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Original Research Article

Primary closure versus T-tube drainage after laparoscopic choledocholithotomy: a prospective randomized study

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ABSTRACT

Background: Traditionally laparoscopic common bile duct exploration is followed by T-tube placement because of which patients suffer problems related to T-tube thereby increasing the morbidity of patients. Primary closure of CBD following laparoscopic choledocholithotomy is now being considered as an alternative superior to the traditional method. This study is designed to analyse the outcome of primary CBD repair in terms of mean operation time, duration of hospital stay and post-operative morbidity.
Methods: A prospective randomized study was done in which 40 patients at our institute and associated hospitals were divided into two groups to compare the results of primary closure to T-tube placement following laparoscopic choledocholithotomy.
Results: 40 patients were included in this study. The mean operating time was observed to be 65±14.05 mins in Group A (primary closure) patients while that in case of Group B (T-tube drainage) patients was 95.25±9.66 mins with a p-value 0.0001 which is considered statistically significant. The average duration of hospital stay in Group A (primary closure) was 8.2 days which was much shorter than that of Group B (T-tube drainage) patients which was of 15.7 days. The post-operative complication was observed in 1 patient of Group A (primary closure) while post-operative complication occurred in 3 patients of Group B (T-tube drainage).
Conclusions: This study indicates that primary repair following laparoscopic choledocholithotomy is a safer and more effective method than T-tube drainage and we strongly recommend this procedure in clinical practice.

Keywords: Choledocholithotomy, Laparoscopic, Morbidity, Primary closure, T-tube

INTRODUCTION

Choledocholithiasis develops in about 10-15% of patients with gallbladder stones and literature suggests that common bile duct (CBD) stones are encountered in approximately 7-15% of patients undergoing cholecystectomy.[1,2] Other sites for the lodgement of these stones include common hepatic duct, left or right hepatic duct. The treatment protocol for extracting the CBD stones is either endoscopic retrograde cholangiopancreatography (ERCP), or surgically, by an open or laparoscopic method. ERCP is suggested in cases where the gall stone is small in size whereas surgical intervention is the choice of management in cases of larger stones. The traditional surgical management of CBD stones consists of a supra-duodenal choledochotomy, removal of stones followed by insertion of T-tube. The T-tube insertion aids in postoperative biliary decompression thereby facilitating the visualization and extraction of any residual stones.

However, this therapeutic modality has its shortcomings. These include bacteraemia, dislodgement of tube, obstruction and/or fracture of tube.[3] T-tube drainage is associated with an increased incidence of cholangitis and wound sepsis.[4,5] Furthermore, leakage of bile may be encountered after its removal.[6] Other associated complications include inconvenience to the patient due to its placement for a long time and delayed hospital discharge.

The role of T-tube has been challenged since Thornton[7] and Halsted described primary duct closure after CBD exploration more than a century ago.[8] Compared to T-tube drainage, primary closure has its advantages which include shorter operating time, lesser duration of stay at hospital, lower incidence of bile leak and wound infections etc. Hence, primary closure of CBD is a relatively safe and feasible treatment procedure as compared to T-tube drainage after laparoscopic choledocholithotomy. This study was carried out to assess the benefits of primary closure of CBD versus T-tube drainage following laparoscopic choledocholithomy in terms of operating time, post-operative complications and time span of hospital stay.

METHODS

This prospective study was conducted in the Department of General Surgery, Sarojini Naidu Medical College and associated hospitals, Agra, Uttar Pradesh, India from 1st January 2016 to 31st December 2016. A total of 40 patients of choledocholithiasis were included in this study. The patients were evaluated with routine investigations including full blood counts, liver function tests, ultrasonography upper abdomen, renal function tests, X-ray chest and ECG. The criteria for choledocholithotomy were palpable CBD stones, preoperative ultrasound or radiographic evidence of CBD stones or dilated CBD. Patients with pancreatic pathology, suppurative cholangitis, renal failure and malignancy were excluded from the study.

All 40 patients underwent cholecystectomy followed by laparoscopic choledocholithotomy with flushing of the CBD with normal saline, thereby ensuring no distal obstruction. Depending upon the type of procedure whether primary closure or T-tube insertion the patients were divided into two groups. Group A- 20 patients (50%) underwent primary closure while Group B- 20 patients (50%) underwent T-tube insertion. Interrupted sutures of Vicryl 3-0 round body was used to repair CBD. For group B patients, a T-tube of 12/14 F was placed in-situ. A sub-hepatic drain was used in patients of both the groups to monitor any bile leakage for a duration of 72 hours. A T-tube cholangiogram was performed on 10th post-operative day. T-tube was then clamped for 24 hours in patients with normal cholangiogram. In cases with no significant clinical symptoms following T-tube clamping, the T-tube was removed and sterile dressing was applied.

RESULTS

In the study group of 40 patients, there were 7 male patients and 33 female patients. In Group A (primary closure) the male: female ratio was 4:16 while in Group B (T-tube drainage) the male: female ratio was 3:17 (Table 1). The average age of the patients in the study sample was 43.7 years (Table 2).

Table 1: Comparison of parameters.

Parameters	Group A (primary closure)	Group B (T-tube insertion)
No. of patients	20	20
Sex (M:F) ratio	4:16	3:17
Age range (years)	22-60	22-70
Mean age (years)	41.8	45.7

In Group A (primary closure) patients the mean operating time was observed to be 65±14.05 mins while that in case of Group B (T-tube drainage) patients was 95.25±9.66 mins with a p-value 0.0001 which is considered statistically significant. The total duration of hospital stay in Group A (primary closure) patients ranged from 5-15 days with an average duration of 8.2 days which was much shorter than that of Group B (T-tube drainage) patients which ranged from 8 to 25 days with average of 15.7 days (Table 3).

Table 2: Age comparison of patients.

Age	Males	Females	Total no. of cases	Percentage
20-29	1	3	4	10
30-39	2	8	10	25
40-49	2	8	10	25
50-59	1	9	10	25
60-69	1	5	6	15

Of all 40 patients of Group A (primary closure) 1 patient suffered bile leakage that subsided on the third postoperative day. No biliary peritonitis was observed. While in Group B (T-tube drainage) patients, biliary leakage occurred after the removal of T- tube in a total of 3 patients, which was managed by ultrasound guided aspiration (Table 3).

Table 3: Comparison of outcome of results.

Parameters	Group A (primary closure)	Group B (T-tube insertion)
Mean operating time (minutes)	65±14.05	95.25±9.66
Average duration of hospital stay (days)	8.2	15.7
No. of patients with post-operative complications	1	3

DISCUSSION

Symptomatic gallstone disease is a very common indication for abdominal surgery.[9] Laparoscopic primary closure of the common bile duct without a T-Tube has been advocated by some authors because of the potential complications associated with T-tube placement.[10-14]

In the Petelin JB, Lechleitner RA, series, primary closure of the choledochotomy laparoscopically was performed in over one third of cases where a choledochotomy was used, and did not result in any complications.[15] There was no incidence of bile leak, peritonitis, or clinical evidence of retained bile duct stones. Patients reported a higher degree of comfort and satisfaction than those in whom T-tubes had been placed. Other authors have had similar results.[16-18]

This study was performed to test the hypothesis that laparoscopic primary closure of the common bile duct leads to quicker convalescence with less postoperative complications, when it is carried out after proper investigations to rule out stones residual.

In present study, there was 1 case of bile leakage in Group A patients in whom primary closure of the CBD was done, whereas 3 among 20 patients of Group B had biliary leakage in whom the T-tube was used. Yamazaki et al[19] reported an incidence of 11.7% and 5.8% respectively, and an overall incidence of leakage was reported to be 14.3-38%. The mean operating time as well as hospital stay was shorter in case of Group A patients (primary closure) in comparison to that of Group B (T-tube insertion).

CONCLUSION

Both primary closure of CBD and T-tube drainage after CBD exploration are equally good treatment modalities for uncomplicated choledocholithiasis. However, primary closure of CBD has significantly shorter operating time and lesser duration of stay at hospital. This study thus indicates that laparoscopic primary closure of the common bile duct, following its exploration, is a safer alternative as compare to T-tube placement.

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