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Laparoscopic primary suture of the common bile duct: A local retrospective study

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Abstract- Aim:to evaluate the feasibility and safety of primary closure sutures for the common bile duct compared to T-tube usage, post laparoscopic, common bile duct (CBD) exploration for treating choledocholithiasis associated with cholecystolithiasis.
Methods: Patients with choledocholithiasis accompanying cholecystolithiasis who underwent a failed ERCP procedure were included in this four-year- retrospective study in the period from January 2015 until December 2018. They were divided into two groups; group I: included those who had primary suturing closure of CBD, while group II were those who underwent a T tube insertion technique. Patients' data including the pre, intra, and post-operative outcome were evaluated.
Results: Forty-three patients were included; they were 26 females and 17 males with the ratio of (1.5 to 1). G I (n= 28) were those with primary closure suturing technique. While G II (n= 15) had a T tube inserted. During the first postoperative day, total drainage was not high among G I patients compared to those of G II. No significant statistical difference existed between the two groups as regards the total bilirubin level (TBL) post-surgery. This facilitates the short time of removing the T tube among G I patients.
Conclusion: Primary closure sutures of the common bile ductis a safe and feasible post choledochotomy procedure.

Key Words: Choledocholithiasis, Cholecystolithiasis, Primary sutures, LCBDE, T-tube

Introduction

Common bile duct stones is a usual pathology of the biliary system [1]. In many instances, especially among those with chronic diseases such as, sickle cell disease (SCD), patients do not recognize gall bladder stones that are only diagnosed afterphysical and imaging examinations[2-5]. SCD is often accompanied by many other pathologies, such as cardiovascular and respiratory systems [5-8]. The associated pathologies may increase the operative risks, affecting the post-operative prognosis, and may even cause perioperative death [9]. Operative strategies for treating choledocholithiasis complicating cholecystolithiasis include laparoscopic choledocholithotomy, cholecystectomy and T-tube drainage [10-11]. Laparoscopic procedures are less invasive, yet, T-tube drainage of the biliary tract still entails many complications[12-13].

Sometimes, long-term T-tube drainage maybe needed post hospital discharge inducing extra comorbidities. Moreover, T tube is not only be inconvenient but also may cause extra health problems including, dyspepsia, fluid, and electrolyte imbalance[14]. Laparoscopic exploration of the common bile duct, besides being a minimally invasive procedure, has proved to carry the same efficacy of the

endoscopic retrograde cholangiopancreatography (ERCP) [15]. This technique is currently recommended as the single-stage modality managementof choice for common bile duct stones either to initially start with or to apply after failure of ERCP[16].

The current study aimedto evaluate the feasibility and safety of primary closure sutures for the common bile duct. Furthermore, this technique is compared to T-tube usage, post laparoscopic, common bile duct (CBD) exploration for treating choledocholithiasis associated with cholecystolithiasis.

Patients and Methods:

An ethical approval was initially obtained from our institutional research board (IRB) after successfully fulfilling all the needed study-related ethical issues.

All patients who were preoperatively diagnosed to have choledocholithiasis and cholecystolithiasis were included in the study during the period of four years from January 2016 until December 2019. The diagnosis mainly relied on results of imaging procedures such as; Color duplex abdominal ultrasound, computed tomography (CT) scan of the upper abdomen.

In addition, in some patients who had a doubtful diagnosis, magnetic resonance imaging (MRI) and magnetic resonance cholangiopancreatography (MRCP) were done to verify the presence choledocholithiasis combined with gallstones. Excluded from the study, were those patients who had contraindications to undergo laparoscopic surgery. Patients' records were reviewed empathizing on their demographic, preoperative data, surgical technique and post-operative outcomes. Patients were divided into two groups; the first group (G I), it included those who underwent the primary suture repair. While the second group (GII) were those who underwent laparoscopic choledocholithotomy, cholecystectomy, and T tube insertion for drainage.

In G I patients; the procedure took place through a 4-hole laparoscopic procedure. The first hole was located under the umbilicus to induce pneumoperitoneumafter inserting a 10mm trocar. A 10mm laparoscopic trocar was inserted under the xiphoid process as the main operating hole. Two 5mm trocars were also placed at the costal arch of the abdomen to the underside of the gallbladder and 2cm below the costal margin of the right axillary front respectively as the auxiliary operating holes. Cholecystectomy was done after clipping of the cystic vessels and duct. Choledochotomy was followed, as stone/s were removal by choledochoscope. Common bile duct (CBD) position was specified using a puncture needle. After secluding the peritoneum from the CBD surface, it was opened and choledochoscope inserted to remove the stone/s. CBD was washed to check for any residual stone inside or at the intrahepatic biliary radicals. A primary bile duct using 4-0 absorbable (Vicryl) suture was set in a continuous interlocking technique. A peritoneal drainage tube was placed through the Winslow hole. In GII, the operative procedure was the same as in GI, except for atrimmed T-tube placed it into the abdominal cavity, and placed into the CBD after being sutured. T tube was then washed to observe any bile leakage a peritoneal drain was left through Winslow foramen. Retrieved data included the mean operative time, intraoperative blood loss, postoperative peritoneal drainage volume on the first day, postoperative total drainage volume on the first day was reported. Also, recorded was the time until the removal of both the

T tube and peritoneal drain. Hospital stay period and post-operative liver function tests were also recorded, as well as postoperative complications such as bile leakage and residual stones.

Patients' follow-up in the outpatient departments within the first 6 months after the operation was studied. Obtained data were statistically analyzedusing SPSS 26.0 software for Windows; SPSS, Chicago, IL). A chi- square test was adopted for the enumeration data. The rank-sum test of two independent sampleswas adopted for measurement data, shown as M (P25, P75). PQ0.05 was statistical significance.

Results

Forty-three patients were included; they were 26 females and 17 males with the ratio of (1.5 to 1). G I (n= 28) were those with primary closure suturing technique. While G II (n= 15) had a T tube inserted. During the first postoperative day, total drainage was not high among G I patients compared to those of G II.All patients in both groups successfully underwent laparoscopic choledocholithotomy. (Table I)

There were no statistically significant differences in operation time, intraoperative blood loss, and postoperative peritoneal drainage volume on the first day. A significant statistical difference did not also exist as regards, peritoneal drainage, tube extubating time, length of hospital stay, or postoperative alanine transaminase (ALT) between the two groups. However,a significant statisticaldifference in postoperative total drainage volume on the first day was recorded as well asthe drainage tube-extubatingtime or postoperative total bilirubin level(TBIL) between the two groups. In-group I, the total postoperative drainage volume on the first day was low and patientswith residual stones were fewer. Also, all drainage tube extubating time was shorter compared to that in-group II. (Table II)

There were four cases of postoperative bile leakage in-group I. Those patients had peritoneal drainage tubes. Hence, they underwent a conservative treatment.Leakage stopped after 1-5 days Drainage tubes were removed after an abdominal CT examination showed no effusion.

On the other hand, group II patients had no postoperative bile leakage.

Nevertheless, five patients in-group II showed retained stones. They were diagnosed through a postoperative T-tube cholangiogram. They underwent a successful removalvia choledochoscopy to extract the stoneswithin the outpatient department.No stones appearedduring the six months follow-up period in the both groups. Both groups showed no statistical difference in either the bile leakage or retained stones during follow-up.

Discussion

Traditional open surgical management for common bile duct exploration is currently replaced by minimally invasive laparoscopic procedures that have gained more popularity within the last three decades.[17-19]Choledocholithiasis combined withcholecystolithiasis is currenltly treated by laparoscopic Cholecystectomy (LC) and with laparoscopic common bile duct exploration. (LCBDE).[20]

LCBDE entails the creation of a longitudinal choledochotomy using the laparoscope. Choledochoscopy usually followed this procedure to assure the complete removal of all CBD stones followed by the primary closure of the common bile duct. In some instances, T- tube may be needed to secure removal of any residual stones[21].

In the current study, it was feasible to remove CBD stones during the operation via a choledochoscope before performing its primary closure. This data coincides with previous Meta analytic study that supports the feasibility of laparoscopic primary closure of CBD after stone removal[22].

Yet, this met analytic study supported the notion that primary closure entailed less complications compared the T- tube drainage technique. Other studies supported the advantages of the primary closure technique by reporting its feasibility in patients with without distal obstruction where stone clearance can be easily performed.[23] On the other hands; some reported that the T-tube complications might exceed its benefits. [23-24]These data contradict our studyresults that showed no significant statistical difference between both groups.Despite the published reports of biliary leakage from the choledochotomy site due to edema at the ampulla of vater that compresses the CBD.[25]

Conclusions

LCBDEwith primary suture technique may not increase the risk of postoperative bile leakage. The primary suture closure of CBD is having the advantage over the T- tube replacement as it help patients from having the T- tube for a longer time with all its related complications . Primary suture technique is also feasible, safe, and valid after laparoscopic choledochotomy for verification of ductal clearance. The current study has some limitations on being a retrospective type with a quite small sample. Therefore, future prospective randomized controlled study recruiting larger patients sample with a longer follow-up period may be needed to realistically evaluate and verify the advantages and merits of primary suture.

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Table Legends:

Table 1: Demographic, preoperative clinical and laboratory parameters

Table 2: Operative, post-operative outcome and complications

Parameter	Group 1 (n=28)	Group 2 (n=15)	P value
Age(year)	33.3 ± 15.2	45.6 ± 18.4	0.712
CBD diameter(cm)	1.33 ± 0.4	1.29 ± 0.2	0.21
CBD stones	10.9	10.7	0.445
ALT(U/L)	193.2 ± 11.1	194.3 ± 12.2	0.33
TBIL(umol/L)	39.12	43.6	0.007
Previous LC (Y/N)	2/28	1/15	0.44
Gender(Male/Female)	11/17	6/9	0.711
SCD (Y/N)	7/28	3/15	0.332

CBD common bile duct, LC laparoscopic cholecystectomy, SCDSickle Cell Disease

Table 1: Demographic, preoperative clinical and laboratory parameters

Parameter	Group 1 (n=28)	Group 2 (n=15)	P value
Operation time (min)	180 ± 11.4	179.3 ± 20.1	0.311
Intraoperative blood loss (ml)	27.3 ± 7.2	30.2 ± 9.1	0.072
Postoperative peritoneal drainage volume on the first day(ml)	16 ± 2.5	21 ± 4.6	0.431
Postoperative total drainage volume on the first day (ml)	17.3 ± 9.1	89.4 ± 15.3	0.00
Peritoneal drainage removal (d)	5.5 ± 1.1	4.9 ± 2.5	0.374
All drainage tube extubating time (d)	7 ± 4.2	24 ± 11.7	0.000
Postoperative ALT(U/L)	94.3 ± 5.9	102.6 ± 11.4	0.621
Postoperative TBIL(umol/L	21.8 ± 4.6	29.4 ± 3.8	0.008
Hospital stay(d)	12.1 ± 6.7	15.3 ± 3.1	0.221
Bile leakage (Y/N)	3/28	0/15	0.321
Residual stones (Y/N)	0/28	3/15	0.003

Table 2. Intraoperative index and postoperative complications