T- tube drainage group respectively (P<0.05). Total hospital stay was 7 days in Stent drainage group and 10 days in t tube drainage group.

### DISCUSSION AND CONCLUSION

The treatment of concomitant gallbladder and common bile duct stones is variable in term of operative procedure from surgeon to surgeon, without a standard treatment protocol. Endoscopic retrograde cholangiopancreatography followed by laparoscopic cholecystectomy has been widely being used, but laparoscopic common bile duct exploration (LCBDE) is also being widely performed by the surgeons. Laparoscopic exploration of the common bile duct has been proven to be an effective and most preferred approach for uncomplicated common bile duct stones. However there is still controversy regarding the choice of biliary decompression after laparoscopic Choledochotomy. Some authors has presented method of LCBDE, with anterograde insertion of an endobiliary stent and primary closure of the CBD using unidirectional barbed suture and observed LCBDE using barbed V-Loc suture with insertion of endobiliary stent is a safe, feasible treatment modality that is easily reproducible.<sup>[10]</sup> Huang J.<sup>[11]</sup> and his colleague in their study placed a spontaneously removed endobiliary J stent in the distal CBD to decompress the biliary tract and performed a primary closure of the CBD after laparoscopic common bile duct exploration and observed that spontaneously removed endobiliary J-stent drainage is a safe and effective surgical technique that allows for straightforward postoperative management after LCBDE.

In surgery with T tube use it is observed that absorption of bowel is affected and peristalsis is slowed down. In biliary stent, the biliary pressure is reduced without loss of bile, and this may help decrease postoperative complications.<sup>[10]</sup> Use of biliary stents and their spontaneous removal does not need a second procedure, which reduces the risk of complications.<sup>[11]</sup> Abdominal drainage tube removal in Stent drainage Group was 3 days while in T- tube drainage group was 4 days. It was statistically significant.

In patients with intestinal adhesion or intestinal diverticulum use of stent drainage should be avoided. Previous studies have shown that patients having intestinal adhesion or intestinal diverticulum, intestinal perforation occurs due to stent migration<sup>[12]</sup> also it is considered that spontaneous removal of stent is associated with the postoperative mental state of patient, activity, diet, and gastric motility.<sup>[9]</sup>

10-15% of patients having gallstone disease have synchronous common bile duct (CBD) stones. Combined laparoscopic cholecystectomy and intra-operative laparoscopic bile duct exploration has been demonstrated to be safe and effective for removal of CBD stones.<sup>[13]</sup> Complication rates and mortality are equivalent between one stage or two stage procedures.<sup>[14]</sup> In a study by showed that Human fibrin sealant can reduce post-operative bile leakage in primary closure of CBD after LCBDE in patients with choledocholithiasis and primary closure of the common bile duct (CBD) without drainage is considered a suitable approach after laparoscopic CBD exploration (LCBDE); however, the risk of post-operative bile leakage is high.<sup>[15]</sup>

Mean operation time in group I was 105± 24.2 while in group II was 124±34.5 (P value <0.005). Blood loss during operation in Stent drainage Group (n=18) was 25±3.5 while in T- tube drainage group (n= 18) was 36±4.2 (P value <0.005). Average abdominal drainage tube removal was 3 days in Stent drainage group and 4 days in T tube drainage group. Intestinal recovery time, postoperative bowel function recovery time was 2 days and 4 days in stent drainage group and T- tube drainage group respectively (P<0.05). Total hospital stay was 7

days in Stent drainage group and 10 days in T-tube drainage group. Similar results were observed by Tang CN et al. they concluded postoperative bile diversion by antegrade biliary stenting after laparoscopic choledochotomy is shown to shorten operation duration and postoperative stay as compared to T-tube drainage, but the problem of bile leak needs further refinement of insertion technique.<sup>[16]</sup>

Primary closure of the CBD without drainage has been performed by surgeons<sup>[17,6]</sup>, and primary closure may avoid complications associated with T-tube placement.<sup>[18]</sup> Also due to instrumentation of CBD papilla could develop oedema and increase biliary pressure, and there is associated risk of bile leakage.<sup>[19]</sup> Therefore spontaneously removable biliary stent can be used as alternative to this. But large studies are required to confirm these results as the sample size in this study was small.

To conclude Primary closure of common bile duct with spontaneously removable biliary stent placement is safe and feasible after laparoscopic choledochotomy it has shown less surgical time, less bleeding and less intestinal complications.

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