

## **A group of cases of cholelithiasis and choledocholithiasis treated by three scopes under gastroscop assistance.**

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### **Abstract**

**Endoscopicretrogradecholangio-pancreatography with Laparoscopic Cholecystectomy (LC) has been applied to the treatment of cholelithiasis and choledocholithiasis. However, there are some limitations. Patients in this group adopt Laparoscopic cholecystectomy, Laparoscopic Cholecystectomy and Common Bile Duct Exploration (LEBDE), Endoscopic Nasobiliary Drainage (ENBD) and primary common bile duct closure to treat cholelithiasis and choledocholithiasis. This research found that the median follow-up time was thirty-three months (22-46 months). Only one patient had stone recurrence in the 23<sup>th</sup> month after surgery. Above all, LC, LEBDE, ENBD and primary common bile duct closure are effective surgical methods for treating cholelithiasis and choledocholithiasis, which have clinical application value.**

**Keywords:** ERCP, LC, Three scopes under gastroscop assistance.

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### **Introduction**

About 10% to 20% patients with cholelithiasis also have choledocholithiasis [1,2]. This disease also can lead to some complications of acute biliary pancreatitis, jaundice and acute purulent cholangitis. Some severe cases will endanger their life. In the era of minimally invasive surgery, the treatments methods of cholelithiasis and choledocholithiasis include LC (Laparoscopic Cholecystectomy) with ERCP (Endoscopicretrogradecholangio-Pancreatography), and LC with LCBDE (Laparoscopic cholecystectomy and common bile duct exploration) [3]. But without a kind of surgery method for all patients even if there are multiple surgery methods.

At present, ERCP with LC have been applied to the treatment of cholelithiasis and choledocholithiasis. However, ERCP/EST (Endoscopicretrogradecholangio-Pancreatography/Endoscopic Sphincterotomy) may cause severe postoperative complications of hemorrhage, perforation and acute pancreatitis, also injury the function of oddi sphincter, which can lead to remote complications of regurgitation cholangitis, ampulla stenosis, stone recurrence, malignant tumor of biliary duct [4-6]. More and more RCT suggest that LC with LCBDE is safer, effective. And its cost is low, postoperative recurrence rate is low [7-10]. However, primary closure or closures after various effective drainage tube placements are selected after choledochotomy, which is the discussion focus [11].

Patients in this group adopt LC, LEBDE, GNBD and primary common bile duct closure to treat cholelithiasis and choledocholithiasis. No stone residues are identified by LCBDE during surgery. GNBD is placed under gastroscop

assistance, which has functions of drainage and reducing pressure, finally reach to primary common bile duct closure.

### **Methods**

We prospective analysed patients' clinical data of LC, LEBDE, GNBD and primary common bile duct closure from October, 2012 to July, 2014 in people's hospital of Xintai city. The diagnostic basis was clinical characteristics, B ultrasound, CT and MRCP, which identified as cholelithiasis and choledocholithiasis. The inclusion criteria should meet the age from 30 to 80 years old, clinical symptoms of biliary colic or no jaundice, the cholelithiasis and choledocholithiasis verified by B ultrasound, CT and MRCP and the diameter more than 10 mm. The exclusion creteria include acute pancreatitis, infectious stroke, hepatolithiasis, difficult to tolerate anesthesia and laparoscopic surgery, liver cirrhosis and surgery history of upper abdomen.

This study acquired approval of Clinical Ethics Committee of people's hospital in Xintai city. Patients and their families signed operation informed consent before surgery. All surgical operation and endoscopic surgery accomplished by the same group. Their operator had plentiful clinical experience for operating laparoscope and endoscope.

Trocar was placed by using routine four-hole methods. Calot triangle was dissociated. The relations between cystic duct, artery of gallbladder and common bile duct were affirmed after intratracheal intubation tube of patients for general anesthesia. Cystic duct was given clipping by two Hem-o-loc clips apart from 0.5 cm of common bile duct. We clamped and cut off cystic duct by using one Hem-o-loc clip near to ampulla of

gallbladder. One Hem-o-loc clip was placed on near-end of artery of gallbladder and electrocantery was used to abruption. Gallbladder was removed by combining anterograde and retrograde method. Bile was extracted from upper section of choledochoduodenum by puncture. Then common bile duct was affirmed. Anterior wall of common bile duct was cut apart by using electrocantery. Blood was stopped properly. Anterior wall was cut apart about 10 mm to 15 mm vertically. Stone would be put into self-made specimen bag (made by sterile gloves) if stone was found at slit. Olympus CHF-P20 electronic choledochoscope was placed into common bile duct through puncture hole at right clavicular midline to probe. Stone in common bile duct was taken out by using stone-fetching net and basket. Internal and external bile duct was washed by normal saline repeatedly.

Nasobiliary drainage was placed under gastroscope after no tone residues examined by choledochoscope exactly. The first step: Under the operation hole of choledochoscope, banma guidewire (guidewire used for making ERCP, Boston Scientific Company from America, 0.035 mm) was placed into duodenal cavity through common bile duct and duodenal papilla. The second step: The assistants put gastroscope through oral cavity into descending part of duodenum (assistant should have skilful ability of operating gastroscope). Now, the banma guide wire can be seen from duodenal papilla. The third step: Endoloop was placed through gastroscope operation hole into duodenal cavity. Then the endoloop entangled banma guide wire. Endoloop was fixed. Then gastroscope was taken out gradually. The end of guide wire was pulled out from oral cavity to external body. The fourth step: Guide wire was pulled out for adequate length (the other end of guide wire at the outside of operation hole of choledochoscope). Nasobiliary duct was placed following guide wire (Ireland, Cook Company, 0.89 mm). Guide wire was pulled out from nasobiliary duct far from oral cavity, which was fixed. Guide wire was pulled backwardly by the operator of choledochoscope. The end of nasobiliary duct was extracted at incision location of common bile duct in abdominal cavity. The length was about 15 cm. The back of nasobiliary duct end was clamped by using forceps clip without wound (avoid falling off of nasobiliary duct during guidewire extraction process). Guidewire was pulled out from oral cavity. The fifth step: Nasobiliary end was placed into common hepatic duct. 3-0 absorbable suture was used to suture common bile duct interrupt. Nasobiliary duct was extracted from nasal cavity (the method was similar to ERCP) was similar to and fixed. The end part was connected with drainage pack. Nasobiliary duct was extracted when there were no bile leakage and tone residues identified by nasobiliary duct drainage radiography after five to seven days of surgery.

All patients were given liver function and B ultrasound examination in the first, third, sixth, twelfth month after leaving hospital. It was necessary to do CT or MRCP examination sometimes. To explicit whether stone recurred. Once re-examination every year after one year.

## Results

The age, sex, clinical symptoms, recovery during and after surgery of patients were seen as Table 1. All patients had no conversion to open abdominal surgery. The body temperature of one patient (2%) exceeded 38.5 degrees. No biliary leakage and acute pancreatitis were found.

**Table 1.** Patient characteristics and clinical outcome dates.

Variable	GNBD (n=50)
Age (years)	62 ± 11 (30-80)
Sex (Female) (%)	39 (78%)
Clinical symptoms (%)	
Biliary colic	50 (100%)
Jaundice	9 (18%)
Fever	6 (12%)
CBD (Common Bile Duct) diameter in US (mm)	13.4 ± 2.4 (10-20)
CBD stones ≥ 3 (%)	9 (18%)
Operative time (min)	126.6 ± 18.7 (90-180)
Intraoperative blood loss (ml)	82.6 ± 39.9 (40-200)
Inflammation or edema of the CBD wall	7 (14%)
Time to first flatus (days)	1.5 ± 0.6 (1-3)
Hospital stay (days)	7.5 ± 0.8 (6-9)

Values are mean ± SD (range) or n (%); CBD: Common Bile Duct.

The median follow-up time was thirty-three months (22-46 months). Only one patient had stone recurrence in the 23<sup>rd</sup> month after surgery (Table 2). This patient was male, 58 years old. He lost follow-up after surgery. He was admitted into hospital because of five-hour abdominal pain in the 23<sup>rd</sup> month after surgery. B ultrasound suggested choledocholithiasis. He was given this surgery treatment again.

**Table 2.** Complications.

Complications	GNBD (n=50)
Bile leakage	0
Fever	1 (2%)
Retained stones	0
Postoperative bleeding	0
Acute pancreatitis	0
Biliary stricture	0
Recurrent CBD stones	1 (2%)
Total	2

CBD: Common Bile Duct; NA: Not Available.

## Discussion

This study has improved existed minimally invasive surgery. Using LC, LEBDE, GNBD and primary common bile duct closure to treat cholelithiasis and choledocholithiasis. The results show it has advantages of quick recovery of patients after surgery, less complications, low remote complications, which is a worthy surgical method for clinical application.

With the development of minimally invasive surgery, laparoscope with endoscope becomes the best methods for treating cholelithiasis and choledocholithiasis [12,13]. The present minimally invasive treatment method was used widely, which not only has its indications and advantages, also has its disadvantages: First, LC, LCBDE, T tube drainage have disadvantages of long hospital stay, bile loss after surgery, long time of T tube placement and indwelling after surgery. Second, LC, LCBDE and primary common bile duct closure, its surgical indication is very narrow. Common bile duct is short of effective drainage. Spasm and edema of papillary muscle after surgery, inflammatory edema of lesion of bile duct mucosa and blood clot has formed, which can cause unsmooth of bile duct, bile leakage, stenosis of bile duct and acute pancreatitis. Third, LC, ERCP, EST, ERCP is conducted whatever before, during or after surgery, the effects of LC with ERCP/EST have no differences in treating cholelithiasis and choledocholithiasis [14]. But ERCP may induce biliary infection, acute pancreatitis, hemorrhage of digestive tract and perforation. Incision of Odd's sphincter can induce some remote complications of retroinfection of biliary duct, hemorrhage, stenosis of ampulla and cancer [4-6]. And the patients need staging surgery (ERCP conducted before or after LC). The cost is high.

In recent years, many randomized control studies suggest, LC with LCBDE are safer than ERCP/EST with LC. The cost of LC with LCBDE is low. The recurrence rate of stone after surgery is low [8,15]. ERCP/EST and LC are mainly used for treatment of high-risk patients, such as acute biliary pancreatitis and cholangitis and progressive increase jaundice [16]. Low-risk patients can select LC and LCBDE surgery, which can protect Odd's sphincter especially for young people [7]. However, the process of common bile duct incision for extracting stone may cause injury of biliary duct wall, edema of duodenal papilla, inflammatory exudates, which may cause high pressure of biliary duct [17]. Therefore, selecting primary common bile duct closure or closure after various drainage placement after incision of common bile duct is still a discussion focus.

T tube placement after stone extraction of common bile duct incision, which can lower the pressure of biliary duct, avoid the risk of bile leakage [18]. Mehmood study [19] finds that, during laparotomy surgery, patients with nasobiliary placement after failure of ERCP stone extraction compare with patients with T tube placement. The decompression function of nasobiliary duct is equal to T tube. The extraction time of

nasobiliary is shorter than T tube ( $6.515 \pm 0.905$  vs.  $11.727 \pm 1.536$ ,  $P < 0.001$ ). And the nasobiliary is more easily to be extracted safely. Patients with extrusion of early nasobiliary drainage duct after surgery have no bile leakage and biliary peritonitis. In addition, Cai and Zhang [20,21] find that, surgical indications of primary common bile duct closure include: first, the diameter of common bile duct is over 8mm. Second, wall of common bile duct and odd sphincter have slight inflammation and edema. Because patients with thin common bile duct, severe inflammation of wall of biliary duct, biliary peritonitis are easily have bile leakage. These patients need to lower the pressure of common bile duct and drainage [13,20-23]. LCBDE of patients in this group (7, 14%) have obvious edema in wall of common bile duct. But there is no bile leakage after surgery, which may has relations with nasobiliary duct drainage. Therefore, nasobiliary has function of lowering pressure of biliary duct effectively.

Holder placement of biliary duct is another effective method for stone extraction of common bile duct incision of laparoscope. One randomized control study of Vivek finds that, holder placement after stone extraction can shorten hospital stay effectively, promote recovery of patients' activity. And the complication occurrence isn't increase [14,15]. Then holder should be extracted under endoscope after surgery. There are risks for internal holder displacement, obstruction, perforation of duodenum [14,15,24-28]. Nasobiliary placement can avoid complications caused by internal holder effectively.

The advantages of nasobiliary duct under gastroscope during surgery have, first, expansion of indications of primary common bile duct closure of common bile duct under laparoscope. Nasobiliary duct has function of drainage, which can lower pressure of biliary duct and reduce occurrence of bile leakage. Second, it is not needed staging surgery. It also can shorten hospital stay and lower cost. Third, it can reserve the function and structure of sphincter without incision of Odd's sphincter.

**Disadvantages:** Surgeon should be familiar with gastroscope operation during surgery, or need cooperation of endoscopic department. The process is a little tedious.

**Surgery matters:** First, avoiding quick extraction of guidewire during process, in case of injury of duodenal papilla. Second, advising anaesthetist to observe trachea cannula when gastroscope is placed, in case of falling off.

## Conclusion

In conclusion, this research found that LC, LEBDE, GNBD and primary common bile duct closure may be effective surgical methods for treating cholelithiasis and choledocholithiasis, which have clinical application value.

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