Frontiers in Health Informatics ISSN-Online:2676-7104 www.healthinformaticsjournal.com
2024; Vol 13: Issue 3 Open Access

Comparison of T-Tube Placement Vs Primary Repair of Common Bille Duct in Choledochotomy

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Cite this paper as: Fazli Akbar, Shah Abbas, Saddar Rahim, Fazal Elahi, Adnan Badar, Shabab Hussain (2024) Comparison of T-Tube Placement Vs Primary Repair of Common Bille Duct in Choledochotomy *Frontiers in Health Informatics, 13* (3),8720-8724

ABSTRACT

Objective: *To compare the outcome of T-tube placement vs primary repair of the common bile duct in cases of CBD exploration using choledochoscope in a tertiary care hospital.*

Study Design*: Randomized controlled trial.*

Place and Duration of the Study: *Department of Surgery, SGTH Saidu Medical College, Saidu Sharif Swat KP – Pakistan from January-2024 to July-2024.*

Methodology: *In this randomized clinical trial, we included 100 Cases of choledocholithiasis undergoing choledochotomy. The patients were recruited from January-2024 to July-2024. In first group (P), CBD exploration was done using primary repair. In second group (T), CBD exploration was done using T-tube placement. Operative time, bile leakage, wound infections and hospital stay were compared between the two groups.*

Results: *Mean age of study patients was 42.66±9.27 years in group P and 43.9±6.79 years in group T (p-value 0.42). Mean operative time was prolonged in group T; 88.5±6.22 minutes versus 76.6±9.17 minutes in group P (p-value <0.0001). Bile leak occurred in 2 (4.0%) patients in group P and in 8 (16%) in group T (p-value 0.04). Wound infections occurred in 3 (6%) in group P and in 9 (18%) patients in group T (p-value 0.06). Mean hospital stay was also prolonged in group T; 12.7±4.46 days versus 8.24±2.59 days in group P (p-value <0.0001).*

Conclusion: *Primary repair of CBD is associated with shorter operative time and hospital stay in comparison to T-tube placement in patients undergoing choledochotomy.*

Keywords: *T-tube placement, primary repair, choledochotomy, operative time, hospital stay.*

INTRODUCTION

Choledocholithiasis is a somewhat prevalent condition. Following cholecystectomy, 5-30% of patients develop common bile duct (CBD) stones. The prevalence is significantly greater in older age groups.[1] This may lead to either complete or partial bile duct obstruction, presenting as cholangitis or gallstone pancreatitis.[2] Immediate diagnosis and action are necessary to prevent additional morbidity.Following open choledochal drainage for stone extraction, the conventional surgical method involves closing the choledochotomy using a T-tube. The justification for this method includes the decompression of the bile duct, the accessibility of postoperative contrast tests, and the capability to retrieve residual stones.[3] The

predominant complication is biliary leakage following T-tube extraction.[4] Complications may be severe in certain cases. Removing T-tubes too soon, before the ducts have fully decompressed, can lead to infections in the bile ducts and bile leakage, which can necessitate additional surgery and increase the risk of illness and death.[5]In recent years, the choledochoscope has been the primary tool for visualizing the CBD. Primary closure reduces the risk of wound infections, bile leaks, and tube dislodging. Additionally, primary closure requires less time to operate on and shorter hospital stays.[6]The aim of this study was to compare the outcomes of T-tube placement vs primary repair of the common bile duct in cases of CBD exploration using choledochoscope in a tertiary care hospital.

METHODOLOGY

In this randomized clinical trial, we included 100 Cases of choledocholithiasis undergoing choledochotomy. The patients were recruited from January-2024 to July-2024. Known cases of common bile duct (CBD) stricture, patients with pancreatitis, cholangitis, or having malignancy were excluded.Full autonomy was given to study participants about inclusion in the study. Confidentiality of data and information record about all the study participants was ensured.

Patients were randomly assigned to group P and T. In group P, CBD exploration was done using primary repair. In group T, CBD exploration was done using T-tube placement.

Procedures were performed under general anesthesia. After cholecystectomy, choledochotomy was performed. After removing the stones, the CBD was flushed using normal saline and choledocoscopy was performed to determine the confirmation of retained stones. In primary closure group, CBD was closed using continuous sutures using 3-0 vicryl sutures. In T-tube patients, a 12-F t-tube was placed in CBD. Subhepatic drain was inserted in all patients and was removed on 14th post-operative day. Antibiotics were given for 3 days to all patients.

Data was analyzed using SPSS v23. Independent sample t-test and chi-square test were applied to compare continuous and qualitative variables between the groups. P-value ≤0.05 was considered significant.

RESULTS

Mean age of study patients was 42.66±9.27 years in group P and 43.9±6.79 years in group T (p-value 0.42). Frequency of gender and diabetes were comparable between the groups. Duration of choledocholithiasis was 5.16±2.67 months in group P and 5.70±2.42 months in group T (p-value 0.29) [Table 1].Mean operative time was prolonged in group T; 88.5±6.22 minutes versus 76.6±9.17 minutes in group P (p-value <0.0001). Bile leak occurred in 2 (4.0%) patients in group P and in 8 (16%) in group T (p-value 0.04). Wound infections occurred in 3 (6%) in group P and in 9 (18%) patients in group T (p-value 0.06). Mean hospital stay was also prolonged in group T; 12.7±4.46 days versus 8.24±2.59 days in group P (p-value <0.0001) [Table 2].

Table -1: Baseline Characteristics.

	Group P	Group T	P-value
Age (Y)	42.66±9.27	43.9±6.79	0.42
Male Gender (%)	20 (40%)	14 (28%)	0.20

Duration of Choledocholithiasis	5.16±2.67	5.70±2.42	0.29
Diabetes (%)	13 (26%)	6 (12%)	0.07

Table -2: Study Outcomes.

	Group P	Group T	P-value
Operative time (mins)	76.6±9.17	88.5±6.22	<0.0001
Bile Leakage	2 (4.0%)	8 (16.0%)	0.04
Wound Infections (%)	3 (6%)	9 (18%)	0.06
Hospital Stay (days)	8.24±2.59	12.7±4.46	<0.0001

DISCUSSION

Ludwig Courvoisier established the basis for contemporary common bile duct exploration in 1890 with the first successful extraction of common bile duct stones. For subsequent generations, operative exploration of the common bile duct during cholecystectomy for stone removal has been regarded as the gold standard against which all other treatment modalities are evaluated.[7] Halsted advocated for the closure of the common bile duct following choledocholithotomy and the drainage of the duct via a small tube inserted through the cystic duct. The tube was to remain in position for 3-4 days; it would then be clamped, provided that the bile flow was uninterrupted, after which the tube should be removed.[8]Residual stones were prevalent until Mirizzi introduced intraoperative cholangiography in 1932, a procedure that significantly decreased the incidence of missed stones and mortality rates. The subsequent advancement in common bile duct exploration was the introduction of choledochoscopy, wherein Bakes described a speculum that utilized a mirror and reflected light from the surgeon's headlamp.[9] Gurusamy conducted a study evaluating the advantages and disadvantages of T-tube drainage placement compared to primary repair without biliary stent following open common bile duct exploration for common bile duct stones. The findings demonstrated that the duration of hospital stay was notably extended in the T-tube drainage group in comparison to the primary closure group (MD 4.72 days; 95% CI 0.83 days to 8.60 days; five trials). These findings align with this study's results concerning the duration of hospital stays in both treatment groups.[10]In this study, mean operative time of patients in primary repair group (Group P) was 75.46±9.19 minutes and in T-tube group (Group T) was 88.13±6.31 minutes with p-value of <0.001.In a similar study by Ambreen et al. only one patient out of 16 (6.3%) developed biliary complication undergoing primary closure of CBD compared to 15.7% biliary complication rate in patients having T-tube drainage procedure. In the former group the mean time of hospital stay was 5.1+/- 1.1 days and the later had 13.6+/-2.3 days.[11]Abdulraheem et al. also reported significantly lower operative time and hospital stay using primary repair, however, the authors did not find any significant difference in complications rate between the T-tube and primary repair.[12] Jan et al. also reported short hospital stay using primary repair following choledochotomy.[13]Gurusamy's study similarly revealed that the surgical duration was markedly longer in the T-tube drainage group compared to the primary repair group (MD 28.90 minutes).[10]

All these findings align with the conclusions of this study. Specifically, primary repair required less operation time compared to the T-Tube group.T-tubes that are implanted are not only unpleasant, but they also need to be managed continuously and restrict the patient's mobility due to the possibility that they will become dislodged. Patients with free drainage who also utilize T-tubes run the danger of becoming electrolyte imbalanced and dehydrated. The sphincter of Oddi can enlarge or contract in response to the exploratory shock when a T-tube is used. Inadequate duct drainage can lead to biliary peritonitis by accumulating pressure in the extrahepatic ductal system, which in turn increases the risk of duct leakage or malfunction. Stones stuck in the tube tract can also be located and removed with its help. According to recent research, primary closure during choledochotomy is advised in order to lower

the risk of issues connected to the T-tube and to enable early hospital discharge, a prompt return to regular activities, and lower hospital costs.[14]

CONCLUSION:

Primary repair of CBD is associated with shorter operative time and hospital stay in comparison to T-tube placement in patients undergoing choledochotomy.

Ethical Approval:

Ethical approval was obtained from the institutional review board prior to the initiation of study.

Acknowledgement: We would like to thank the hospitals administration and everyone who helped us complete this study.

Disclaimer: Nil

Conflict Of Interest: The author declared no conflict of interest.

Funding Disclosure: Nil

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