



LETTER TO EDITOR

Modified laparoscopic choledocholithotomy T-tube drainage reduces the risk of bile leakage: A surgeon's experience[☆]



Dear Editor,

We have recently read the article of "Primary Closure Versus T-tube Drainage After Open Choledochotomy" which was published in your journal by Ambreen M et al from Liaquat University, Pakistan.¹ Choledochotomy followed by T-tube drainage has been the standard surgical treatment for choledocholithiasis. With the development of laparoscopic technology, experienced surgeons prefer laparoscopic choledocholithotomy with T-tube drainage for primary treatment of choledocholithiasis patients.² It is a safe and effective method for postoperative biliary tract decompression for T-tube drainage, but complications can not be avoided. The complications of laparoscopic choledocholithotomy and T-tube drainage are bile leakage, bleeding, residual stones of bile duct, stricture of bile duct, etc. Biliary leakage following removal is the most serious. Incidence of bile leak was 3.8–6.9%.^{3–5} The optimization procedure we will describe next, greatly reduces the risk of bile leakage after T-tube drainage. Therefore, it is necessary to master the techniques and experience of optimization of laparoscopic choledocholithotomy T-tube drainage.

Here we would like to share some of our clinical experience about laparoscopic choledocholithotomy T-tube drainage which could reduce the risk of bile leakage. In our surgery, the umbilicus is cut open and the pneumoperitoneum is made at first, (about 12 mmHg), then the laparoscope is placed through the 10 mm port of the umbilicus. According to the location of common bile duct, the angle of 60° between the line of the hole and the line of the incision of the common bile duct and the longitudinal axis should be formed. This position provides convenience for the suture of the bile duct in the next step. Determine the

auxiliary operation hole, usually 1–2 cm away from the center line under the right costal margin, which is not only the shortest distance from the T-tube, but also facilitates the operation of the choledochoscope in the next step. Through the abdominal cavity, firstly, freed the Calot's triangle, and the location of the cystic duct, the cystic artery and the common bile duct is separated and exposed. Secondly, clip and cut the cystic artery, and then clip the gallbladder neck, the cystic duct at the proximal common bile duct is not clipped. During this process, the gallbladder is not excised first, so it can be used as a pulling effect. Lift the gallbladder to fully expose the common bile duct. The needle of Vicryl 4-0 is clamped by a separate clamp, and the power is connected to the forceps. The full layer of the clamped needle is cut through the bottom of the preincision bile duct at 1–2 cm. The electroacupuncture is used to cut the common bile duct and to extend the incision upward with scissors. It is not easy to cause a wide range of electrical damage to the bile duct. The laparoscopic sheath of the auxiliary hole is pushed to the incision of the common bile duct, from which the choledochoscope is placed, and the stone is taken under the direct view of the stone net. Place the appropriate trimmed T-tube from the main operating hole and place the distal end of the T-tube under the right side to avoid the pain and infection caused by residual bile flowing into the intestine and between the omentum. The placed T-tube is sutured with a 4-0 Vicryl. The upper corner is sutured, knotted and trimmed. When suturing the upper corner of the bile duct, the needle insertion and exit points should be in line with the upper vertex. Select a suitable margin and spacing to sew a needle down without knotting. Push the T-tube upward and suture the lower corner of the common bile duct incision. When suturing the lower corner of common bile duct, the principle of suturing the upper angle of the common bile duct should be followed, but not the knot. The proper

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margin and spacing should be selected for upward suture. In general, the suture of this needle usually means the end of the suture of the bile duct. If the suture is not enough, continue to select the appropriate spacing and suture up until the T-tube is pushed up, and the natural suture of the lower edge of the T-tube is used as the end suture, and finally knotted. According to the clinical experience of our team, it is found that the upper and lower corners of the common bile duct are prone to bile leakage. Therefore, we need to suture the upper and lower corners of the common bile duct incision so that the bile duct tissue on the corner is tightly packed without biliary leak. The two ends of the T-tube are best sutured, because the fastening of the thread is a kind of mechanical bonding. It is not easy to

release the T-tube and leak bile. Irrigate bile duct sutures, subhepatic and subphrenic bile, and use white gauze to detect bile leakage around T-tube, and suture properly if bile leakage occurs. The drainage tube is placed under the liver and around the T-tube through the assistant operation hole, and the T-tube is extracted from the auxiliary operation hole. Adjust the patient's head low position, then pull the omentum around the T-tube with a non-invasive forceps. Under the strict monitoring of laparoscopy, gently pull out the T-tube and gently press the upper abdomen to make the abdominal wall is as close as possible to the omentum. In this way, the T-tube will not bend, and the formation of the sinus will be more complete in the future, and the residual stones will be easily removed through the

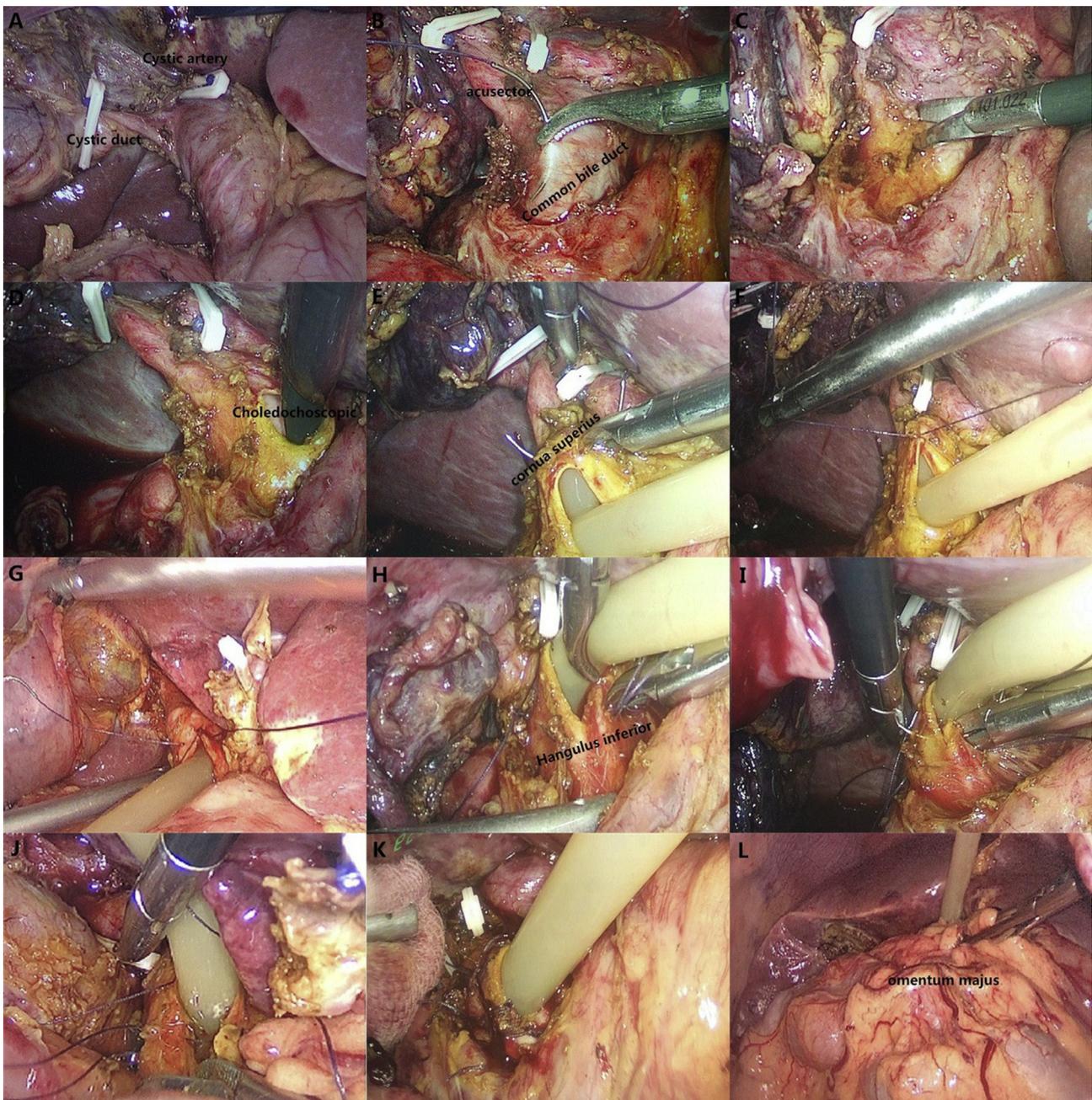


Figure 1 Schematic illustration of laparoscopic choledocholithotomy T-tube drainage.

sinus. Finally, the equipment and gauze are counted, the tube is fixed, the incision is sutured, and the sterile dressing is applied. The operation is over (Fig. 1).

We retrospectively analyzed our team's 22 cases of laparoscopic choledocholithotomy T-tube drainage from November 2016 to July 2018. All the patients recovered and discharged from hospital from 6 to 8 days. After six weeks of cholangiography, there were no stones and T-tube removed. At the same time, there were no complications such as bleeding, bile leakage and stenosis in 22 patients.

For laparoscopic choledocholithotomy T-tube drainage, most literature have not described the procedure in detail,^{6,7} especially in the suture of bile duct. However, our surgical not only describe the procedure of bile duct in detail but also optimize for each step. We find that there is no bile leakage after operation after using our optimized operation methods. Therefore, mastering and deeply understanding the surgical technique is the key to success of the operation and the prerequisite for the completion of high quality surgery.

Conflicts of interest

All the authors have no potential conflicts of interest to disclose.

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