

A prospective comparative study of the outcomes between choledochoduodenostomy and choledocholithotomy with t-tube closure in multiple CBD stone

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Abstract

Background: Common Bile Duct Stones (CBDS) are one of the medical conditions leading to surgical intervention. They may occur in 3%-14.7% of all patients for whom cholecystectomies are performed. When patients present with CBD STONES, the one important question that should be answered: what is the best modality of treatment under the given conditions? There are competing technologies and approaches for diagnosing CBDS regarding diagnostic performance characteristics, technical success, safety, and cost effectiveness.

Aim and Objectives of the study: The objective of the study to compare the outcomes of Choledochoduodenostomy (CDD) versus choledocholithotomy and insertion of a T-tube in subjects with multiple CBD stones.

Methodology: This study was conducted in the Dept. of Surgery, Tripura Medical College. we included a total of 60 subjects divided into two groups, Group A and Group B with 30 subjects in each group. Group A underwent choledocholithotomy and insertion of a T-tube and Group B underwent Choledochoduodenostomy. Details of the study were told to the patient and informed consent was taken. After obtaining consent, the patient underwent procedure as per the study design. We compared the parameters, mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin.

Results: We compared mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin between the two groups. The Mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin in Group A were 68 ± 11.8 , 8 ± 1.82 , 11% and 0.78 ± 0.33 in Group B were 98.6 ± 10.1 , 14 ± 3.21 , 26% and 1.7 ± 0.97 respectively. There was statistically significant difference in all the parameters between the two groups.

Conclusion: Both Choledochoduodenostomy and T-tube drainage after CBD exploration are equally good procedures for the treatment of uncomplicated choledocholithiasis. However,

choledocolithotomy and insertion of a T-tube is having significantly lower operating time and less duration of stay at hospital. Therefore, it can be recommended for treatment in selective patients of choledocholithiasis.

Keywords:Choledocholithiasis, choledochoduodenostomy, choledocolithotomy and insertion of a t-tube, mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin

Introduction

Common Bile Duct Stones (CBDS) are one of the medical conditions leading to surgical intervention. They may occur in 3%-14.7% of all patients for whom cholecystectomies are performed ^[1, 2]. When patients present with CBD stones, the one important question that should be answered: what is the best modality of treatment under the giving conditions? There are competing technologies and approaches for diagnosing CBDS regarding diagnostic performance characteristics, technical success, safety, and cost effectiveness. Management of CBDS usually requires two separate teams: the gastroenterologist and the surgical team ^[3]. One of the main factors in the management is initially the detection of CBDS, before, during, or after cholecystectomy.

Large longitudinal studies of patients with symptomatic gallstones have shown that 58-72% will have ongoing symptoms and complications. Most patients with symptomatic gallstones are recommended to undergo cholecystectomy to alleviate symptoms of pain and jaundice, and to prevent complications such as pancreatitis, cholangitis and cholecystitis. Approximately 10-18% of patients who undergo cholecystectomy for gallstones also have common bile duct stones. Common bile duct stones may be suspected preoperatively by symptoms or signs of jaundice, pancreatitis or cholangitis, deranged liver function or imaging showing duct dilatation or actual ductal stones ^[4-6].

Choledochoduodenostomy (CDD) was first performed in 1888 by Riedel and the first case led to unfortunate results. The first successful operation was performed in 1891 by Sprengel. At present, CDD is indicated in patients with recurrent stones, biliary sludge, ampullary stenosis or where endoscopic management was difficult or failed. However, its use remains debatable because of the risk of complications such as reflux cholangitis, sump syndrome and alkaline reflux gastritis. Sump syndrome is the development of cholangitis, hepatic abscess or pancreatitis after CDD, owing to stones, sludge or debris being lodged in the pool of the terminal common bile duct. However, the true incidence and resultant morbidity of these complications are not well defined and have not yet been thoroughly examined ^[7, 8].

The traditional surgical management of CBD stones consists of a supra-duodenal choledocotomy and insertion of a T-tube. The recommendation for T-tube drainage is based on the premise that it provides postoperative decompression of the CBD should outflow obstruction occur, it allows for radiological visualisation of the CBD, and it provides a potential route for extraction of any retained stones. The duration of T-tube drainage is variable and can range from 7-45 days depending on individual preference. A T-tube cholangiogram is usually performed postoperatively to look for residual stones or biliary leakage. The role of T-tube has been challenged since Thornton and Halsted ^[9, 10] described primary duct closure after CBD exploration more than a century ago. Others also have challenged the utility of a T-tube ^[11, 12] and three randomised trials have shown benefit of primary closure over T-tube insertion ^[13, 14] Continuous external drainage of bile can lead to fluid and electrolytes imbalance and nutritional disturbances. T-tube drainage is associated with an increased incidence of cholangitis and wound sepsis ^[15, 16] Significant bile leak after T-tube removal can occur in 1-30% of cases. External loss of bile leak through T-tube may lead to slow wound healing, anorexia and constipation. Complications like dislodgement, fracture of tube, encrustation, difficulty in removal and duct stricture also have been

described. The incidence of recurrent stones may be greater than T-tube drainage because the tube acts as a foreign body around which bile pigments and salts may precipitate [16].

Aim and objectives of the study: The objective of the study to compare the outcomes of choledocholithotomy and insertion of a T-tube versus Choledochoduodenostomy (CDD) in subjects with multiple CBD stones.

Methodology

Source of data: This study was conducted in the Dept. of Surgery, Tripura Medical College. We included a total of 60 subjects divided into two groups, Group A and Group B with 30 subjects in each group. Group A underwent choledocholithotomy insertion of a T-tube. and Group B underwent Choledochoduodenostomy.

Type of study: Prospective observational study.

Duration of study: 1 year from January 2021 to December 2021.

Inclusion criteria: All patients undergoing elective open choledocholithotomy.

Exclusion criteria

- Age > 70 years.
- Previous history of choledocholithotomy.
- Deranged coagulation profile.
- Severe respiratory illness.
- Pancreatitis.
- Cholangitis.
- Evidence of ampullary obstruction.
- & those undergoing emergency surgery.

Details of the study were told to the patient and informed consent was taken. After obtaining consent, the patient underwent procedure as per the study design.

Results

The presented study included a total of 60 subjects, we divided the subjects into Group A and Group B.

Group A underwent choledocholithotomy and insertion of a T-tube and Group B underwent Choledochoduodenostomy.

Table 1: Shows age wise and gender wise distribution of study subjects

	Group A	Group B
Age in years	48.6 ± 12.6	49.8 ± 10.87
Females/Males (number)	22/8	24/6
Females/Males (percentage)	73.3/26.6	80/20

Table 1 shows that the mean age in Group A was 48.6 ± 12.6 and in Group B was 49.8 ± 10.87. There was no statistically significant difference in age between the two groups the value of p was not significant. Out of 30 subjects in Group A, number and percentage of females were 22 and 73.3% and number and percentage of males were 8 and 26.6% respectively. Out of 30 subjects in Group B, number and percentage of females were 24 and 80% and number and percentage of males were 6 and 20% respectively.

Table 2: Shows age wise and gender wise distribution of study subjects

Outcome parameters	Group A	Group B
Mean operating time (minutes)	68 ± 11.8	98.6 ± 10.1
Mean duration of stay at hospital (days)	8 ± 1.82	14 ± 3.21
Wound infection	11	26
Post-operative serum bilirubin	0.78 ± 0.33	1.7 ± 0.97

This table presents the comparison of mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin between the two groups. The Mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin in Group A were 68 ± 11.8, 8 ± 1.82, 11% and 0.78 ± 0.33 in Group B were 98.6 ± 10.1, 14 ± 3.21, 26% and 1.7 ± 0.97 respectively. There was statistically significant difference in all the parameters between the two groups.

Discussion

The presented study included a total of 60 subjects, we divided the subjects into Group A and Group B. Group A underwent choledocholithotomy and insertion of a T-tube. and Group B underwent Choledochoduodenostomy. The mean age in Group A was 48.6 ± 12.6 and in Group B was 49.8 ± 10.87. There was no statistically significant difference in age between the two groups the value of p was not significant. Out of 30 subjects in Group A, number and percentage of females were 22 and 73.3% and number and percentage of males were 8 and 26.6% respectively. Out of 30 subjects in Group B, number and percentage of females were 24 and 80% and number and percentage of males were 6 and 20% respectively.

We compared mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin between the two groups. The Mean operating time (minutes), mean duration of stay at hospital (days), frequency of wound infection and post-operative serum bilirubin in Group A were 68 ± 11.8, 8 ± 1.82, 11% and 0.78 ± 0.33 in Group B were 98.6 ± 10.1, 14 ± 3.21, 26% and 1.7 ± 0.97 respectively. There was statistically significant difference in all the parameters between the two groups. Our study findings are in accordance with the studies conducted by Zhang *et al.*^[17], Xu *et al.*^[18].

Open common bile duct [CBD] exploration is still an important procedure for removal of CBD stone. After the CBD exploration is performed and stones have been removed, the choice lies between Choledochoduodenostomy and T-tube drainage. T-tube placement after CBD exploration has long been a standard surgical practice for choledocholithiasis. The main advantages of this modality were provision of external biliary drainage till edema of sphincter of Oddi subsided and percutaneous removal of retained bile duct stones. However, this technique is associated with significant complications; therefore, primary repair of CBD has been advocated in literature.

Conclusion

Both Choledochoduodenostomy and T-tube drainage after CBD exploration are equally good procedures for the treatment of uncomplicated choledocholithiasis.

However, Choledocholithotomy and insertion of a T-tube is having significantly lower operating time and less duration of stay at hospital. Therefore, it can be recommended for treatment in selective patients of choledocholithiasis.

References

1. Schirmer B, Winters KL, Edlich RF. Cholelithiasis and cholecystitis, Journal of Long-Term Effects of Medical Implants. 2005;15(3):329-338.
2. Riciardi R, Islam S, Canete JJ, Arcand PL, Stoker ME. Effectiveness and long-term results of laparoscopic common bile duct exploration, Surgical Endoscopy. 2003;17(1):19-22.
3. Dorman JP, Franklin Jr.ME, Glass JL. Laparoscopic common bile duct exploration by choledochotomy: an effective and efficient method of treatment of choledocholithiasis, Surgical Endoscopy. 1998;12(7):926-928.
4. Wenckert A, Robertson B. The natural course of gallstone disease. Eleven-year review of 781 non-operated cases. Gastroenterology, 1966, 376-381.
5. NIH Consensus. Consensus Development Panel. Gallstones and laparoscopic cholecystectomy. (National Institutes of Health Consensus Development Panel on Gallstone and Laparoscopic cholecystectomy).JAMA. 1993;1:018-1,024.
6. Soltan HM, Kow L, Toouli JA. A simple scoring system for predicting bile duct stones in patients with cholelithiasis. J Gastrointest. Surg.,2001, 434-437.
7. Sprengel O.Übereinem fall von extirpation der gallenblase mitanlegungeiner communication zwischen ductus choledochus und duodenum. Arch KlinChi., 1981, 417-420.
8. Srivergadesh G, Vikram K, Anathakrishnan N. Evaluation of long-term results of choledochoduodenostomy for benign biliary obstruction. Trop Gastroenterol., 2003, 205-207.
9. Thornton JK. Observation on additional cases illustrating hepatic Surgery. Lancet. 1891;137:763-4.
10. Halstead WS. Contributions to surgery of the bile passages, especially of the common bile duct. Bull John Hopkins Hosp. 1900;106:1-11.
11. Mirrizi PL. Primary suture of the common bile duct in choledocholithiasis. Arch Surg. 1942;44(1):44-54.
12. Collin PG, Redwood C, Wynne-Jones J. Common bile duct without intraductal drainage following choledochotomy. Br J Surg. 196;47:661-7.
13. Sheen-Chen SM, Chou FF. Choledochotomy for biliary lithiasis: is routine T-tube drainage necessary? A prospective controlled trial. ActaChirScand. 1990;156:387-90.
14. De Roover D, Vanderveken M, Gerard Y. Choledochotomy: primary closure versus T-tube. A prospective trial. ActaChirBelg. 1989;89:320-24.
15. Zhang LD, Bie P, Chen P, Wang SG, Ma KS, Dong JH. Primary duct closure versus T-tube drainage following laparoscopic choledochotomy. Zhonghua Wai KeZaZhi. 2004;42:520-3.
16. Xu L, Zheng Z, Chen K, Wu R, Mao G, Luo J, *et al.* [Primary common bile duct closure after choledochotomy] Zhonghua Wai KeZaZhi. 2002 Dec;40(12):927-9.
17. Gurusamy KS, Samraj K. Primary closure versus T-tube drainage after open common bile duct exploration. Cochrane Database Syst. Rev. 2007 Jan;1:CD00-5640.
18. Ambreen M, Shaikh AR, Jamal A, Qureishi JN, Dalwani AG, Memon MM. Primary closure versus T-tube drainage after open choledochotomy. Asian J Surg. 2009;32:21-5.