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Research Article

Wrapping of the omental pedicle flap around the T-tube for the early postoperative biliary endoscopic intervention

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ABSTRACT

Background: The placement of t-tube and postoperative biliary endoscopic intervention through T-tube tract is not an uncommon practice in the management of residual choledocholithiasis. In this study, we have evaluated the safety and feasibility of artificial T-tube tract for the early postoperative biliary endoscopy and early intervention through it, which was made by wrapping of the omental pedicle flap around the T-tube.
Methods: A total of 230 cases of choledocholithiasis who underwent open common bile duct exploration and t-tube insertion according to new surgical technique in our hospital from January 2009 to January 2014 were analyzed retrospectively. T-tube imaging was taken after 2 weeks and for normal imaging T-tube was removed and biliary endoscopy was performed at 2-3 weeks.
Results: Of 230 patients, 78 (33.9%) were male and 152 (66.1%) were female; 68 (29%) patients were with comorbidity. All groups underwent early postoperative endoscopy and early intervention at 2-3 weeks (an average of 17.9 ± 2.2 days). The result was statistically significant at ($P < 0.05$). The residual stone were found in 27 patients (11.7%) and also noticed firmed, matured t-tube tract without any incidence of bile leakage.
Conclusions: Wrapping of the omental pedicle flap around the T-tube is a simple, practical and safe procedure to make strong artificial T-tube tract for the early biliary endoscopic intervention, It has shortened the time of postoperative biliary endoscopy from 4-6 to 2-3 weeks without any incidence of intraperitoneal bile leakage.

Keywords: Omental pedicle, CBD stone, Artificial T-tube tract, Biliary endoscopy

INTRODUCTION

The placement of T-tube drainage is a common procedure after common bile duct exploration. Postoperative biliary endoscopy and biliary endoscopic intervention through T-tube tract is not an uncommon practice in the management of residual choledocholithiasis. T-tube is used to reduce the risk of bile leakage, stricture formation and decompression of the biliary tree. In addition, the benefits of t-tubes are maintaining ductal patency in the setting of edema, providing easy access for postoperative imaging and access for removal of residual stones.

For this reason some scholars advocate that the patient who needs interventional procedures via T-tube tract, It should be retained for an extended period of 4-6 weeks.[1] D. A. Gillatt et al.[2] suggest in case of residual stone some patient need T-tube in situ for 49 to 92 days. The duration of T-tube drainage is variable and can range from 7 to 45 days depending on individual preference.[3] According to Marko Nikolic et al.[4] T-tube removal after 3 weeks is a common practice in UK,

However, long term T-tube placement not only annoys the patients, but also associated with numerous complications like cholangitis, wound dehiscence, sepsis,

electrolyte imbalance due to continuous bile drain, post choledocostomy acidotic syndrome, fracture and encrustation of T-tube. There have been numerous reports in literature concerning bile leakage after T-tube removal but very few studies have been done for the improvement in this area. Researchers are lacking on behalf of safety and early post-operative biliary endoscopy for the extraction of residual stones especially in comorbidities like diabetes, liver cirrhosis and elderly aged patients.

To handle all these T-tube related clinical problems and practice of late postoperative biliary endoscopic intervention specially to avoid the incidence of intraperitonial bile leakage we modified some surgical techniques. Instead of waiting more than 4-6 weeks for strong and mature T-tube tract in patients with comorbidities, we developed simple and very practical technique of placement of T-tube in case of suspected residual stones after open choledochotomy and treated more than 230 patients in our department of hepatobiliary and pancreatic surgery, Jingzhou central hospital, Hubei and observed clinical outcomes especially incidence of bile leakage at the time of T-tube in situ and T-tube removal, and also evaluated the safety and feasibility for the early postoperative biliary endoscopy through newly formed artificial T-tube tract after obtaining valid consent and with outmost respect of ethical principles and values.

METHODS

A total of 230 patients from January 2009 to January 2014 were included in our retrospective cohort analysis who had underwent open bile duct exploration for the bile duct stones. We divided all patients into 4 groups according to the presence of two most common comorbid conditions as we found in the study group. 1) CBD stone with diabetes (12%) 2) CBD stone with liver cirrhosis (Child Pugh Score A, 9%) 3) CBD stone with elderly aged (≥65 years, 8%) and 4) CBD stone alone (71%).

All patients underwent supraduodenal longitudinal choledochotomy and T-tube insertion. T-tube was placed through the choledochotomy site, and the incision being closed with interrupted 4-0 vicryl absorbable suture and fixed conventionally. Intra-abdominal part of T-tube was wrapped with greater and lesser omental pedicle flap and fixed around it with No.1 silk then both ends of tract were fixed, proximally with hepatoduodenal ligament and distally with parietal peritoneum of anterior abdominal wall. The length of artificial fistula being made approximately equal to the length of intra-abdominal part of the T-tube with diameter of 2.0-3.0 cm. After 2 weeks postoperative T-tube cholangiogram was performed. For normal cholangiography result T-tube was clamped and observed for 2 days. T-tube was removed when if there were no signs of discomfort of abdomen after clamp.

Postoperative biliary endoscopy and early postoperative biliary endoscopic intervention times were recorded for all groups and results being analyzed with hypothesised average value of T-tube removal time of 4-6 weeks with standard deviation of 5 days who requires postoperative biliary interventional procedures (average 28 ± 5 days). Artificial T-tube tract was evaluated for the incidence of bile leakage, stability and its maturation, and then biliary endoscopy performed. In case of positive finding of residual stones endoscopic extraction been done either by basket stone extractor alone or with saline irrigation but for impacted stones electro hydraulic lithotripsy also used at the same time. Stones clearance was confirmed in all cases. T-tube was clamped for 2 days and observed any signs of discomfort before removal. The outlet of tract left for spontaneous secondary healing. Procedures are presented in figures and results in tables.

Procedure for wrapping and fixing the omental pedicle flap around the T-tube

Figure 1: T-tube is wrapped with omental pedicle.

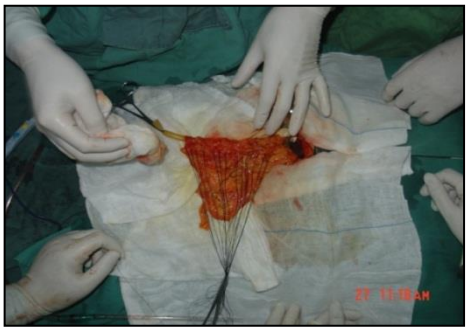

Figure 2: Omental pedicle flap is fixed around the T-tube with No.1 silk.

Figure 3: Artificial tract is fixed proximally to hepatoduodenal ligament.

Figure 4: Distal end of tract is fixed to anterior abdominal wall making outlet of the tract.

RESULTS

Records of 230 patients were retrieved for this study. There were 78 (33.9%) males and 152 (66.1%) females. The male to female ratio was 1:1.9. The ages of the patients ranged from 16-78 years with mean age 52 years. Patients without comorbidities were 162 (71%) and with comorbidities were 68 (29%). All 230 patients underwent early postoperative endoscopy and extraction of residual stones was done successfully at 2-3 weeks (an average of 17.9 ± 2.2 days with the P value <0.00001). The result is statistically significant at (P <0.05). The residual stone were found in 27/230 (11.7%).

Single attempt residual clearances were 19 patients in which 11 were expelled by saline irrigation and 8 were extracted by basket stone extractor after lithotripsy, 6 patients required second attempt and 2 patient required more than 3 attempts because of impacted intrahepatic stones. There were no evidence of bile leakage and completely well-developed mature T-tube tract was noticed in all patients.

Table 1: Evaluation of incidence of bile leakage, residual stone and postoperative biliary endoscopy.

CBD stone with or without comorbidity	No. of patients	Incidence of residual stone	Incidence of bile leakage	Postoperative biliary endoscopy (an average)
Diabetes	28 (12%)	4	No	18.4 ±2.3 days
Liver cirrhosis	21 (9%)	2	No	20.1 ±2.1days
Elderly aged (≥65 years)	19 (8%)	2	No	18.2 ±1.9 days
CBD stone alone	162 (71%)	19	No	14.9 ±2.5 days
Total patients	230	27	No	**An Average:** 17.9 ± 2.2 days

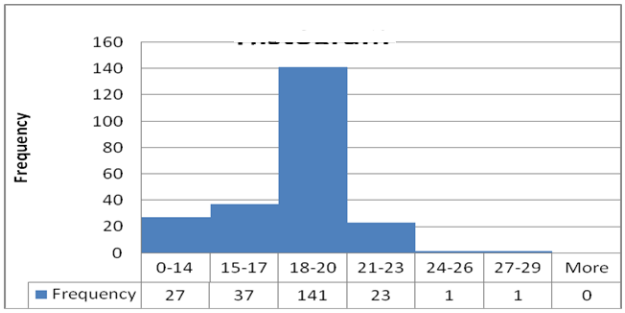

Figure 5: Early postoperative biliary endoscopy timing frequency.

DISCUSSION

Due to current advancement and continuous improvement in the field of hepatobiliary surgery there is significant reduction of incidence of residual stones.[5] However, the incidence of residual CBD stones in different series ranges from 2% to 10% and despite significant advances in endoscopic, percutaneous and laparoscopic techniques, they continue to present a management challenge to the surgeons, gastroenterologists and radiologists.[6] T-tube is necessary in case who fail preoperative ERCP and patients in whom ductal clearance is not confirmed intra operatively.[7] Postoperative lithotripsy of residual stone through T-tube tract is an effective alternative way and decreases the incidence of biliary leakage.[5,8]

An essential requirement for the postoperative biliary choledochoscopy is the maturation and stability of T-tube tract so that the endoscope could be passed safely into the bile duct without perforating the tract wall. The study confirmed that 97% of T-tube tract is form after 3-9 days, and then it takes 4-5 days to be firmly established. Hence; suitable T-tube removal time becomes 6-21 days.[8-10] A recent study reports that T-tube removal at 2 weeks, the incidence of bile leakage is still 6.1%. [9] The incidence of bile leakage after T-tube removal following negative T-tube cholangiogram varied from 0.8% to 49% depending upon the method of detection.[1] Maghsoudi et al.[10] reported that mortality rate of bile leakage is 5.9% and co-infection mortality rate because of bile leakage is 20%.[11] For this reason some scholars advocate that the patient who needs interventional procedures via T-tube tract, should be retained for an extended period of 4-6 weeks,[1] which is more or less appropriate but some

authors like Marko Nikolic et al.[4] are also not fully agreed with this but continuous external drainage of bile can lead to fluid, electrolyte, and nutritional disturbances. Indwelling of T-tube is uncomfortable, require continuous management, and restrict the patient's activity because of risk of dislodgement.

Prolonged indwelling of T-tube drainage or removing after 3 or 4 week is not a good solution. It does not avoid occurrence of bile leakage. The most important fact is the formation of the tract. Development and stability of the tract contributes greatly and it does matter. Actually, incomplete and fragile tract is the main cause of bile leakage. There are some comorbid conditions where T-tube tract dose not mature enough and gain stability such as immunocompromised patient, poor nutritional status,[1] and other systemic factors as diabetes, liver cirrhosis and elderly aged with poor physical condition etc.

To resolve these clinical problems we applied our new technique of placing T-tube to create artificial tract by wrapping omental pedicle flap around the T-tube which is easy and scientific because of following reasons: (1) Omental pedicle is good source of blood supply and fast granulation, (2) Easy to make short, thick and strong fistula around t-tube, (3) Easy to handle and fix, (4) Easy to make double fold in case of thin omentum.

CONCLUSION

Wrapping of the omental pedicle flap is a simple, useful technique to make artificial T-tube tract which completely develops within 2-3 weeks even in diabetes, liver cirrhosis and elderly aged patients. This procedure is applicable. It makes safe and feasible tract to access for the early postoperative biliary endoscopic intervention even in comorbidities patients without risk of incidence of bile leakage. It also shorten the time of postoperative biliary endoscopy from 4-6 to 2-3 weeks.

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Ethical approval: The study was approved by the institutional ethics committee

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